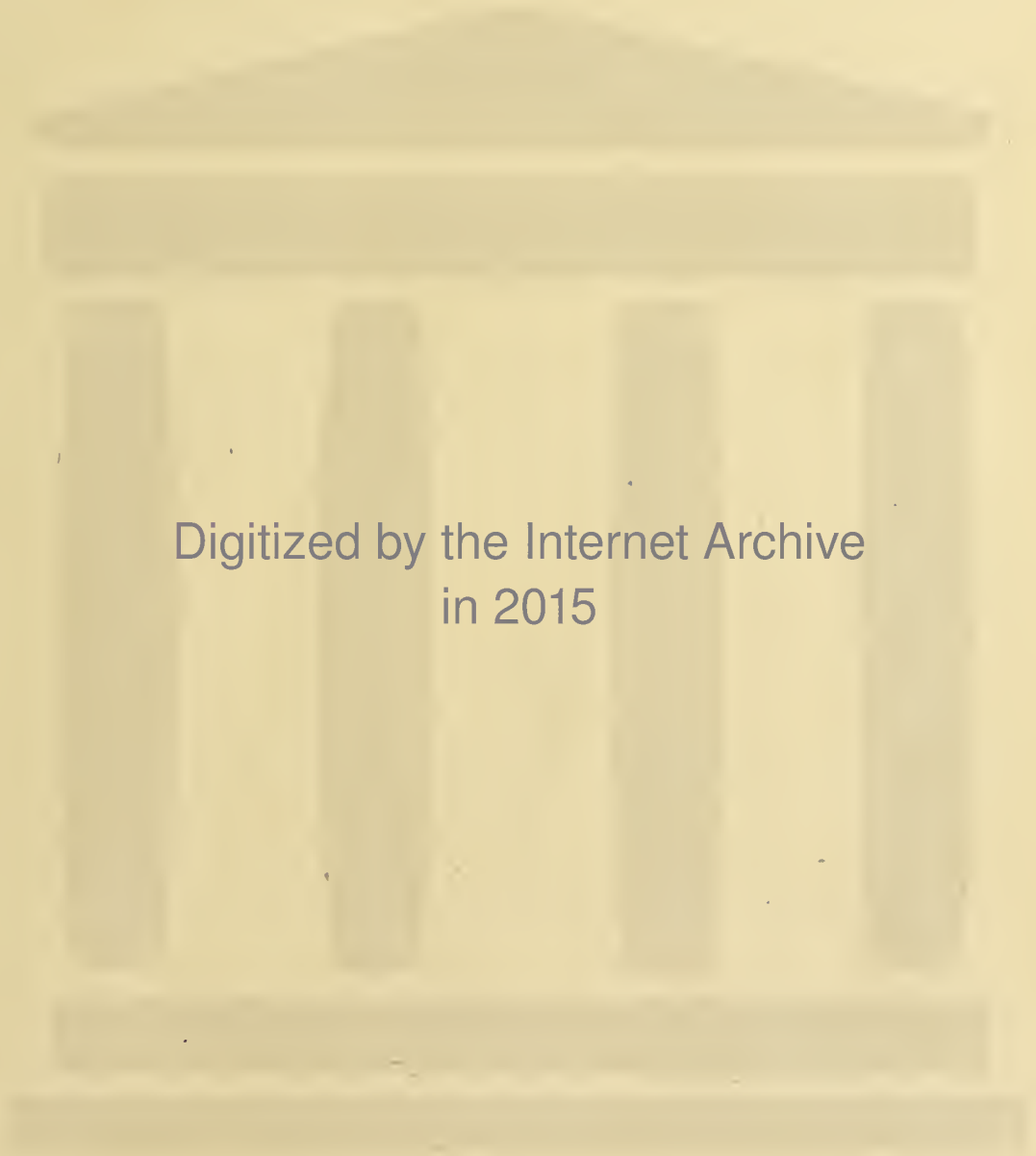




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THE BUILDING NEWS

AND ENGINEERING JOURNAL.

DECIDED VIEWS.

A REMARK made by Lord Rosebery the other day, that the art of thinking is what we ought to develop among our educational forces, can be very aptly applied to those who follow and patronise architecture. There is too great a tendency to accept the thinking of others. A man, he rightly says, becomes too often a walking reflex of the paper he reads, and independent thinking is dying out in consequence. Our architects and the public taste have been governed by a few authorities, who have carried them off their feet and out of their depth. By the quick succession of styles from all parts, the mind of the artist became deadened to art: he followed one, and then another style, till at length he became powerless to think out for himself the real problems of practical architecture. He was unable to take anything first hand, and to form an independent judgment upon it. We may well question if the facilities we possess in the form of reproductive processes and the publication of books and designs have not been instrumental in making a lot of cribs—in other words, of supplying all the thinking. Photography and its many reproductive processes, the professional Press, have all, like the cheap literature of the day, supplied the place of independent thinking, and made us “slaves of habit.” The architect who now gets the architecture of the whole world at his very doors is no longer compelled to think out any problem for himself. He goes straight to the plans of some other architect, and the man who avoids thinking for himself is generally a copyist. Others will not take the trouble to examine both sides: they fall back on the plans and opinions of others, rely on what authors say or on tradesmen’s circulars. Is it not easier to select an architectural treatment for an elevation than to design one *ab initio*? Well, of course, the commercial and business men at once avail themselves of the opportunity. The man of strong views is not one that would have stood much chance a few years ago, when everything seemed to be ruled by a respectable authority in professional circles as well as outside. Very few men dared to cast a stone on any of those verities of Philistinism which prevailed everywhere. Who would have thought of assailing stone or stucco by venturing to hold up terracotta or glazed bricks and tiles? Who would have preached a crusade against plaster or paint as a covering to our inside walls and woodwork, or impugned Institute traditions for handicrafts, or have cast a slur on professional education and schemes of examination? Yet all these opinions are held now. Some of them may appear heretical to the older men in the profession; but the art itself is none

the worse that so many different sidelights have been thrown upon it. Architecture is all the stronger and healthier for the expression of opinions, and for having within its ranks men of such diverse and opposite views. Every representative of thought finds his own level. He may be self-opinionated and pugnacious, self-assertive at first; but the time comes when his prejudices begin to be toned down and his rough edges rounded off. He is less influenced by the general impulse of fashion than were his predecessors, who were carried beyond their depth by the tide of general public opinion. Now each man, if he has any view at all, can feel his own feet; he begins to understand architecture in its true sense, not as a mere preference for a particular style or period.

In matters of building and taste, people who can think for themselves will always differ, and this difference is, after all, a healthful sign of life and movement. We can scarcely imagine a lull in public opinion now on any question. In architecture the only approach we have had to a perfect calm of opinion—when there was a general agreement as to what was worth imitation—was probably when the Classic Revival took place, when everybody seemed agreed that any departure from ancient Greek or Roman models evinced a common or vulgar taste. A period of architectural unanimity occurred once early in the present century in France, during the Empire, when everyone believed that the French Empire was the successor of the Empire of the Cæsars, and when every building, civic, ecclesiastical, and domestic, donned the dress of ancient Rome. In painting and sculpture it was the same: everything—furniture and decoration—were influenced by the pure Classicism of David and Canova. In this country a like unanimity in feeling and taste was experienced. Under the influence of French tastes, no one ventured to oppose the universal fashion that set in during the latter part of the 18th century. Architecture was under the domination of such men as Vanbrugh, Gibbs, Kent, Chambers, or the Adam Brothers. No one dared to think the Classic formulae were impossible or could be superseded; there were no questionings as to which was the most appropriate style for a church or a house when Inwood erected his pseudo-Hellenic church of St. Pancras, and other churches, town halls, and houses were considered incomplete without an Ionic or Doric portico. The period of Sir John Soane was certainly one of unquestioned faith in Greek and Roman, as a little later the Gothic Revival stemmed the tide of Pagan art and taste, and introduced a rival style. Then, again, all was quiet for a time. Soon other buildings besides churches acknowledged the common art creed. But these two instances are exceptions to the

rule of which we are speaking. Now everybody seems to have some opinion of his own as regards building and art. Unlike each of those epochs, there is no unanimity at all amongst any one large class of the profession. Then it was the fashion to be all Greek or all Gothic; now there are as many fighting for one style, or version of a style, as there are others fighting for another. Differences are more numerous than they were formerly. Instead of two styles or schools trying to obtain ascendancy, there are several art sects, each taking up a certain development of art. Our requirements—which are so many—have brought about a differentiation of opinion on almost every subject. We hear of opinions now expressed about a variety of questions, decided views on architectural education and practice, materials, construction, visible and concealed, colour and mouldings, decoration and sculpture.

We have one man strongly wedded to colour, which he presses home on every conceivable occasion. He generally takes a very decided view; the best architectural detail, mouldings, proportions, light, and shadow are as nothing to him. He asks, as Mr. Ricardo did the other day at the Institute, “who wants all the pomp of cornice, pilaster, architrave, and string?” The street would be all the wider and lighter and clearer without them. One strong idea with the colourist is that when you have a colour scheme you can dispense with mouldings. Certainly; where we have colour decorations, mouldings are out of place: they destroy and neutralise the effect of colour by the shadow they throw and by the light they divert. Yet a flat treated front in a street, relieved by bands of colour and inlays of material, would be monotonous in our long streets. Are not the projections of cornices and pilasters of some value in the long perspective of a street? At a little distance they give character and expression; again, in our grey smoky atmosphere the distant houses would be veiled, no trace of colour would be visible. Here the lines of shadow, horizontal and vertical, are the main relief to the eye, for we occasionally have sunlight. But again the colourist bids us to look at our finest buildings, St. Paul’s Cathedral, Somerset House, and even at the fast discolouring pile of the Law Courts, and glance at the dirty, sooty smears, the black, begrimed cornices, the dark and obscured soffits, the white and black streaked columns, half bleached, and the other half coated with soot. As for the sculptured ornaments and capitals, they are choked up with the same black carbonaceous matter entirely hiding these details. All this is very disheartening, yet the eye can still value as it does the grey lichen-covered rock or ruined abbey—the beauty of these features.

There are others who are equally decided in their opinions as to the employment of certain materials. Nothing but terracotta will do for one, and it must be of a certain colour and manufacture; everything must be in glazed brick or tile for another. No doubt these men are "faddists" of a sort: they are hard to please. The ordinary workman will not do for them: they want specially-trained artists—men who have done their work before, who understand their meaning and wishes, appreciate their whims. These leaders are still advocates and apologists of some phase of art which has probably been neglected in the past; they may be narrow in their art views and preferences, but they are leaders of a band or school of craftsmen who have the future of art in their hands, and whose influence is to correct or counterbalance some other tendency.

What would our architecture have been without our Pugins, Butterfields, Norman Shaws, and Waterhouses, each of whom has championed the cause of some style or the use of some material that had been neglected hitherto. "Decided views" in ornament and decoration have created discords: one man strictly follows nature, he goes to her for all his motives and methods; another takes his own intuitive ideas founded on a geometrical or logical motive. The man of decided views in decoration very often rides his hobby rough-shod over everything. Both the naturalistic and the conventional methods are logical and true up to a certain point, each being adapted to certain conditions. We have those who like to see an evolution in everything, even in decorative art, who, for example, can discern in the pattern of a spear-shaft the result of a series of changes, slight though they may be, from a human and grotesque figure to a simple conventional form.

A slight variation or amplification or degradation, proceeding from a human or natural form, may account in this way for the design on a vase. Such an ethnographic view of art is ingenious and interesting, but, of course, can be carried too far—so far, indeed, as to ignore creative modes altogether, and endeavour to discover a certain law of evolution which should guide the artist. So many men are ready to jump to a conclusion if it fits a pet theory; but even those men infuse thought and inquiry into artistic matters. Thus, too, we find on this principle men advocating an origin for all architecture from Nature or from Music. How much time and ingenuity has been wasted in attempting to show that the Greek and Mediæval builders used certain geometrical elements or ratios for their buildings it would be hard to say. These inquiries and investigations have not, however, been profitless. They have done good, at least, in directing attention to certain proportions and ratios which please the eye, and have instilled a love of principle in our architecture, and thus to some extent corrected the inclination of the capricious artist. Opinions are divided also upon other qualities—such, for example, as breadth and divided surfaces. A strong and growing school has decided in favour of simplicity and breadth, in design as a protest against repetition and fussiness, which qualities have become so pronounced. The man of decided views often offends the prejudices of his client. It may be that unintentionally he casts a slur on his taste or preconceived notion, that in pressing his own ideas he is apt to undervalue the advantages of other schemes or exaggerate his own opinions. At any rate, with all his faults, and he has many, he fairly represents the thinking party of his profession, and in so doing he rises above the level of those in the art who are content to accept the popular standard and opinions of the public in his profession.

PROTECTION OF BUILDINGS FROM LIGHTNING.

FROM the questions that are often put to us by correspondents, together with the very uncertain nature of the advice tendered in books and reports on the subject of lightning conductors, it is quite obvious that very little is known as to the actual value of a lightning conductor or system of rods in protecting a building from the electric discharge. It is very true, indeed, that every building of any importance or height is furnished with one or more of these metallic rods, and that presumably they are safer from injury by this cause than other edifices not so furnished. One of our correspondents, Mr. James Cooper, of Scarborough, in a letter we published last week, refers to a correspondence that has been going on in the *Yorkshire Post* on this subject, and he, like many others, have had an impression that a lightning conductor attracted the lightning or electricity, and conveyed it safely to the ground. The popular notion is that if a lightning conductor is put up at any high point of a building, no matter how large it may be, or however complex or composite a structure, the safety of the building is assured. The size and position of the rod, its connection with the walls of the building, what provision for earth, what points, &c., are matters which till lately have not been considered essential. The architect simply specifies a copper rod of a certain size to be put up in a given position, and that is considered sufficient. It is not enough to merely conduct the charge to earth, if the energy cannot be exhausted; the conductors must be sufficient to convey the charge harmlessly, as nothing is more dangerous than the repetition of these currents up and down and their disruptive effect on the building. We often hear of curious pranks played by lightning. It will follow the conductor for a portion of its length and then begin to knock holes in the walls of shaft or spire and take or make a more easy path for itself. We can only explain this behaviour by the supposition that there are less resisting paths for the current—perhaps the soot of the chimney, or some bolts in the masonry, a roof gutter, or a water- or gas-pipe. Then the architect is often puzzled by differing theories. There are many who only believe in a good earth connection—a necessary thing, no doubt—but not the only essential. To say that a "bad earth" affects the whole path or rod, and makes it so resisting that the current refuses to take it, can hardly be seriously entertained. Were it ever so good, side-flashes will occur from other causes. Others have considered the sky-end of a rod of primary consequence; that it should be well spiked with points of platinum, or cones of copper gilded. There are various kinds of points, simple and multiple, and many ideas of their value and form are heard of. Where the tension is high enough it does not much matter what kind of point is used, so long as it is sufficient to prevent fusion. The first requirement is to protect all the higher features, ridges, and pinnacles of the building. We can even imagine a single conductor to a large group of buildings to be a danger under certain conditions.

Again, the question as to the metal, size, and shape of a conductor is still unsettled. Some prefer copper, others iron; some think it should be a rod, others a ribbon, others, again, a bundle of detached wires. There are also differences of opinion as to whether it should be insulated from the building, or be in metallic connection with it. Copper is recommended by the late conference of experts, though galvanised iron is preferred by well-known authorities, Professor Lodge and Mr. Preece. Probably the flat ribbon has the advantage over a round rod. The theory has lately been maintained that the conductor should be connected with all the

metal in the building; but this, too, is still an open question; it may be undesirable to connect up some metallic structure like a verandah or balcony which people use. This latter consideration, of course, leads us to the broader question of the system of protection which is thought to be the best or safest. There is the old "collecting and carry away system," which finds favour with those who believe in the one conductor. The other and later system which has gained a large amount of credence is the "birdcage or meat-safe principle" of the late Clerk Maxwell, which suggests the inclosure of the whole building within a network of iron wire. No doubt the building so placed is perfectly safe from shock if the earth connection is sufficient at all points; but few architects would like to see their buildings encased by wires or rods. Recent experiments have not led to any very definite results; but they appear to show that a conductor should be of the same metal from point to root, that allowance must be made for expansion and contraction, that sharp bends and corners are undesirable, that to lessen side-flash the insulation of the conductor is necessary, as a conductor which passes within a few inches of an uninsulated piece of metal gives off a violent side-flash.

For the information of the reader it may be stated on a reliable authority that a conductor, if near any water or gas mains, should be connected to them, and if these pipes are inside the building, the conductor ought to be connected to their mains underground. It is better to have a number of points on a building, as along the ridge of a roof, than a few only. Every prominent part of the building should have a rod along it. Professor Lodge also observes that the "cheapest way to protect an ordinary house is to run common iron telegraph wires up all the corners and along all the ridges and eaves, over all the chimneys, taking them down to the earth in several places, and at each place burying a load of coke." All rainwater spouts and other outside metal ought to be connected. The same authority recommends that all pieces of metal ought to be connected to each other but not to the conductor; again it is stated that a conductor detached from the building is safer than one in contact with it. These are rules which can be safely followed, and have been endorsed by many of the latest authorities, including the War Department. The leading requirements of a conductor appear to be a proper number of points to dissipate a charge, or prevent an accumulation of a charge, a galvanised iron or copper conductor of ample capacity, a perfect earth connection buried in small coke. It is now generally agreed that a number of small rods, connected together by conductors carried along the main features of a building, provide a more reliable protection than the same amount of metal in higher rods at farther distances apart; but a more extended series of experiments seem to be necessary before the profession will give up the old and orthodox system of single rods on the gathering up and carrying away principle.

THE PASSMORE EDWARDS FREE LIBRARY, HAMMERSMITH.

LORD ROSEBURY on the 25th ult. opened the new public library at Shepherd's Bush, presented by Mr. Passmore Edwards. Lord Rosebery said those who watched the growth of the free public library system, in spite of the persistent opposition of ratepayers, had cause to inquire into their usefulness. Everybody saw predominance given to outdoor sport of all kinds; but a nation required brain as well as muscle. He would be told that brain was furnished by existing educational appliances. He did not wish to undervalue our public schools, either primary or secondary, nor the work the universities had done; so large was his toleration that he did not



LEIGH HUNT.



MR. J. PASSMORE EDWARDS.



THE TABLET.



CHARLES KEENE.

wish even to disparage the efforts of the Government in the cause of education (laughter); but even education would not give us all we wanted. What we wanted to develop in our race was the art of thinking, an art which stood a very good chance of perishing from amongst us altogether. The work of public libraries was a great counter-irritant to intellectual apathy, and induced readers to form their own conclusions and convictions apart from the first impressions of the world.

Mr. Passmore Edwards, in acknowledging the vote of thanks, congratulated the people of Hammersmith on the well-designed and substantial library that the architect, Mr. Maurice B. Adams, had provided. The new building,* the foundation-stone of which was laid on July 4, 1895, has a commanding frontage in the Uxbridge-road, on Shepherd's Bush Green, and is so contrived that complete supervision is secured throughout all departments by the officials. From the lending-library counter in the central hall, the attendant is enabled, by the glazed screens, to see all parts of the interior. Every room in the building is well lighted, and the public rooms are ample and commodious. They comprise a central hall for the lending department, a news-room, magazine-room, ladies' room, boys' room, reference-room, and large galleries for the storage of books. The first floor forms an admirable residence for the chief librarian, and the top floor is devoted to the storage of reference books. The work is carried out in English Renaissance style, with red brick and stone, and green-slatted roof, the memorial tablet occupying a conspicuous position in the main front. The entire cost, exclusive of site, is rather more than £6,000. The architect is Mr. Maurice B. Adams, F.R.I.B.A., and the builders were Messrs. Johnson and Co., Ltd., Wandsworth.

The portraits of the donor, Mr. J. Passmore Edwards, of Leigh Hunt, and Charles Keene, whose local associations with the neighbourhood are commemorated by the building, and the photograph of the tablet affixed to the return front, are reproduced herewith by the courtesy of Mr. Samuel Martin, the librarian, whose eminent fitness for the post he has accepted—that of “taster to the reading public,” as Lord Rosebery happily phrased it—is a matter of congratulation to the Hammersmith ratepayers.

THE TIMBERS OF AUSTRALASIA.—XI.

THE HARDWOODS: VIII.—WOOD-PAVING (*concluded*).

DURABILITY.—The life of the softwood pavements mostly used in London and elsewhere may be taken (from the large amount of English evidence on the subject) as averaging seven years, while that of hard stone setts (according to the experience already mentioned)

cannot be set down as more than five. On the other hand, the life of a close-jointed, hardwood pavement in Sydney is given by the city surveyor, Mr. Richards, in his pamphlet, “Wood-Pavements in Sydney, 1880-1893,” which he prepared specially for the New South Wales Department of Mines, Agriculture, and Forests, as follows:—“Making full allowance for depreciation and contingencies, the minimum life of wood-pavements, as at present laid, may be safely considered as about sixteen years, or from three to four times that of cube setts, while the maximum life may prove to be about fifty years, provided the blocks were of thoroughly sound timber.” In a paper entitled “Australian Hardwood for Pavements,” by Mr. W. A. Smith, M.I.C.E., Divisional Engineer of the Public Works Department of New South Wales, contributed to the (English) Institution of Civil Engineers, and subsequently printed and laid before the Colonial Parliament, the life in London of a properly-laid hardwood pavement is predicted to be “at least sixteen years, and probably a much longer period, before renewal of the blocks is necessary”—a period which Mr. R. R. Hickson, M.I.C.E., then Commissioner and Engineer-in-Chief for Roads and Bridges (N.S.W.), when he saw the paper, considered was altogether too short. The climate of Sydney, it must be remembered, is an extremely trying one to timber perpetually exposed, on account of the long spells of hot, dry weather, followed by very heavy rains, and of the frequent sudden and great falls in the temperature which take place. A wood-pavement would be likely, therefore, to enjoy a longer lease of life in a more even climate, and especially one less subject to violent rainfalls. By the mode of laying now adopted, however, the perviousness to excessive moisture is reduced to a minimum; while there is so little friction in the traffic, so little to loosen or shatter the blocks, and (owing to the slight elasticity of the wood) so little concussion to fracture or deteriorate the foundation, that experience with the most approved timbers appears to fully justify the belief that a pavement constructed of them, properly laid, and properly treated, would in London last, on an average, fully from twenty to twenty-five years.

Cleanliness.—In point of cleanliness there is no pavement that will bear comparison with one properly constructed of hardwood. As there is no surface disintegration, there can be no dust arising from it; while its non-absorbent character and its imperviousness to moisture prevent the absorption and subsequent exhalation (often after decomposition), as in the case of softwood pavements, of any objectionable fluid that may come in contact with it. All solid matter (such as horse-droppings) can be as easily removed from it to the street orderly bin as from asphalt, and it is not too much to say of the principal Sydney streets—not many years ago either a desert of dust or a morass of mud—that at almost any time, even a few minutes after a heavy fall of rain, a

lady might cross them in her satin ball-shoe without the risk of soiling it. The Sydney streets are permitted to be flushed by stand-pipe and hose service from the water main; but this is rarely resorted to, as it is regarded as not only unnecessary but undesirable. The Sydney mode of cleansing a wood pavement is to judiciously water (not flush) it and simultaneously sweep it at day-break, and afterwards (on “greasy” days) to lightly sand it over. The only dirt then possible (except what is purely extraneous), is the little dust arising, should there be wind, from the gradual pulverisation of the sand, which, after all, is “clean dirt.”

Noiselessness.—In Sydney, the term “noiselessness” is a relative expression—a mental abstraction—since no such thing exists there. Many complaints are made from time to time, in the Press or otherwise, as to the noise attendant on the street traffic; but few, if any, persons seem to be aware of the noise inherent in the place itself. I have never seen this written about, have never heard it spoken of, and have, therefore, never known an explanation attempted; indeed, if ever I allude to the existence of this peculiarity, I am looked at with astonishment. But that it exists is undeniable: it is noticeable in the houses as well as in the streets, and the reverberation attendant on the slightest sound is almost like that experienced in an empty building. In all probability the explanation lies in the fact that Sydney, instead of standing upon gravel, like many cities, or upon clay, like London, is built upon the solid freestone, the living rock, which, instead of deadening the sounds, as clay would do, intensifies them rather, and acts as a vast nether sounding-board. Consequently, while the wide-jointed pavements were still in use, the noise of the traffic was deafening to a degree, and it was scarcely possible to hear the sound of one's own voice in a cab or omnibus proceeding at a reasonable speed. But the adoption of the butt joint has changed all this, and the pavements are now as noiseless as any pavements in Sydney could be. They certainly compare favourably in this respect with both asphalt and macadam, and (in the opinion of those who know both) with even the soft wood pavements of London. At the time of writing these lines, there are two adjacent lengths of roadway in central George-street (the chief business thoroughfare of Sydney), in one of which the blocks have been relaid with close joints, while in the other they are awaiting that operation. The difference in the noise is altogether startling. In the relaid portion, the movement of the wheels of ordinary vehicles cannot be heard above the general hum of all busy traffic, and the only sound clearly distinguishable is the slight tap of the horses' hoofs upon the wood—a thing not to be got rid of with any pavement until we put in practice poor mad Lear's conceit, “It were a delicate stratagem to shoe a troop of horses with felt.”

Coolness.—The temperature, real or apparent, of a roadway is a matter that will appeal but slightly to dwellers in the Temperate regions of the United Kingdom; but as these lines will be read in many parts of the world thousands of miles from the British Isles, the subject should scarcely be passed over. Those who know anything of the summer in hot countries need not to be told of the extreme discomfort (and sometimes worse) arising from the glare, the radiation, and the great heat to the feet, of various kinds of pavement. Even the asphalted streets of Paris, as the writer remembers them when he last visited that city, in the hot July of 1878, possess unpleasant recollections for him; while in some of the Australian towns, where wood-paving has not yet been adopted—notably, in Freemantle, Western Australia—the glare to the eyes from the material of which the roadways are formed is trying in the extreme, and in American cities the unbearable, flame-like heat reflected from the asphalt, and even the granite streets, during the hottest weather is the theme of equally unfavourable comment by visitors and residents. Had such streets existed in Sydney during the late terrible summer of 1895-'96, the distress actually experienced must have been materially augmented, and the deaths from heat apoplexy in what may be called “Black January” far more numerous than they were. On the other hand, the wood-paved roadways of Sydney are absolutely faultless in this respect; there is nothing in the colour, surface, or texture of the material to either reflect or retain the light or heat of the sun's rays, and the paving is as comfortable and pleasant to walk upon on the most blindingly hot

* A general view from last year's Royal Academy appeared in the BUILDING NEWS for March 29th, and a detail of the main front was illustrated in our issue for July 6th, 1895.

day as the internal floor of a building. It certainly reflects no more heat than a common dirt-road.

Smoothness of Traction.—One important aspect of this matter has been already dealt with as noiselessness. But there are two others to be mentioned—namely, increased comfort in travelling and diminished wear and tear of vehicles (and, perhaps, of horseflesh also). On a point of this kind it is difficult, if not impossible, to furnish definite data and statistics, though probably in course of time the Sydney Omnibus Company will be in the possession of figures showing the saving in their 'bus wear through the adoption of the close-jointed pavement. But the difference between travelling over the latest-laid Sydney paving and many other kinds of roadway is almost like the difference between riding in springed and springless carriages, and it should be sufficiently apparent that the economy in the wear and tear of human nerves effected by a smooth unjolting transit must find a corresponding saving in the structural wear of the vehicles in which those nerves are carried. Mr. Isaacs states with regard to even a softwood pavement, that "it gives the minimum of traction with the exception of asphalt," thus according second place to a softwood pavement with grouted joints between the courses. It is, therefore, fair to assume that by using hardwood blocks with butt joints, the resistance in the traction is reduced to that on asphalt. Certain it is that the most ponderous loads of wool are hauled through the Sydney streets with apparent ease; and dray-loads of two or three tons drawn by single horses, from four to six tons drawn by pairs, and from seven to ten tons (or even more) drawn by four horses are no uncommon sights. The Sydney teamsters assert that on a perfectly smooth, clean, hardwood pavement they have only the strength of their waggons to consider, while on all other pavements they must regard the pulling power of their teams.

Foothold for Horses.—Closely connected with the above is, of course, the question of the foothold which hardwood pavements afford to the cattle traversing them. The city surveyor of London reports that the average distance which a horse may be expected to travel without falling is, on granite pavement, 132 miles; on asphalt pavement, 191 miles; on wood, 446 miles; while the injuries to horses and the obstructions to traffic are greatest on asphalt, and least on wood. In point of fact, it was found, as the result of observations on the respective slipperiness of asphalt, granite, and wood, extending over 50 consecutive days in the City of London, that the number of accidents were respectively as follows: On asphalt, 1,066; on granite, 719; on wood, 542. No similar returns are available for Sydney; but it is the rarest thing to see a horse down, and there cannot be a doubt that the present hardwood pavements afford a perfect foothold to the cattle, excepting on those days when there is just suspicion enough of rain to make all pavements "greasy," or where the gradients of the streets are steep. Both these cases, however, are effectually provided against by lightly sprinkling the surface of the blocks with sand early in the morning, as already mentioned. In Sydney this is generally done by hand, an expert being able, by a peculiar motion of the arm and wrist, to distribute a shovelful of sand over the entire width of the roadway with remarkable evenness; occasionally, however, a sprinkler is used, which is arranged in something the same manner as a watering-cart. Apart from the foothold afforded, there exists a certain amount of elasticity in even the hardest woods, which, slight as it may be, is still sufficient to afford an enormous saving to horseflesh; and, consequently, the hard and rather reckless driving of the Sydney "cabbies" seems never to tell upon their horses as the same driving would do over granite or stone cubes, over the vitrified bricks now used in the United States and Canada, asphalt so dear to the American, or even the good old-fashioned macadam. Drivers who have had experience of other cities speak in enthusiastic terms of the Sydney hardwood pavements, and Mr. Isaacs asserts that "in the event of a horse falling on wood pavement he can rise more easily than on granite or asphalt."

Hygiene.—That the softwood pavements employed in London are not only insanitary, but oftentimes offensive to the smell, there is abundant testimony on the part of engineers and surveyors, to which, however, it is unnecessary to allude more specifically in an English professional journal. When the hardwood pavements were first introduced in Sydney, many fears were

expressed lest a variety of disease germs should find a fertile soil in the damp or decaying wood, or in the deleterious matter absorbed by it or working into the interstices between the blocks. But all such evil predictions were falsified. No disquieting results occurred, and doubts upon the subject were finally set at rest by the scientific examinations and report made by Mr. McGarvie Smith, the noted bacteriologist, on the commission of the then Mayor of Sydney, Sir W. P. Manning, K.C.M.G.

31 December, 1894.

SIR,—I have the honour to report that in accordance with your commission dated 2nd October, 1894, I have made an examination of the moisture and mixture from beneath the wood pavements of Sydney, and have not found any pathogenic organisms present. The samples were taken from the wood pavements of George-street, between Bathurst and Park-streets, blocks laid in, apart, on foundations of concrete, joints grouted with tarred screenings and pitch; opened for traffic during October, 1893. After cultivating and isolating the organisms present, which consisted of bacilli and micrococci, I injected them under the skin of guinea-pigs, and in no case did they cause death. I made special search for the typhoid bacillus (which is only pathogenic in man), the diagnosing of which is determined by its growth and characteristic behaviour on the different soils and media used, but failed to find a single bacillus.—I have, &c.,

J. MCGARVIE SMITH.

H. J. Daniels, Esq., Town Clerk, Sydney.

When such a result as this is contrasted with that arrived at with the softwood blocks of Paddington, London, which Dr. Sedgwick Saunders found to be "saturated with organic matter, chiefly urine and horse-dung, and some having the appearance of a growth of fungi," further comment seems superfluous. In fact, the natural closeness in the fibre of the hardwoods, with the addition of the bath of molten pitch, renders them almost impervious to moisture of any kind; and so they cannot give off the "sickening odour" described as characteristic of the Victoria Station, London, and the neighbouring streets. Though Mr. McGarvie Smith's investigations were made with blocks from an open-jointed pavement, they could not have resulted more satisfactorily had the blocks been taken from the paving with butt joints now in use, and so carefully cleansed each day by the Sydney Corporation. From a hygienic point of view, therefore, hardwood pavements must be placed alongside asphalt, and declared to be in advance of any other kind of roadway known.

Economy of Construction and Maintenance.—In all such matters as paving, the crux of the whole business, in most British communities, is the question of cost. An impression prevails, I believe, in England and elsewhere, that our Australian hardwood pavements are so much more expensive than the softwood paving of London as to place them *hors de concours*. No doubt the first cost is higher; but so much greater is the durability, and so much smaller the cost of maintenance, that there would be a very considerable saving in the total cost in 21 years. A good many calculations have been made upon the subject; probably the simplest (and the most trustworthy at the time they were printed) are those put forward by Mr. W. A. Smith in a paper on "Australian Hardwoods for London Pavements," read before the Royal Society of New South Wales, and published by the Government along with the paper for London already mentioned, because Mr. Smith's London data are based upon an average of the figures given by a number of leading English engineers, surveyors, and others holding official positions (such, for instance, as Mr. H. H. Bridgman, Chairman of Commissioners of City Sewers).

But the markets have so changed since Mr. Smith prepared his paper—indeed, are so perpetually changing—that any particular set of figures could only be misleading (especially to those who at any time can have before them the latest English quotations); and estimates based upon the prices ruling in Sydney even at the time of writing, with due allowance for freight to London and all attendant expenses, might be completely falsified by altered facts ere these lines appear in print. I will, therefore, simply confine myself to stating that, on the basis of Mr. Smith's figures (which were, in a sense, fathered by the Government of New South Wales at the time they were made public), I find there would be a saving by the use of New South Wales hardwoods, such as black butt, instead of softwood, for London paving, of over £16,000 per mile of chain-wide roadway in every 21 years; and that, even allowing for a considerable increase in the prices of Australian timbers, the economy effected by the substitution would still be very large.

In addition to the actual money saving, there must be considered the indirect economy to the

public at large, effected by the less frequent arrangement of the traffic (to say nothing of the temper) for the purpose of repairs, while there is also the greater—

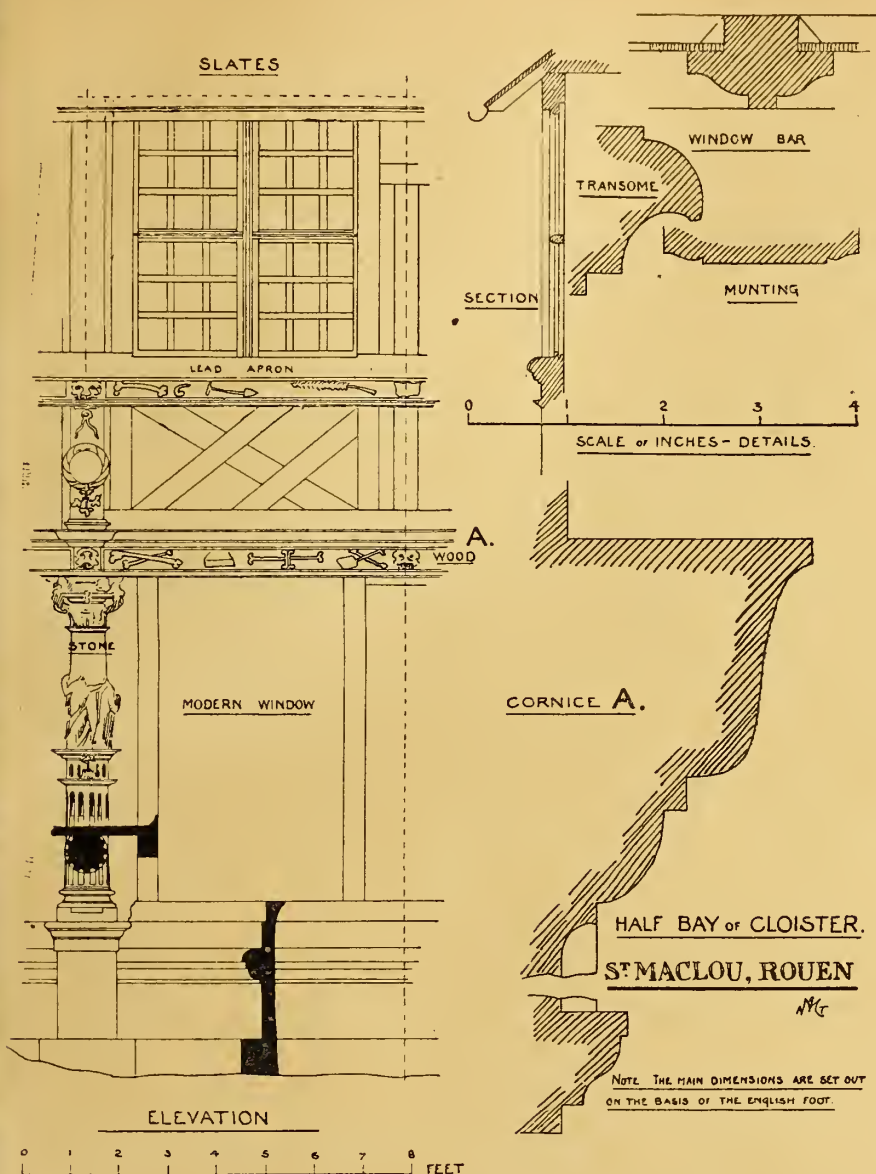
Facility of Repairs.—In cases where portions of the paving have necessarily to be removed to allow of the placing or replacing of gas, water, or drain pipes, coal-plates, tram rails, telegraph poles, lamp-posts, pillar-boxes, orderly bins, hoardings, and so forth, no other paving can be so easily or cheaply removed, and so perfectly restored, as wood-paving. In Sydney, as everywhere else, and as always will be the case until all principal streets of cities and towns are constructed with subways, the paving has often to be temporarily removed for one or other of these purposes, but no unsightly scars are left to mark the spot, and after a day or two it is difficult to discover the site of the operation. This particular advantage of wood-paving may not appear a specially momentous one; but, at all events, it is the converse of the "last straw" of proverbial notoriety.

Summary.—To conclude this article on wood-paving, and at the same time to finally dismiss the Australian hardwoods, I contend that hardwood pavements, as now laid in Sydney, principally of hardbutt, combine in the highest degree the following recommendations—viz., durability, cleanliness, noiselessness, coolness, smoothness of traction, foothold for horses, hygiene, economy of construction and maintenance, and facility of repairs. A material and process which, employed together, are capable, not only of bestowing a shower of blessings upon all street travellers, but of effecting a possible saving of £16,000 per mile of streets to the ratepayers of London every twenty-one years, are surely worthy the careful attention and consideration of English and other readers.

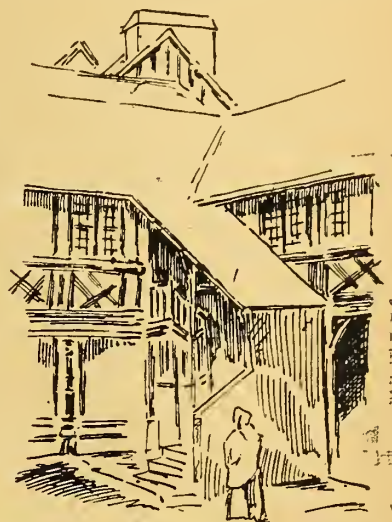
NEW GOVERNMENT OFFICES AT WESTMINSTER.

THE Select Committee appointed by the House of Commons last week "to inquire into the manner in which the sites available for the new buildings required for Government offices may be best appropriated" have a splendid opportunity for improving and beautifying one of the most important centres in the whole of London—to wit, the thoroughfare running from Trafalgar-square to the Houses of Parliament. The Committee, which commenced its investigations yesterday, is a good one, and its recommendations are bound to carry weight with the Government on the one hand, and the Legislature on the other. The Right Hon. A. Akers-Douglas, First Commissioner of Works, has been chosen chairman, and the other members are Sir Michael Hicks-Beach, Chancellor of the Exchequer; Mr. Herbert Gladstone, Sir Charles Dilke, Mr. Smith Barry, Mr. John Burns, Mr. Disraeli, Sir James Kitson, Mr. Legh, Sir Herbert Maxwell, Mr. Molloy, Sir Stafford Northcote, and Mr. Whitmore. We have at present two huge buildings as Government offices in Whitehall. The first runs from Dover House to Downing-street, and accommodates the Education Department, the Privy Council, and the Treasury. In the second room has been found for five departments—the Home Office, facing Whitehall; the Colonial Office and the Foreign Office, overlooking Downing-street; and the Local Government Board and the India Office, fronting Charles-street, Westminster. Nearer Charing Cross stand the Admiralty new offices, contiguous to Spring-gardens. But the other departments of the Administration are distributed about in the most unaccountable fashion. The affairs of the War Office are carried on under difficulties in Pall Mall, in a rabbit warren. The Board of Trade is inconveniently located in Whitehall-gardens; the Board of Agriculture divides its strength between Whitehall-place and St. James's-square, the Irish Office is situated in Old Queen-street, Westminster; and the Commission of Works in Whitehall-place. The public inconvenience arising from this scattering about of the various offices is obvious, and the question for consideration is how the evil can be cured.

No reasonable outlay will be grudged. Two sites are in the possession of the Crown, and both can be instantly utilised for the public advantage. The first is the Carrington House site, opposite the Horse Guards, in Whitehall, only a few insignificant leasehold interests remaining to be extinguished. For years past the place has been surrounded by an unsightly hoarding, and it would



cornice A is 12in. deep, the frieze above it 2ft. 6in.; the second cornice also 12in., and the windows of the upper floor measure 5ft. by 4ft. 6in. Here and there slight variations are found, due apparently to settlement or



The Cloisters of St. Maclou, Rouen.—(From a Sketch by Mr. J. D. Mills.)

decay; but, even allowing for these, the prevalence of the "round-figure" English dimensions is curious.

MUNICIPAL ENGINEERS AT BRIGHTON.

THE annual meeting of the Incorporated Institution of Municipal and County Engineers was held at Brighton yesterday week. Mr. May, borough engineer of Brighton, president, occupied the chair, and there were present the engineers of most of the leading municipalities in the kingdom.

Professor Herry Robinson, of London, read the first paper on the subject of "River Pollution." He said the subject was entering upon a new phase, and in the immediate future remedies would be enforced to prevent the continuance of the pollution of rivers. From 1876 (when the first Rivers Pollution Prevention Act was passed) until the last few years, the powers that had been conferred by Parliament to prevent river pollution were not only too permissive a character, but, as a matter of fact, those who had to enforce them were generally the very offenders themselves. The Local Government Act of 1888, however, gave county councils power to enforce the Rivers Pollution Prevention Act of 1876, and it enabled the Local Government Board to form joint committees to deal with river pollution. In 1892 the Mersey and Irwell Joint Committee obtained an Act, which was followed, in 1894, by the West Riding of Yorkshire Rivers Act. By these Acts a step in the right direction was made. The Bill now before Parliament indicated a further advance, as it would extend to all county councils the main provisions of the Mersey and Irwell and Yorkshire Rivers Acts. The admission of liquid manufacturing refuse into sewers had often increased the difficulties attending the treatment of sewage at outfalls, and had often led to abuse of the sewers. In future, however, it was to be anticipated that these facilities would be very much curtailed, inasmuch as the Local Government Board had on two recent occasions required schemes to be amended in which a large amount of manufacturing refuse was proposed to be admitted to sewerage schemes. Those who had now to advise in regard to sewage disposal works should bear in mind that the best practicable and available means of dealing with sewage must not be based upon that which was accepted only a few years ago. In fact, many existing outfall works would have to be rearranged in the light of recent experience, as a higher standard of purity of effluent was now more readily attainable than heretofore.

Mr. H. Percy Boulnois, city engineer of Liverpool, read a paper on "The Disposal of Utilisation of the Residue from Towns' Refuse Destroyers." He said the question of the disposal of this residuum was important as bearing upon the cost of destruction of house refuse, as

SOME MINOR EXAMPLES OF THE FRENCH RENAISSANCE.*—II.

By G. A. T. MIDDLETON.

THE CLOISTERS OF ST. MACLOU AT ROUEN.

SITUATED behind the church of the same name, amidst narrow streets of beautiful half-timber work, and yet but rarely visited—for they are difficult to find—are the cloisters of St. Maclou. They are similar to an English cathedral cloister in inclosing a quadrangular space, but differ essentially otherwise in that they do not merely form the ambulatory of a monastic building, but are themselves a nunnery, containing all the necessary rooms of such an institution—one of the most important being a school. Further than this, they are of half-timber, with occasional stone columns, and of two stories.

On first entry into the courtyard the impression received is that of quaint tumble-down mediævalism, which Mr. Mills has attempted to convey in his sketch of one of the external staircases in the corners; but further inspection and careful measuring of the details bring to light architectural qualities of a higher order than mere picturesqueness. There has been careful proportioning, and as much thought for the mouldings as in more pretentious works, the stone columns being particularly suggestive, in spite of the sculpture being in every case defaced—unlike the carving upon the wooden friezes, representing bones, skulls, and instruments of torture, and so showing the place to have been of Jesuit establishment.

It is remarkable that all the principal dimensions are based upon the English foot. Each bay is 13ft. wide, the stone columns are 7ft. high, including base 9in. and capital 12in. deep; the

* All rights reserved.

be a relief to see it occupied with a structure worthy of the locality. The second is the Parliament-street site, overlooking the Palace of Westminster and the Abbey. Already a Bill is nearly through the House of Commons for the purpose of enabling the Office of Works to acquire—compulsorily, if need be—the block of buildings bounded by Parliament-street on the one side and by King-street on the other. In due time this block will be demolished, and then there will be placed at the disposal of the Government a vast area running almost up to St. James's Park on the west and Great George-street on the south, save and except the new Institution of Civil Engineers, with which probably it will be unnecessary to interfere. The business of the Select Committee is to recommend how the sites shall be appropriated. That both will be occupied is certain—the question of immediate interest is how.

One Royal Commission and several Select Committees have sat within the last thirty or forty years. The earlier committees recommended the grouping of the Government offices at Westminster. The later ones, however, urged that the War Office and the Admiralty should be as nearly as possible under one roof, whilst the Harrington Commission insisted upon the inconvenience from an administrative standpoint of the two great defence departments being so much scattered about. The Select Committee presided over by Mr. Akers-Douglas would, we think, be justified in setting the Carrington House site apart for the new War Office. That decided upon, there would be no alternative but to devote the space behind Parliament-street to the housing of the Board of Trade and some minor departments. The widening of Parliament-street would be a boon, for the new building would be so designed as to run in a straight line from the Home Office down to Great George-street.

up till now, in nearly all cases, it had had to be treated as a waste product, which required to be either carted or barged away as a useless material. He was now dealing with the clinker and ashes produced by the 24-cell destructor erected at Liverpool for the purpose of making clinker concrete flags under hydraulic pressure, which had been very successful. The clinker was broken in a small crusher to about $\frac{3}{4}$ in. in size, and this was mixed by hand on an ordinary banker in the proportion of one part of cement to three-parts of broken clinker, the compo being mixed very wet. About 45 yards of slabs were manufactured per day, the cost being 1s. 7 $\frac{1}{2}$ d. per yard, without reckoning the saving in using the clinker. Some of these slabs had been laid twelve months, and showed no sign of wear, but sufficient time had not yet elapsed to enable him to say whether they would last as long as Yorkshire or other natural stones; but he was of opinion that they would, and, owing to the porous material with which they were made, they had a foothold much better than the natural stones.

Mr. J. H. Brierley, borough surveyor of Richmond, Surrey, read a paper on the housing of the working classes.

CONCERT-HALLS AND ASSEMBLY-ROOMS.—XXII.

By ERNEST A. E. WOODROW, A.R.I.B.A.

THE provincial music-hall demands as much attention as the London theatre of varieties, and some fine examples are to be found among the wretched places which are scattered broadcast over the whole of the country towns of

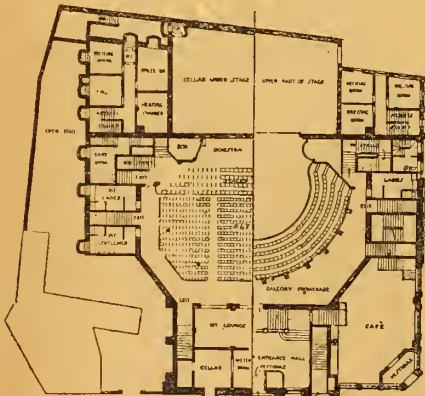


FIG. 1.

Great Britain. The ordinary provincial music-hall is too dreadful to think about; as a rule it is extremely dangerous from a fireman's point of view, it is vulgar in treatment, ill ventilated, badly lighted, and generally a place to be avoided.

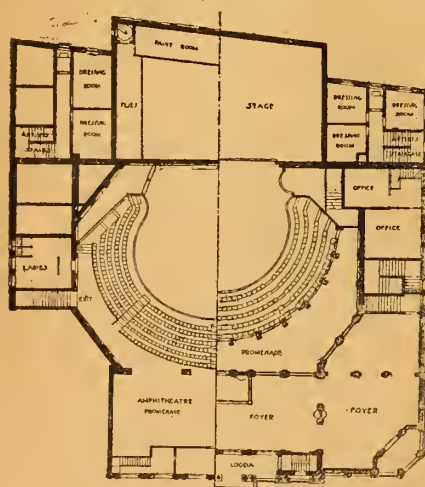


FIG. 2.

I have said that there are some fine examples to be found, and one of the best is undoubtedly Messrs. Darbyshire and Smith's building in Manchester, the Palace of Varieties, Figs. 1 and 2. Here the architects were guided by the initial condition

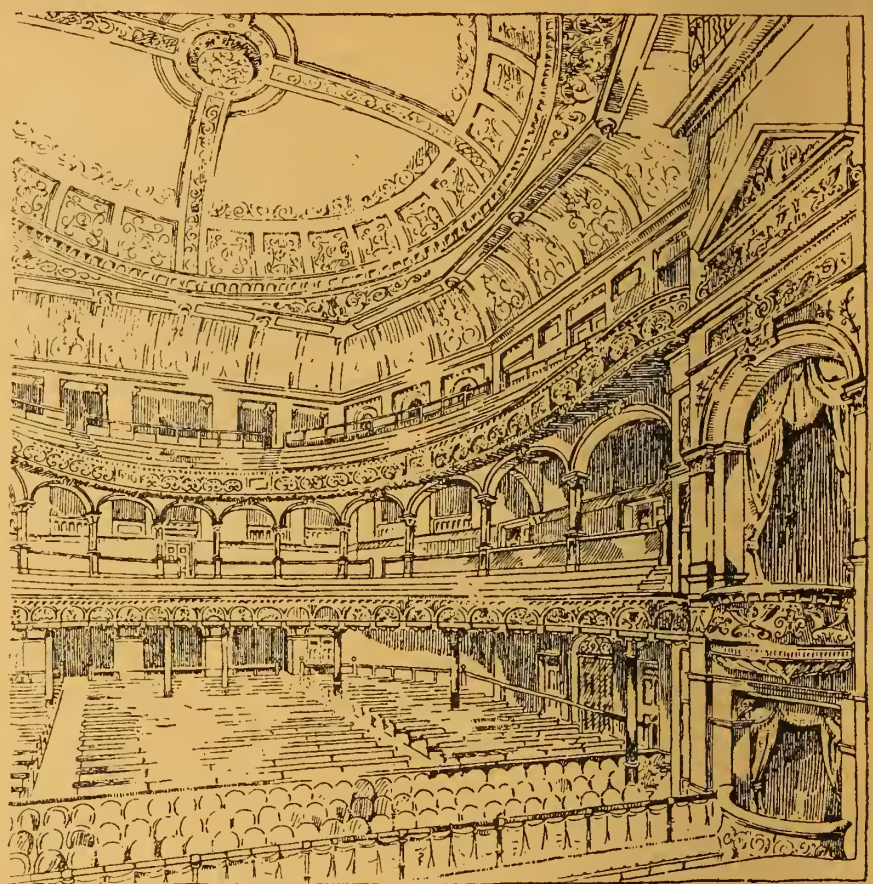


FIG. 4.

of safety—namely, isolation, and the Palace stands in an open space. On the ground to the left, away from the hall, are placed the dangerous elements of a hall—the lime-light tanks, electrical plant, carpenters' shop, and workshops. The general arrangement of the plans is symmetrical, and the simplicity of the arrangement of exits from each tier shows that the designers were well aware of the advantage of having both sides of the house arranged alike. There are no tricks in this plan; it is one that can be taken in by the audience at a glance, and a building in which they would therefore feel safe.

The general scheme of the plan has been

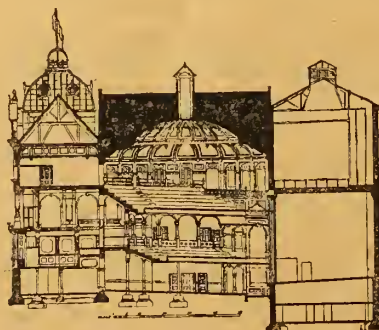


FIG. 3.

governed by the old Greek form of the semi-circle, which brings the seated audience nearer the stage, and allows for the addition of a wide promenade behind the seats, a provision almost essential in this class of building. On examining the section, Fig. 3, it will be seen that a large foyer extends the entire length of the back of the auditorium. This is slightly raised above the heads of the promenaders, so that occupants of the foyer have a full view of the performance.

Fig. 4 is a perspective view of the auditorium. The ceiling is a cove in form, surmounted by an elliptical dome 60ft. above the area floor. The auditorium is 90ft. wide and 66ft. deep. The stage is large enough for the production of the most luxurious spectacle or ballet, being 66ft. by 40ft., with a proscenium opening 36ft. wide by 32ft. 10in. in height. The highest point the

audience can reach from the street is 33ft. 6in. The cost of the building was a little over £40,000, and the seating accommodation is for 3,078 persons. The construction is fire-resisting, the tiers being made of concrete upon steel canti-

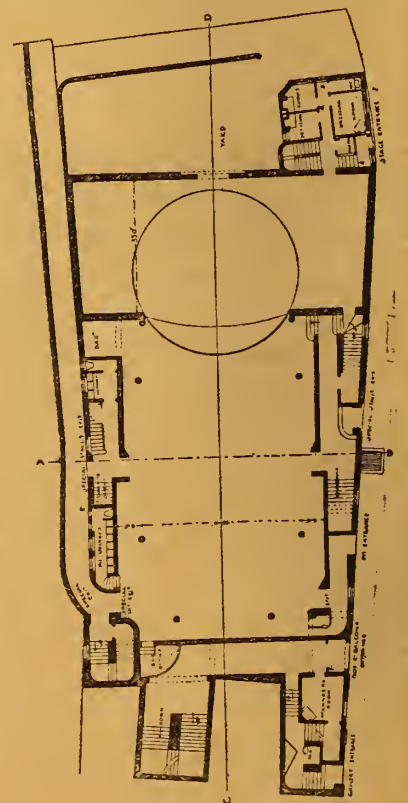


FIG. 5.

levers, so that no columns come between the seated audience and the stage.

Figs. 5, 6, and 7 are of the Bristol Empire, a provincial music-hall of a smaller type than the Manchester Palace, but one none the less im-

important, as representing a class rapidly increasing in provincial towns to supplant the dangerous structures which have done duty in the past. Messrs. Wyllson and Long are the architects of this hall, which was originally intended to include a circus, as shown upon the plan, Fig. 4. where the ring is formed by removing a portion of the stage. This intention was, however, subsequently abandoned.

There is a large pit or area floor, as being the part most frequented in places of this kind. The area is 81ft. 3in. deep by 52ft. wide; from this part there are four exits. Immediately over the pit is the balcony, consisting of six rows of seats, with promenade and raised buffet in the rear; above this is the gallery. The Empire is said to be one of the best music-halls of its class in the provinces, and the architects have designed it in an appropriate Free Oriental style, which readily adapts itself to the internal and external decoration of the building, the colour scheme of the auditorium being in warm tints, in which red and blue predominate. The size of the stage is 72ft. wide, with a depth of 32ft. The holding

There is not sufficient room to move about, there is unfortunately no promenade, thanks to the authorities, and the communication between the tiers is not what one would demand in designing a music-hall on the same scale. As an opera-house, its one great and fatal defect was the smallness of the stage, which did not allow the constant change of scenery demanded in opera-houses. The lack of room meant increased labour in mounting and unmounting the scenery, and the expenses spelt ruin to the undertaking. So now we have the palace as an assembly hall for variety entertainment. I do not agree with some that the Palace was too good a building to be turned into a music-hall, but in many respects it

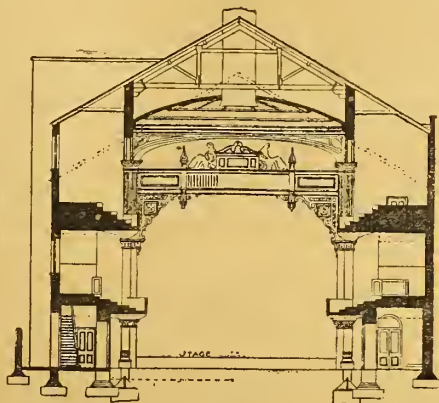


FIG. 7.

is inappropriate because designed for another purpose. Its excellence in design is not lost, but its lack of accommodation for a moving audience is manifest, and this is perhaps greatly due to the licensing authorities. My argument that a beautifully designed building will influence the class of the audience is confirmed by the example of the Palace. Here alone a great lesson can be learned: that it is worth while for both the architect and the clients to put forth every effort when designing these buildings; it is time and money well invested.

The licensing laws appertaining to music-halls are, for the most part, a survival of very old legislation, which is not at all applicable to the present state of society. Architects practising in this class of building are at the necessity of studying the laws of licensing and the ways of the various authorities who issue these licenses.

Music-halls have to be designed in accordance

even oftener. One year he may find it possible to build the music-hall with extensive promenades and refreshment bar, &c., on every tier, while the very next year, if he were to make the same application, he would be promptly refused. There is great variation in the rules which govern these demands, as in one place a

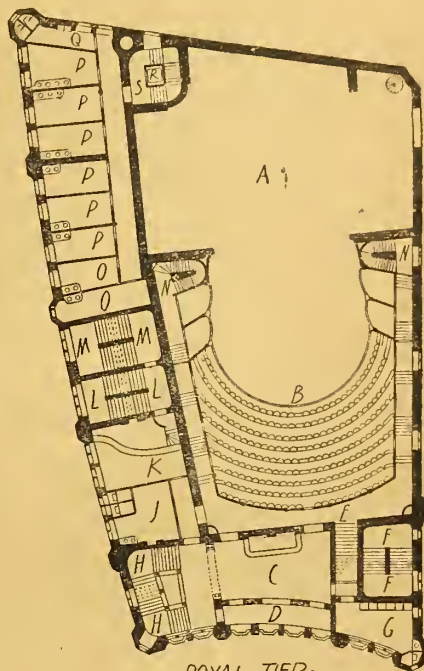


FIG. 8.

promenade will be permitted, while in another it is forbidden.

The obtaining of a music license for a music-hall does not carry with it the Excise license. The proprietor has not only to obtain the music license, but from another body he has to obtain the drink license. In the theatre this is different, as the license granted for the holding of stage plays covers also the right of a license for the sale of intoxicating liquor for the refreshment of the audience who come to witness the play during the time the theatre is open. Some people think that because a theatre has an Excise license liquor can be sold there at all times in the same

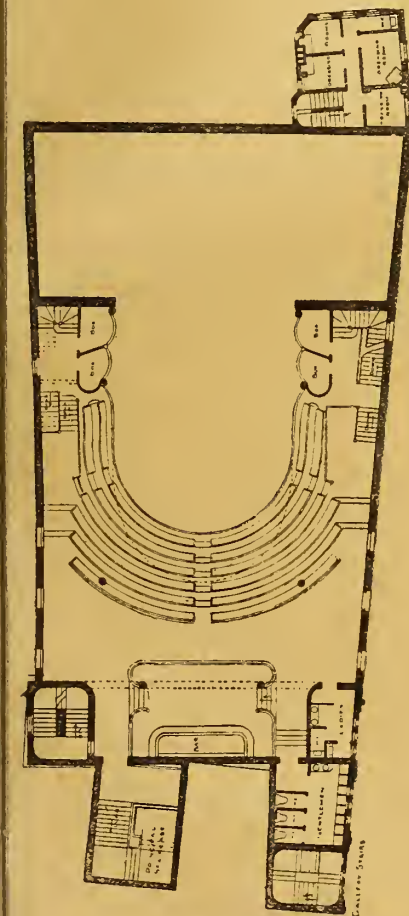


FIG. 6.

capacity of the auditorium is 1,376 persons, seated as follows: Pit 338, stalls 218, balcony 246, gallery 542, private boxes 32.

These two examples, I think, will suffice to show the character of building which is now being erected in the provinces as a music-hall. They differ in many respects, the one having an auditorium nearly square on plan, while the other is an oblong. The one may be truly included in the type of theatres of variety, while the other is essentially a music-hall of the better class.

My next illustrations, Figs. 8 and 9, are of the Palace Theatre, London. It might be argued that, being built as an opera-house, this is not a music-hall. Yet I include this house in my series, to see what useful lessons we can gather from the fact that a house built for one purpose has been used for another.

The Palace Theatre stands almost alone as a place of entertainment where a music-hall performance is given. In spite of descending from an opera-house to a music-hall through changes of fortune, it has maintained a character which the beauty of the building demands. There is nothing vulgar in the surroundings of the Palace. As a music-hall the building has its defects.

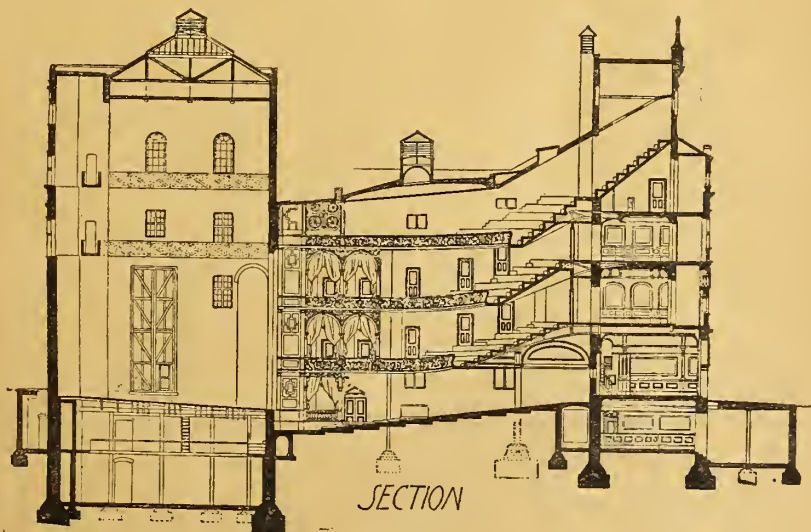


FIG. 9.

with the requirements of the licensing bodies, and it is because of the tendency these have towards faddism that proprietors prefer the licensing being in the hands of permanent justices whose views on these matters are not likely to change from year to year.

It is extremely difficult for an architect to design a building to please an authority whose views change with each triennial election, and

manner as in a public-house; this is not the case, intoxicating liquor can be sold only to people attending the performances.

In music-halls the license is continuous, as we have seen a public-house often forming a part of the hall, and perhaps being the original cause of the erection of the hall. Another point which may interest architects in reference to licensing matters, which is suggested by the above remarks,

is that when an addition is made to a licensed building it is not necessary to apply for a new license, but merely to place the plans before the magistrate, and ask him for an extension of the existing license, a very much easier thing to obtain than a new one. When the license is granted it embraces the whole of the building, and when it is enlarged the license grows with it, and if the plans are satisfactory the justices cannot refuse to grant the extension.

A curious case came before my notice a short time back, where an extension was being made to a theatre, and such extension was for workshop and office for the theatre. In the lease for the land upon which the block was to be erected was a clause inserted by the ground landlords to the effect that the land was not to be in any way used for the erection of a public-house. As the theatre held perforce an Excise license, the license had to embrace the addition as a natural consequence, and it was some time before the ground landlords could be made to see that this extension, although holding an Excise license, could not be used as a public-house, being part of a theatre. Of course, the lessee was powerless, as whether he liked it or not the license had to grow with his building.

Another and very important thing with regard to licensing matters which the architect should not forget, that where he is making alterations to a licensed premises, however small and unimportant the alterations matters not, he must deposit plans and obtain the consent of all authorities concerned, and he will find the authorities having a voice in the consent as numerous. Each of them will want a set of the drawings, and some of them will require duplicate sets, returning one set marked as approved. In a case which lately came under my notice, no less than six authorities had to be satisfied before a small addition could be made to a licensed building. The worst of it is that the various authorities do not always quite agree in their requirements. Such is the muddled state of our licensing laws.

SUTTON-IN-HOLDERNESS.

IN the midst of many pressing and very diverse occupations, the superintending architect of the London County Council, by dint of industry and enthusiastic research, has produced an archaeological and critical chronicle of the Manor of Sutton-in-Holderness, the Berewic and Village Community, which must be considered not only as a valuable contribution to the local history of the East Riding, but, by reason of the important character of the great port of Kingston-upon-Hull, Mr. Blashill's record of its developments and changes ranks as a work of very general interest to the antiquary and historian.* The district known as the Isle of Holderness, extending beyond the eastern slopes of the Yorkshire Wolds, presents a vastly different prospect now to that which was familiar to its ancient inhabitants. Instead of the broad, low-lying plain extending from the Wold foot to the comparatively high ground of Holderness, a wide tidal inlet or hollow branched northward from the Humber past Beverley and Driffield, and so curved round towards the sea, in the direction of Bridlington Bay. The depth was comparatively shallow; but in width its expanse was three times that of the Humber at Hull; thus parting in a dreary way the naze, or ness, or promontory from the Wold country. Gradually the salt grass of the shore encroached upon these mud flats, as the flood tides towards the end of the eleventh century visited their shores more rarely, and sooner hurried away. The enterprise and organisation which followed the Conquest turned the surrounding waste into green pastures, four times as extensive as the ancient cornland, meadow and marsh in these parts. The process was naturally a gradual one, and the author of this painstaking volume traces the progress of the reclamation of the Ings and Carrs, which added to the farms of Sutton, and increased the proportions of the oxgangs of tillage. There was then no town of Hull, no market for cattle until at a later date, when the foreign demand for wool rendered sheep-farming more profitable. The monks of Meaux, in the chronicles of their abbey, furnish what knowledge is obtainable about the earlier lords of the Manor. Their record is full of interest, and

the story of the Sayers of Sutton brings the reader down to the times of the Sir Johns de Sutton, and as a frontispiece, Mr. Blashill gives an illustration of the tomb of Sir John, junior, who died in 1357. This monument stood in the choir at Sutton, in the central place, frequently chosen for the tomb of the founder of a church; but 25 years ago it was removed. A plan of the church is given, and also a view of the building as it appeared in 1830. The contemporary photographs of the church add much interest to the book, though the edifice has been much modernised. An interior sketch in 1848 shows the tester-covered pulpit, which stood on four columns over the central aisle of the nave, and the reading-pews for parson and clerk were located on the north side, where the pulpit now stands. A very similar pulpit from Humbleton, near Preston and Burton Pidsae, in Yorkshire, was illustrated in the *Building News* for Jan. 5th, 1883. Sutton church with its incongruous arrangements, seems to have been long neglected, like the sacraments, and the men attending services removed their hats only at that time, but at no other. Other old customs continued unaltered, and furnish Mr. Blashill with much entertaining information, which serves to enliven the more serious incidents and details which mark the history of Sutton-in-Holderness.

THE RELATIVE EFFICIENCY AND COST OF PLUMBERS' WORK.

WE have received an advance copy of the report by the Special Commission appointed by the Editors of *The Lancet* to inquire into the reasons why so large a number of insanitary houses are in existence. Three reasons are suggested: (1) The general indifference of the majority of the public, (2) the prevailing rage for cheapness, which leads to the employment of unqualified or unscrupulous men, and results in scamped work, and (3) the heavy cost of doing such work efficiently. The first reason is not discussed at length, as it is felt that the public are gradually being educated upon this subject. The second and third reasons (which are almost identical) are made the subject of an exhaustive inquiry, commencing with the architectural profession, and extending through the building and allied trades. The writers point out that since the general adoption of the present contract system, houses are not, as a rule, substantially finished, and the work is not of a satisfactory character. The usual method of training the young architect is called in question, particularly as to the way in which his knowledge of prices is generally obtained—namely, from the lowest tenders received from competing firms, such prices being often delusive, and not representing the actual cost of production. The present system of contracting is denounced as contributing to bad work, owing to the appeal made to the speculative or gambling instincts of those tendering, and also to the lack of inducement to maintain a high standard of efficiency. The one object of the contractor under the present system is to execute work cheaply in order to secure employment. Thus the interests of the architect and the contractor are opposed, and friction is caused—not infrequently to the detriment of the work. Sub-contracting, also, is oftentimes another evil, and in not a few cases “scamping” is the result.

The suggestion of a remedy for this state of the building trade is left by the commissioners to those who administer its affairs and who execute such work; but it is pointed out that, although an architect's opinion as arbitrator upon values in an account is considered sufficient in a court of law, yet upon the value of an estimate to execute work it is seldom accepted by a client until a number of men have first been invited to bid one against the other for the execution of the work. The third reason—viz., the excessive cost—forms the bulk of the subject-matter of the inquiry. After alluding to the strained relations existing between the public and the plumber, the Commissioners proceed to discuss the responsible position of the sanitary expert, and the inducements which lead him, for the protection of his own reputation, to condemn all houses unless fitted in the most approved manner.

The details of working a plumber's business are next discussed, with a view to ascertain what is a legitimate profit. It is pointed out that the 10 per cent. profit rule may be fair when applied to large contracts, but that it is quite inadequate in the case of small contracts. While the assump-

tion that a plumber's business has an average turnover of £6,000 a-year is in excess of the average, it is pointed out, after allowing for working expenses, any man who works at the usual prices cannot, with such a turnover, make more than £300 a-year, or 5 per cent. clear profit on the year's work. An endeavour is made to form a standard of prices for good sanitary work, and at the same time to illustrate and explain the system that at present finds acceptance with the leaders of the plumbers' craft, the architectural profession, and medical officers of health. Sets of plans of typical defective town houses are provided, and reports are furnished illustrating the condition of each. The suggested improvements are enumerated, with the reasons for their adoption; and the priced bills of quantities for putting the houses into efficient sanitary repair are added.

The first two examples are terrace houses, having the same accommodation; but, owing to the difference in structure, one is found to cost nearly a third more than the other to put into proper sanitary condition. The third example relates to a small suburban semi-detached villa. A few general observations sum up the inquiry, in which the “jerry” builder, owing to the want of proper supervision in the past by local authorities, is referred to as the principal cause of the unwholesome state of too many of the houses in this country. A system of house-to-house inspection, especially for the poorer class of property, is recommended, as is also the employment of only registered men for dealing with plumbers' work. The conclusion arrived at by the Commissioners is that good work, although expensive, is in the end the cheapest.

The whole of the report has been submitted to a committee appointed by the Worshipful Company of Plumbers, who offer various criticisms and suggestions with regard to it. The Plumbers' Company Committee consider that the reasons stated in the *Lancet* report for the frequency of bad, defective, and insanitary work are generally correct. The defects indicated as existing in the typical houses dealt with in the report are, they add, of the kind commonly met with, although rarely, if ever, present in the same building at the same time, for houses so insanitary would probably be uninhabitable; therefore the defects may be assumed to be grouped under one roof merely for the purpose of illustration. The committee regard the recommendations made in the report for new and altered work, respectively, as consistent with the requirements of modern sanitation and fairly represent the sound plumbing practice of the present day.

The prices and particulars stated in the estimates attached to the report are also approximately correct for sound work in conformity with modern sanitary requirements carried out in houses of the construction illustrated in the report and situated in London. The committee point out that prices for work executed out of London vary considerably—sometimes downward, from local wages being lower than those paid in London, sometimes upward, from travelling expenses and allowances being paid to workmen. The prices stated are liable to increase apart from fluctuations in the price of materials—some items to considerable increase, if the work specified were carried out in sections instead of at one time. On the whole, they express approval of the scope and in the conclusions of the report.

Mrs. Wilhelmina Moffatt, widow of the late William Lambton Moffatt, architect, of Edinburgh, died on June 24th, in her 91st year.

On Wednesday week the foundation-stone of new national schools in Claypit-street, Whitchurch, Salop, was laid by the Rev. W. H. Egerton. The building will cost nearly £3,000, and will provide accommodation for 508 children, 254 of each sex. Mr. Geo. Dodd, of Whitchurch, is the builder, and Mr. J. H. Gibbons, of Birmingham, the architect.

The Prince and Princess of Wales and the Princesses Victoria and Maud visited Messrs. Strode and Co.'s electric lighting installation at the Cardiff Exhibition on Saturday afternoon. The Royal party took great interest in the electrical plant which Messrs. Strode have erected for the purpose of lighting the exhibition, and his Royal Highness accepted a portable electric battery and lamp mounted in silver case, which Mr. Strode presented as a souvenir of the electric lighting section of the Cardiff Exhibition. The Prince of Wales shook hands with Mr. Strode, and complimented him on the admirable way in which the whole of the electric lighting arrangements had been carried out.

* Sutton-in-Holderness: the Manor, the Berewic and Village Community. By THOMAS BLASHILL, F.R.I.B.A. Hull: William Andrews and Co., and Brown and Sons, Ltd. London: 5, Farringdon-avenue, E.C., 1896.

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ILLUSTRATIONS.

"THE LAST DROP," BY PETER FRANÇOIS.—THE PASSMORE EDWARDS SETTLEMENT BUILDINGS, TAVISTOCK-PLACE, W.C.—TWO WALL-PAPER DESIGNS.—CREMATORIUM FOR PADDINGTON.—GRAND MARINE HOTEL, SEA POINT, CAPE TOWN.—LA GILDE DES METIERS, BRUGES.

Our Illustrations.

OLD MASTERS ON THE CONTINENT: NO. XXXV.—
"THE LAST DROP," BY PETER FRANÇOIS.

THE painter of this masterly portrait, which is in the Royal Gallery at Brussels, was Peter François, a Flemish painter, distinguished for his historical works as well as portraiture, who flourished during the first half of the 17th century, and contemporaneously with the famous French portrait-painter, Simon François, with whom his Belgian fellow-worker is sometimes confused, and they were both born in the same year—1606. Peter was the son of Lucas François, himself an historical painter of considerable note. The example which we have chosen to-day from Brussels is an eminently typical work, signed by the author, and dated 1639. It is rich in colour and refined and delicate in drawing, well telling its incident, which serves to give a title to the portrait of the exquisite, who, with a sharp ring of the glass with his thumb, certifies the fact that the goblet is empty even to the last drop. Peter François died in the year 1654.

THE PASSMORE EDWARDS SETTLEMENT BUILDINGS.

THIS is the second design for these buildings, as the site which it was intended to use when the competition was held has since been abandoned for one on the opposite side of the road, formerly occupied by "The Grove." The present buildings contain: (1) A public hall, to seat 450 persons; a large platform or stage, performers' waiting and retiring-rooms, and the necessary lavatory accommodation; also a small kitchen in connection with public hall, for the preparation of light refreshments. (2) Library, reading-room, three classrooms, billiard-room, two workshops, gymnasium (with dressing and bath-rooms), boys' club-room, men and women's lavatory accommodation, and set of rooms for the caretaker. (3) Dining-room, drawing-room, committee-room, secretary's rooms, suite of rooms for the warden, accommodation for twenty residents, including residents' common room, besides kitchen and offices, servants' hall, matron's room, and matron's and servants' bedrooms. The exterior is to be built of red brick, with stone dressings to the doorways, the cornice and deep band under it being finished in Portland cement painted white. The roofs are to be covered with Westmoreland slates. The buildings are to be commenced immediately, the contractors being Messrs. Higgs and Hill.

TWO WALL-PAPER DESIGNS.

I HAVE little to say about the designs from Burlington House, except that they are both intended for printed fabrics or wall-papers, although the colour of my original drawings now in the Academy is more suitable for fabric than wallpaper. The one

with the owls will be published by Messrs. Essex and Co. as a wall-paper. C. F. A. VOYSEY.

PROPOSED CREMATORIUM FOR PADDINGTON.

THIS building has been designed under the conditions which at present regulate the conduct of fire-burial, as carried out by the cremation societies of Europe. The lower story or crypt contains the furnace, while the story above ground forms a handsome chapel in which the final office for the dead is held, and which also has carved wall niches for the reception of the urns or other receptacles of the incinerated bodies. At the conclusion of the burial office, the body, inclosed in a tight shell, is drawn by unseen machinery, and disappears behind a curtain, and is then lowered and placed in the furnace, from whence in an hour or so it emerges in the form of a pearly-white ash, to be presented to relatives for disposal as they may deem fit. The scheme for a crematorium at Paddington Cemetery has long been under consideration, under the auspices of the well-known champions of the cause—Sir Spencer Wells, Sir Henry Thompson, and many others. The design published is that of the architect to the Cremation Society of England, Mr. Edward F. C. Clarke, of 13, Victoria-street, Westminster Chambers, S.W.

HOTEL NEAR CAPE TOWN, SOUTH AFRICA.

IT is proposed to erect this building on a very charming site facing the sea at Sea Point, Three Anchors Bay, a distance of about two miles from Cape Town. A marine hotel of this description is much needed; at present there is absolutely no suitable accommodation in Cape Town; visitors to the colony experience much difficulty in this respect. The scheme has for the present been abandoned, owing to the recent political crisis, but it is probable, when matters resume their normal aspect, the intention of the promoters will be carried into effect. The perspective view indicates the general external character of the building, and the plan we publish will explain the internal arrangements. There are three floors above the ground almost identical, giving bedroom accommodation for about 150 guests, besides four suites of private apartments for families. The servants' bedrooms are located on the fourth floor and in the basement. The kitchen department is placed partly below ground outside the main building, and is convenient and central for the general service of the building. It is proposed to face the exterior with local stone ashlar with brick walls. The verandahs will be of teak and iron. The roofs to be laid with Welsh green slates. Roofs of turrets and verandahs to be of copper, and fireproof construction will be adopted for all floors. A swimming-bath, and also private baths, will be provided adjoining the hotel, supplied with sea-water. The extent of the site is about six acres, Table Mountain being immediately in the rear. The estimated cost of the building, as shown, is £120,000. The architects are Messrs. Highton and Ardron, 39, Victoria-street, Westminster.

LA GILDE DES METIERS AT BRUGES.

BRUGES, now the artist's paradise, was once a powerful and thriving city, in which the commerce of the world was centred. The population has been sadly reduced, and all its former bustle and activity are changed to a quiet, sleepy, old-world air. Its canals, once teeming with craft conveying merchandise from the wealthy cities of the South, are now comparatively deserted. Many of its public buildings and quaint private houses remain unaltered, and serve to remind us of its former greatness. Our illustration shows an interesting little front from this city, with the stepped gable here, as throughout Belgium, to be found in abundance. This is the Hall of the Workers' Guild, which has recently been restored by M. C. de Wulf, the architect.

The Managing Committee of the British School at Athens offer a studentship of £50 for the session 1896-97 to a member of the University, the person appointed being required to go to Athens as soon as possible after the school reopens in November, and to hold himself in readiness to assist in excavations if called upon by the director to do so, and to comply with the regulations of the school in regard to undertaking some regular course of work and reporting upon it at the end of the session. The vice-chancellor requests that candidates will communicate their names to him on or before July 31, together with such evidence as to their qualifications as they may desire to submit.

COMPETITIONS.

ABERDEEN.—Mr. Simpson, architect, Leith, was engaged on Monday and Tuesday as assessor in examining the plans for the corporation lodging-house to be erected in Aberdeen, with the view of advising the town council as to the most suitable design.

ARCHITECTURAL & ARCHÆOLOGICAL SOCIETIES.

DUNDEE INSTITUTE OF ARCHITECTURE, SCIENCE, AND ART.—The annual meeting of this body was held in Dundee on Tuesday, ex-Baillie Keith in the chair. The secretary, Mr. J. J. Henderson, read the annual report, from which it appeared that the institute was still in a flourishing condition. The financial report bore that there was a balance to be carried forward to next year's account of £31 11s. 4d. The following office-bearers were elected:—Mr. Leslie Ower, president; Mr. T. M. Cappon, vice-president; Mr. George Jamieson and Mr. Robert Murray, architectural members of council; and Mr. John Macfarlane and Mr. William Fergusson, associate members of council; Mr. J. J. Henderson, secretary and treasurer; and Mr. George Harris and Mr. Robert Smith, auditors.

MIDLAND INSTITUTE, ARCHÆOLOGICAL SECTION.—The district of Gloucestershire lying between Cheltenham and Broadway was selected for the Midland Institute Archæological Section's first whole-day excursion this year. A small party left Birmingham on Wednesday week for Cheltenham, and then proceeded by carriages to Postlip, where a visit was paid to the old Elizabethan manor-house. The house has a picturesque courtyard and some fish-tanks in the cellar, while the small Norman chapel connected with the hall has an interesting shafted doorway with enriched tympanum, and an exceptionally fine chancel arch. A further drive of two miles brought the party to Winchcombe, where they were met by the Rev. John Taylor, under whose guidance the church was inspected. This building, an excellent example of 15th century architecture, stands on the site of the ancient Abbey of Winchcombe, founded in 798 by one of the kings of Mercia. Dinner was served at the White Hart Hotel, and the party then walked to Sudeley Castle, which was thrown open to inspection by Mrs. Dent. The castle, although now for the most part in ruins, contains in its inhabited portion a vast store of interesting pictures, furniture, and curiosities. Bishop's Cleeve Church, the next place visited, is a fine edifice, chiefly of the Transitional period from Norman to Early English. It contains, amongst other features, a gallery, which is said to be in danger of demolition.

CHIPS.

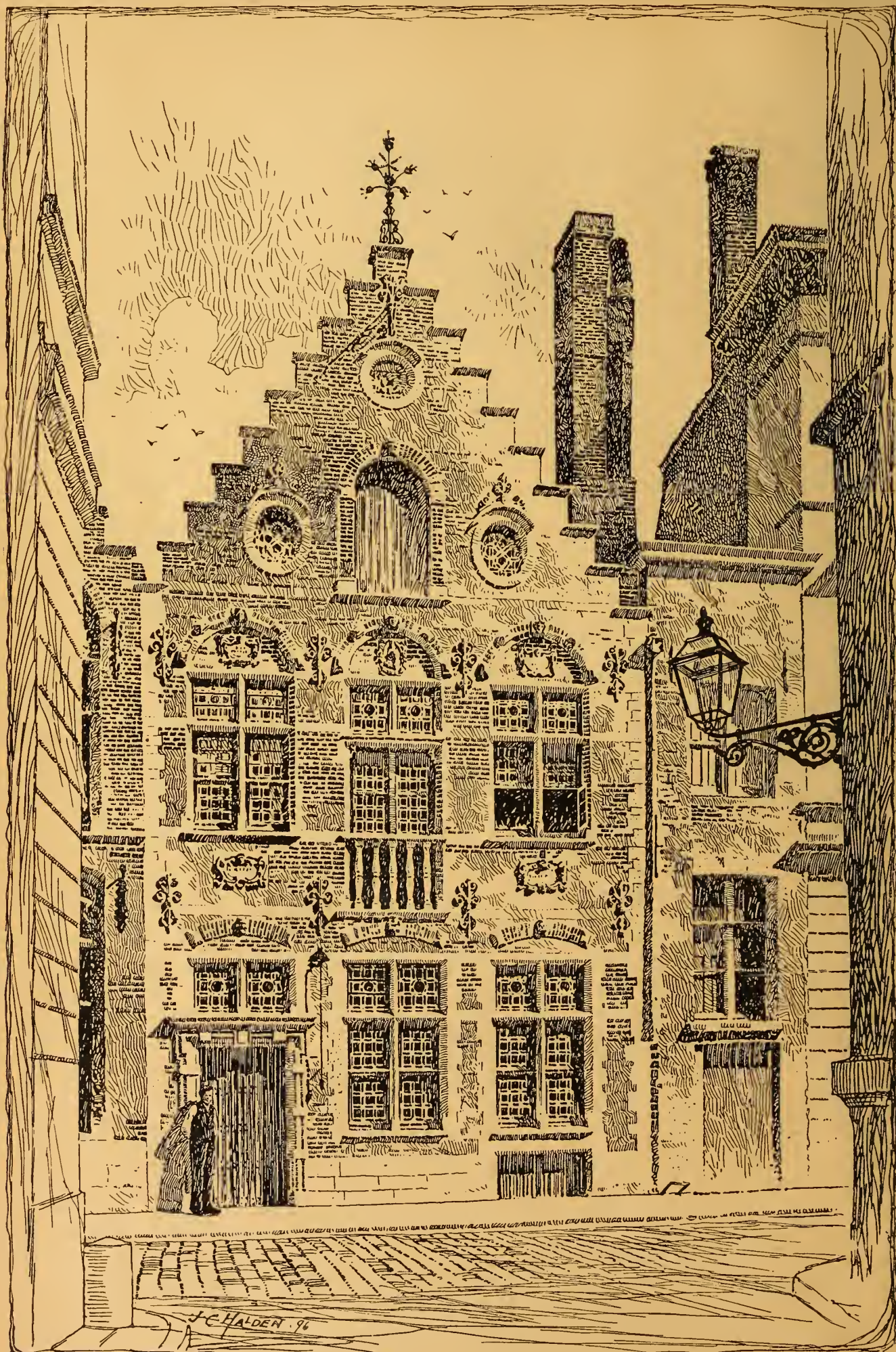
A new mixed school is being carried out at Rough Close, Trentham, Staffs, by Mr. Embrey, builder, of Fenton, from designs by Mr. J. Hall Gibbons, architect, of City-road, Birmingham.

The monument raised at Nancy to the memory of President Carnot was inaugurated with great ceremony on Sunday. The monument consists in an obelisk, at the foot of which are two figures, representing Peace and War, exchanging olive branches. Above them is a medallion, reproducing the likeness of Sadi Carnot.

The cliff railway and pavilion at Aberystwith, opened by the Princess of Wales on Friday, have been constructed from designs by Mr. G. Croydon Marks.

Messrs. Christie, Manson, and Woods concluded on Saturday the sale of the second and final portion of the collection of objects of art, old French and other decorative furniture, old English and foreign silver and silver-gilt, objects of vertu, and pictures by old masters of the Dutch school, formed by the late Sir Edward J. Dean Paul. The first portion of this collection was dispersed in March last, when close on 900 lots, occupying five days' sale, realised £20,378. The four days' sale of silver plate, &c., last week, showed a total of £10,134 12s., whilst the 123 lots of pictures brought £11,571.

Mr. Bayard laid on Monday the foundation-stone of a Congregational church which is to be erected at Gainsborough as a memorial to John Robinson, the minister of the congregation which fled to America in the *Mayflower* from the persecutions in the reign of James I. The building will be erected from designs by Messrs. R. C. and E. Sutton, of Nottingham, selected in competition. The style is Domestic Elizabethan. The contract has been let to Mr. F. Pattinson, of Ruskington, for £4,847.

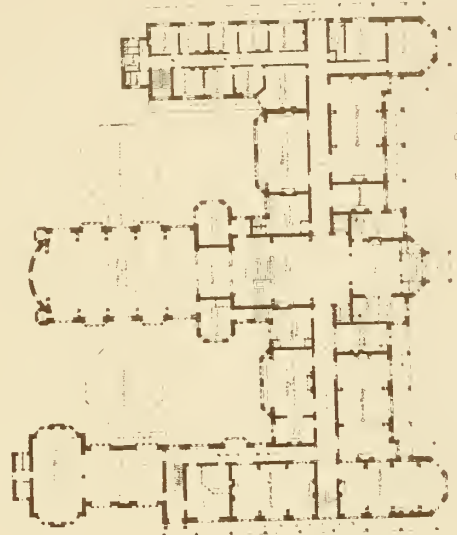


· LA GILDE · DES · MÉTIERS · A · BRUGES · RESTORED BY C DE WOLF ARCH'T.

THE BUILDING NEWS, JULY 3, 1896.

GRAND MARINE HOTEL · SEA-POINT · CAPE TOWN

MESSES HIGHTON & ARDRON ARCHTS



GROUND FLOOR PLAN





Petrus Franchetys. pnxii 1639





"PHOTO-TINT" by James Akelmau, Queen Square, London, W.C.

FROM A PHOTO BY FRANZ HANFSTAENGL

OLD MASTERS · ON THE · CONTINENT · N° 35 ·

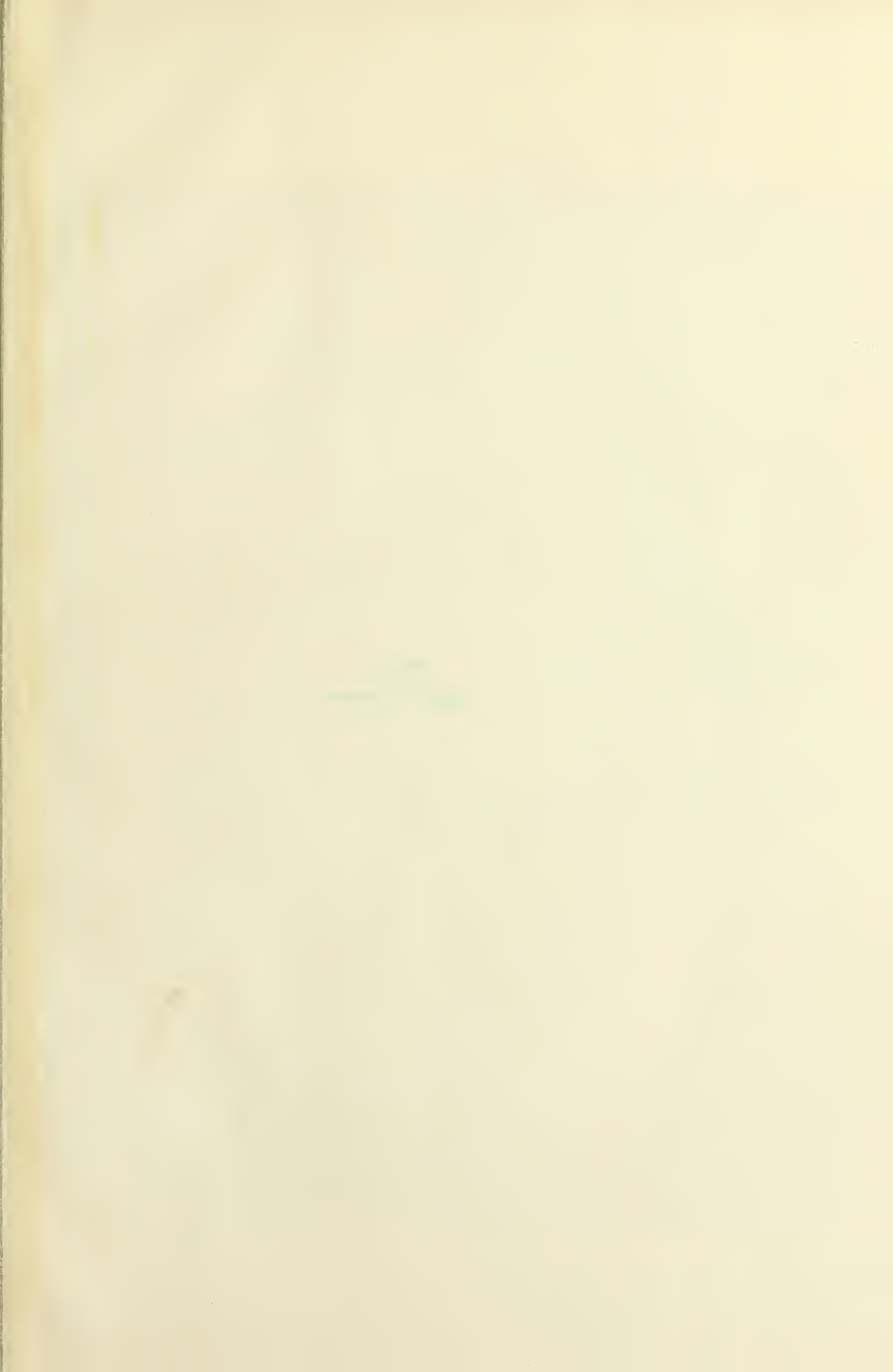
THE · LAST · DROP · (BRUSSELS) BY PETER FRANÇOIS · (B 1606 D 1654) FLEMISH SCHOOL

THE BUILDING DEWS, JULY 3, 1896.





"Photo-Tint" by James Akerman 6 Queen Square London, W.C





JULY 3, 1896.



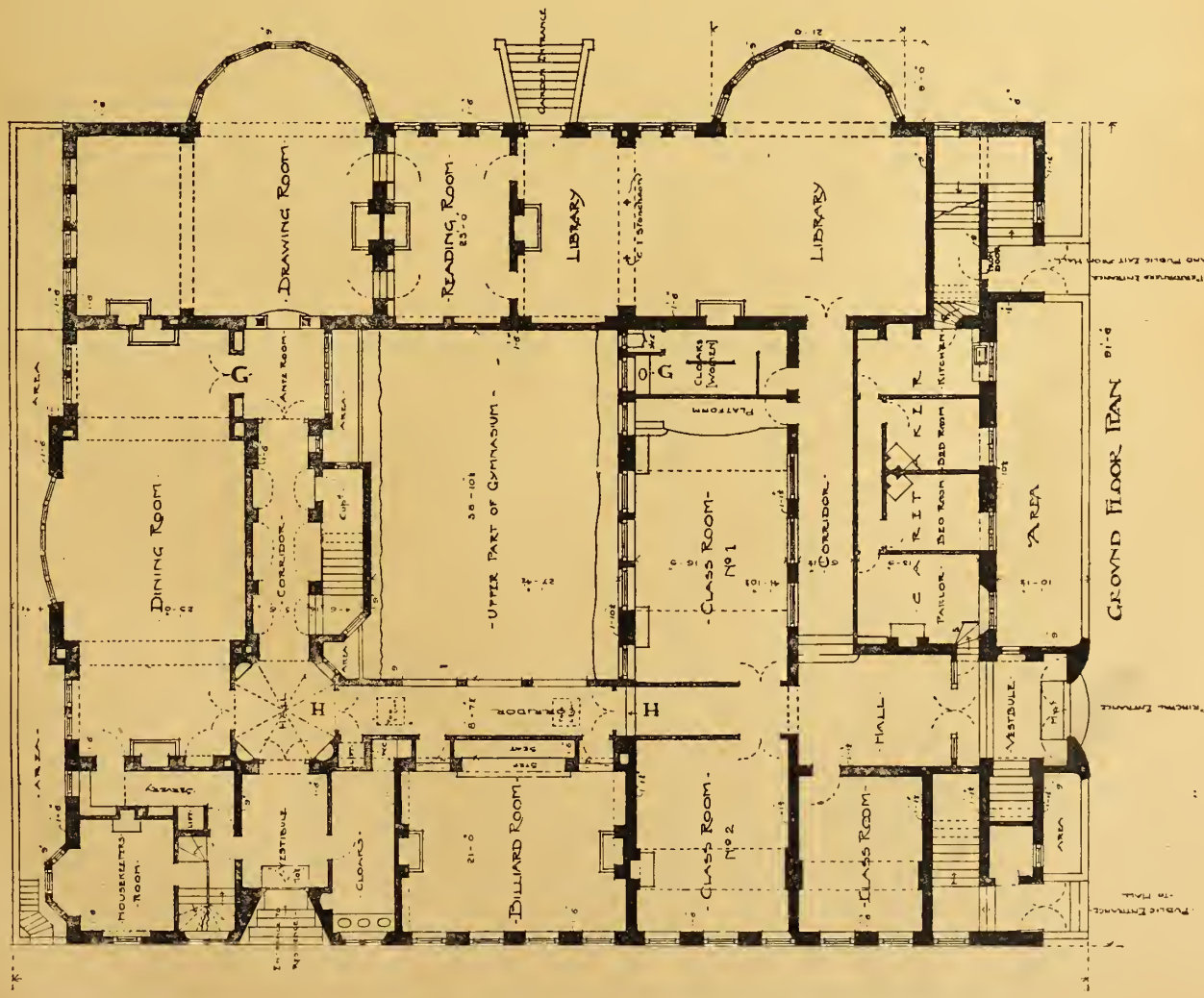
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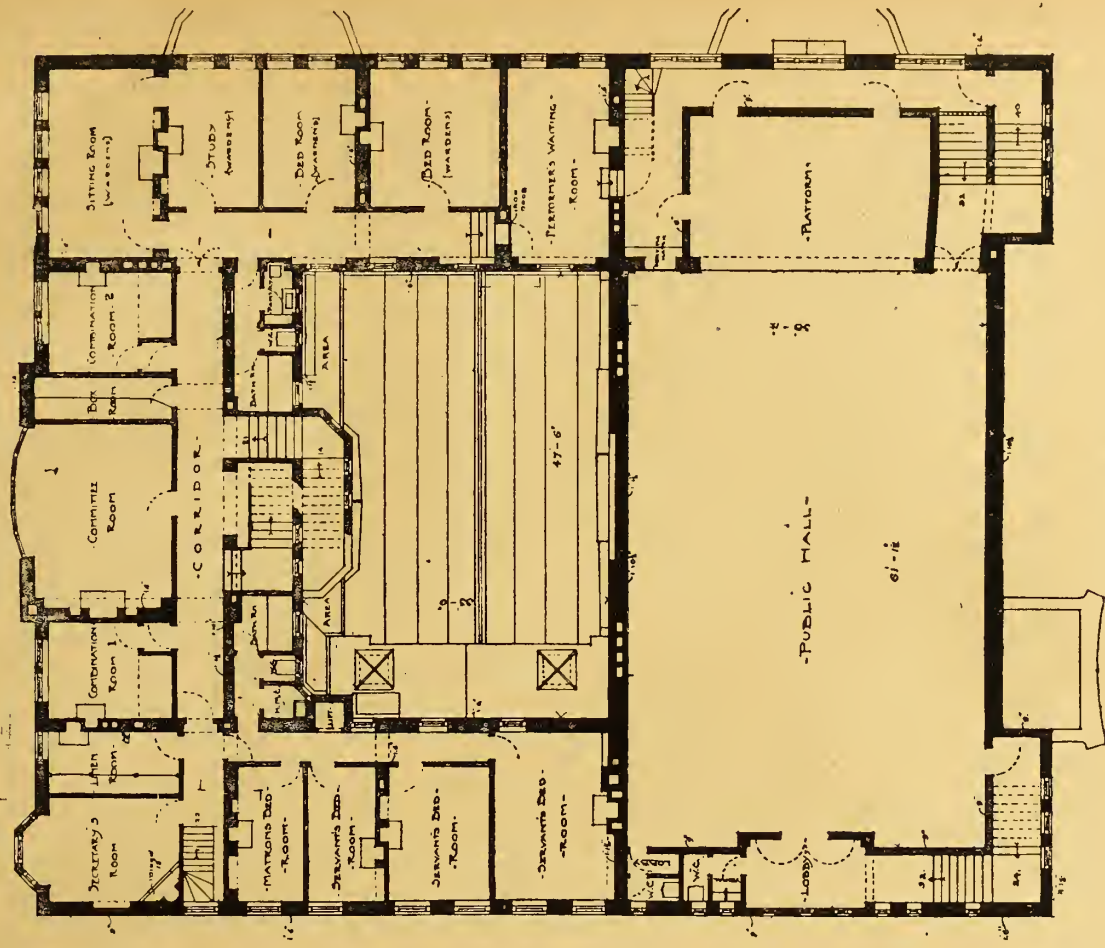


CREMATORIUM FOR PADDINGTON E.F.C. CLARKE ARCHT





GROUND FLOOR PLAN



FIRST FLOOR PLAN

THE ANNUAL EXCURSION OF THE ARCHITECTURAL ASSOCIATION.

THE Excursions Committee have at last decided in favour of West Sussex, with Arundel as a centre, for the forthcoming excursion of the Architectural Association, though the district of Kent round Cranbrook found favour with some as an alternative scheme. The beauty of "the honour of Arundel" is, of course, well known, while the glories of its park are unsurpassed in the home counties. For importance, the antiquity and dignity of the place take a foremost position among the most remarkable in England. The grand old parish church situate just above the castle, is typical of Sussex work, and although the Howards have built up the chancel arch and thus divested the parish of its choir, the interior of the nave for architectural merit holds its own in comparison with the big Roman church, built by the Duke of Norfolk, hard by. In the FitzAlan Chapel, as the parochial chancel is called, there are several sepulchral monuments and brasses. The Renaissance tomb (similar in style to the sacellum of Lord de Warr in Boxgrove Priory, and the memorials at Layer Marney, in Essex) will attract probably the chief interest. The Duke of Norfolk has lately renovated this part of the parish church, and he has recently completed vast changes in the castle. The church, which his grace erected in honour of St. Philip Neri on the crown of the hill, at a cost of £100,000, is a fairly good example of modern Gothic, but is still lacking its tower and spire. The remains of the FitzAlan College stand to the right of the parish church, and are included in the grounds of the castle, from whence magnificent views are obtained. Besides Boxgrove Priory, wide of Chichester and Broadwater Church, Sompotting Church, with its Saxon tower and Rhine-bank-like spire, New Shoreham and Old Shoreham Churches, Clymington and Leominster Churches all deserve attention. Petworth House, of no architectural beauty outside, is one of the principal seats in the county, rich in glorious Claudes, Holbeins, and Vandykes. The church is dedicated to our Lady of Pity. The town hall and market house, in stone, date from 1793, and were erected by the Earl of Egremont. At West Tarring, the Early English church has had a chancel added to it by Mr. Norman Shaw, R.A. Parham possesses Parham House, an Elizabethan mansion. At Pulborough, the church and Lych-gate are worth attention, and close by, at Old Place, there are some remains of Edwardian date, with carved timber-work. Lavington is interesting on account of Cardinal Manning's connection with the church, and Bishop Wilberforce lived at Lavington House. Midhurst is a pleasant old town on the Rother. The grammar school there was erected in 1672. The Montacute Chantry in the Perpendicular church has lost its tomb, which is now in Easebourne church. The ruins of Cowdray, near the station, form still an extensive block of buildings of much interest, all that remains of the "goodly house of Sir Anthony Browne," whose arms are over the entrance. In the dining-hall are very curious frescoes representing events in English history. "Sir," said Dr. Johnson, "I should like to stay here twenty-four hours. We see here how our ancestors lived." In Lodsworth church there was a curious open-timber gallery; but this, we fancy, has been "restored" away. Amberley Castle, Bramber Castle, and Steyning Church are places of interest; but Chichester itself will form the chief attraction of the programme, with the Cathedral, detached bell-tower, market cross, Prebendal school, Greyfriars chapel, and, above all, St. Mary's Hospital in St. Martin's-square, with its oak timber nave and aisles. The excursion commences on August 10th.

The Duke of Fife's new mansion on Deeside, which the Queen inspected last week, is to cost about £20,000. It is being built in the Scottish Baronial style, of pink granite from the Duke's quarries near Braemar, and all the timber has been obtained from Mar Forest. The house stands on the north bank of the Dee, within a hundred yards of old Mar Lodge, which residence is to be demolished in a short time. The new house will have a large lawn extending to the river Dee in front, and behind an extensive wood of pines and teak-firs. The house and stables will be lighted by electricity.

Damage estimated at £3,000 was caused by fire late on Saturday night at the Beaver Cement Works, Rochester. A fireman was badly injured by falling into burning cement.

Building Intelligence.

DONCASTER.—The annual meeting of the seat-holders of the Doncaster parish church was held on Thursday in last week. The accounts showed that £1,954 had been received from the insurance companies to cover the damage done by the recent gas explosion, and after payments had been made for repairs of the fabric, there was a balance of £1,517 to be devoted towards replacing stained windows in the church. The vicar stated that Messrs. Shrigley and Hunt, of Lancaster and London, were preparing new designs and estimates for the new stained-glass windows. It was impossible to reproduce the design for the north transept window, and it was suggested that they should insert a *Te Deum* window, which would cost £1,000. The firm said they could do nothing with the two windows at the west end, and in place of the old designs they suggested the Ascension for one window and the Transfiguration for the other. Two other windows—the Mowbray window in the north aisle, and the Dunhill window in the south aisle—were also seriously damaged, and ought to be replaced; but the money received from the insurance company only provided for repairs.

EDINBURGH.—At the meeting of managers of the Royal Infirmary held last week the plans for the new gynaecological department were laid before the board, as well as a report on the subject by the architects, Messrs. Sydney Mitchell and Wilson, of Edinburgh. The new pavilion is to be built on the site of the old Sick Children's Hospital. It is proposed that the basement be used as a bathing department, the first floor as an ordinary ward, and the second and third floors for gynaecological patients, while additional accommodation for the nurses would be provided on an upper floor, to which the main staircase would be carried. The plans were approved, and the architects were instructed to prepare a bathing scheme.

LONDON COUNTY COUNCIL.—At Tuesday's meeting of this body, the chairman of the General Purposes Committee announced that a letter had been received from Captain Simonds, the chief of the Metropolitan Fire Brigade, declining to send in his resignation, and stating that he was prepared to face the fullest public inquiry. The committee, after considering the letter, had passed a resolution recommending that Captain Simonds's appointment as chief officer of the Fire Brigade be terminated as from the 14th of July, and that he be paid six months' salary in lieu of notice. This recommendation will be considered next Tuesday. It was agreed to seek Parliamentary powers next session for the extension of the Chelsea Embankment westward from Battersea Bridge to Lot's-road, Chelsea, at a cost of £64,000, and to widen Long-lane and to improve the approaches to Tabard-street from Borough High-street by the formation of a new road through St. George's-churchyard at a net cost of £190,400. The recommendation of the Establishment Committee for the acquisition of a site in Spring-gardens, of a total area of nearly two acres, for the erection of a new county hall, was next considered. The cost of acquiring the freehold, with possession, of the whole of the properties required, including the freehold reversion of the present county hall, and allowing for a certain portion of land required for the new avenue contemplated by the Government, is stated at £813,000 net. The cost of the new building is estimated at £500,000. The committee recommended that the Council should apply to Parliament for power to acquire the necessary properties for a site for a new county hall, and that the Parliamentary Committee should be instructed to prepare the necessary Bill to be introduced in the session of 1897. After some discussion and the rejection of several amendments, the report was held over for further consideration.

MIDDLESBROUGH.—The foundation stone for the new lunatic asylum at Middlesbrough was laid on Wednesday week. The asylum, when completed, will accommodate 250 patients, and the total cost, including the land, the building, the furniture, the laying out of the ground, and other incidental expenses, will be about £100,000. Contracts have been let for about £50,518. The contractors are as follows:—Excavation, brick-laying, &c., Messrs. Bastiman Bros., Middlesbrough; plastering, Mr. J. R. Smiles, Middlesbrough; carpentry, &c., Mr. R. T. Snaith,

Darlington; slating, Mr. J. Harrison, North Ormesby; plumbing, &c., Messrs. Baker Bros., Middlesbrough; glazing, &c., Lambert and Sons; painting, Mr. Lewis, Middlesbrough; heating and ventilating, Messrs. Haden and Co., London and Manchester.

CHIPS.

The Leeds Highways Committee have accepted tenders for the new tramways from Roundhay to Kirkstall. Including £14,000 for twenty-five electric cars from Messrs. Greenwood and Batley, the selected tenders amount to £40,764.

A curious error in drafting has crippled the Housing of the Working Classes Act, 1890, so far as it relates to Scotland. In 1892 an amending Act was passed. By an oversight, the result has been that the urban authorities in Scotland have been prevented from borrowing for certain purposes of the Act of 1890. It will be necessary to pass an Act of Parliament remedying this defect.

The Board of Control of Lunacy in Dublin has written to the governors of the Derry Lunatic Asylum informing them that the time has arrived for considering the preliminary arrangements which it is necessary to make for building a new asylum at Gransha. A deputation from the board (consisting of the inspectors and the consulting architect) are to have a conference with the asylum governors on Thursday in next week, July 9th, with a view to consider the arrangements which it is necessary to make.

Mr. Musgrove, an Antipodean theatrical manager, is arranging with the Tulke family to buy the freehold in Leicester-square, now occupied by Messrs. Hawkes and Co., the musical instrument dealers. When he has acquired this, with some other adjacent property, he will build a theatre having frontages, like the Alhambra, in the square and in Charing Cross-road, immediately opposite the Garrick Theatre. The new entrance to the Alhambra in Charing Cross-road is being pushed to completion.

The vicar, on Wednesday week, dedicated the new east window which has just been placed in St. Paul's Church, Burton-on-Trent, at a cost of £800. The work has been executed by Messrs. Burlison and Grylls, under the direction of Mr. G. F. Bodley, A.R.A. There are in each light single figures. In the centre, immediately over the retables, is a representation of the Virgin Mary holding the infant Saviour, and with the traditional lily. On the left hand are figures of St. John the Baptist and St. George, the latter with flag, shield, and cross; while underneath are two figures of St. Augustine and St. Ambrose, the adjoining minor lights being occupied by representations of Melchizedek and Gideon. The right-hand window, looking east, is devoted to St. Stephen, with emblems of his martyrdom; and SS. Oswald, Anselm, and Athanasius, with David and his harp, and Moses holding the Tables of Stone, are represented in the other lights. The centre panel of the large rose reveals the Annunciation.

The Lords of the Committee of Council on Education have appointed Mr. C. Purdon Clarke, C.I.E., F.S.A., director of the South Kensington Museum in succession to the late Dr. J. Henry Middleton. Mr. A. B. Skinner, B.A., succeeds Mr. Purdon Clarke as assistant director.

The estate sales of this season promise to be the most successful of recent years, and every week proofs of the improved state of the market accumulate. Last week the aggregate realisation at the Auction Mart was £189,784, a very large proportion of which was the result of successful sales of country residential properties and land. The supply of the class of investments which usually furnishes the bulk of the returns has been rather limited, and capital is commencing to flow a little more readily in other channels. Land possessing elements of building value is more sought after than hitherto, an encouraging sign of a revival of enterprise.

The Duchess of Albany performed the ceremony of laying the foundation-stone of the new school buildings of St. Stephen's, Paddington, on Saturday afternoon. The new schools, of which Mr. A. T. Bolton, A.R.I.B.A., of the Sanctuary, Westminster, is the architect, are to cost about £7,000, nearly half of which has already been raised locally.

The death is announced from Paris, at the age of 54, of M. Louis Courajod, Curator and Professor of Sculpture at the Louvre.

Dr. Frederick Bliss has informed the committee of the Palestine Exploration Fund that permission for the continuance of the excavations at Jerusalem has been granted by the Sublime Porte. The annual meeting of the fund will be held in July, when Lord Amherst of Hackney will preside.

New British schools are about to be erected at Chipping Norton, Oxon, to seat 150 children. Tenders are being invited from local builders only. The architect is Mr. J. Hall Gibbons, of City-road, Birmingham.

BATHS AND WASHHOUSES, WHITE-CHAPEL.

THE Commissioners of the Public Baths and Washhouses of Goulston-street invited an inspection of their enlarged and remodelled baths near the Aldgate East Station. The building, of red brick, relieved by white brick disposed in pilasters and bands, faces Goulston-street. A pavilion-roof drains the central entrance, which is spaciouly arranged with side-entrance corridors for women and men, and pay-box, &c., between them. The floors and dadoes are of Italian mosaic tiles, and of a geometrical pattern. There are three large swimming-baths—a first class for men, 100ft. by 33ft., with varying depth of water of 6ft. to 3ft., with 67 boxes and galleries round; a second-class bath, 80ft. by 30ft., which has been lengthened at one end; and a ladies' swimming-bath in the rear of entrance, 66ft. by 30ft. water area. The two former are lined with glazed tiles, and fitted with every convenience. The ladies' bath has a marble floor to bottom of bath, and marble gangways, and has 30 boxes. These baths have wrought-iron tied roofs, and are lighted by top lights along the centre of roof. The latter is artificially lighted by incandescent electric lights. The ladies' slipper-baths are at the side of their entrance, and those for the men are located on the first floor, there being 31 first class and 60 second class. This floor is carried by plate girders, and the stairs and baths are excellently lighted and ventilated, the latter being arranged in rows by gangways between. The slipper-baths are Tyler's "Busby," and are made of porcelain; the partitions are formed of slabs of Sicilian marble, with wood architraves and cappings, and present a very clean and light appearance. Messrs. De Grelle, Handret, and Co., of London Wall, supplied the marble; and Messrs. Broers and Martinenghi the mosaic tile-work. The contractor for the building was Mr. W. Goodman, L.C.C.; and the engineers were Messrs. Murdoch and Cameron, of Glasgow. The architect of the new baths and washhouses is Mr. Bruce J. Capell, A.R.I.B.A.; and the work has been carried out under his superintendence. The clerk of works is Mr. T. Liggins.

CHIPS.

The Leeds City Council passed on Wednesday a resolution, adopting the scheme for laying out the city square, submitted by Alderman Harding, in accordance with the plans prepared by Mr. William Bakewell, architect, Leeds.

On Saturday week the permanent nave of the large district church of St. Clement's, in the parish of Ilford, was consecrated by the Bishop of Colchester. Seven years ago the chancel was built, at a cost of £2,500, and consecrated. The nave has now been added. The building is of red brick, with Bath stone dressings, and has been erected from the designs of Messrs. J. E. K. and J. P. Cutts. It will seat nearly 900, and has cost, for nave and chancel, about £7,500.

The death of Mr. William James Gardiner is announced, at his residence, Worcester Park, Surrey, on Wednesday week. Mr. Gardiner, who had attained the great age of 88 years, formerly transacted his business, that of a quantity surveyor, in Great Russell-street, and he was well known among the professional men in that neighbourhood.

The Prince of Wales opened on Saturday the extension of the Free Public Library at Cardiff. The original building was completed in 1882, and was built from designs by Messrs. Edwin Seward, R.C.A., and George Thomas, M.S.A., of Cardiff, who were also the architects for the additions now made. The present outlay has been £17,000, making the entire cost of the structure £45,000, and the accommodation has been increased from room for 150 to 600 readers. Messrs. E. Turner and Sons, of Cardiff, were the contractors for the present works. The structure throughout is faced with Corsham Down stone.

On Thursday week the new church of St. Saviour, at Heckmondwike, was consecrated by the Bishop of Wakefield. The church has been built by means of a sum of £5,000, which was anonymously given to the parish some time ago. The church is of the Early English type, and has been built from the design of Mr. Swinfen Barber, of Halifax. The nave measures 68ft. by 21ft.; there are north and south aisles, 68ft. long by 12ft. wide; the chancel is 32ft. long and 20ft. wide. Accommodation is provided for under 500 in the nave, and for twelve adults and sixteen boys in the choir-stalls. The church is built of Lightcliffe wallstones, with Ringby ashlar dressings.

TO CORRESPONDENTS.

We do not hold ourselves responsible for the opinions of our correspondents. All communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondents.]

It is particularly requested that all drawings and all communications respecting illustrations or literary matter should be addressed to the EDITOR of the BUILDING NEWS, 332, Strand, W.C., and not to members of the staff by name. Delay is not unfrequently otherwise caused. All drawings and other communications are sent at contributors' risks, and the Editor will not undertake to pay for, or be liable for, unsought contributions.

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Advertisements for the current week must reach the office not later than 3 p.m. on Thursday. Front-page Advertisements and alterations in serial advertisements must reach the office by Tuesday morning to secure insertion.

SITUATIONS.

The charge for advertisements for "Situations Vacant" or "Situations Wanted" is ONE SHILLING FOR TWENTY-FOUR WORDS, and Sixpence for every eight words after. All Situation Advertisements must be prepaid.

NOTICE.

Bound copies of Vol. LXIX. are now ready, and should be ordered early (price Twelve Shillings each), as only a limited number are done up. A few bound volumes of Vols. XXXIX., XL., XLI., XLVI., XLIX., LI., LIII., LIV., LVIII., LIX., LX., LXI., LXII., LXIII., LXIV., LXV., LXVI., LXVII., LXVIII. may still be had, price Twelve Shillings; all the other bound volumes are out of print. Most of the back numbers of former volumes are, however, to be had singly. Subscribers requiring any back numbers to complete volume just ended should order at once, as many of them soon run out of print.

RECEIVED.—F. D. Llewellyn.—Rambler.—B. A. E.—F. P.—H. B. and Co.—C. J. Stocker.—L. F. G. Co.

Correspondence.

WHAT THE PUBLIC EXPECT.

To the Editor of the BUILDING NEWS.

SIR,—I have read your article on "What the Public Expect" with great interest. An architect is only a man, and I for one don't expect him to be perfect by any means. At the same time I think, from my small experience and your notes, that, as a class, he is sadly behind his work. If he has no knowledge of hot-water apparatus, then he has no business to specify what he knows nothing about, and should leave that particular branch to someone who does; and the same in case of electric lighting, &c., otherwise he is humbugging his employer. The general public expect the architect to see to everything as regards the actual building, and if he can't do this I think it is only fair that he should have to call in those who can at his own expense. I take it that he is paid to see that materials used are right, that drains are properly laid, chimneys so constructed that they do not smoke, and hot-water apparatus so constructed that there is no liability of a burst-up, and if not, what earthly good is an architect? Is he to build a whitened sepulchre full of dead men's bones—all show outside and typhoid and all the rest inside? Surely a country mansion is not a very unheard-of thing, and any architect worthy of the name should be able to construct such at least with proper water apparatus, sewerage, and chimneys. A church might bother him, but such as is put into any large villa need be no great thing. It is the everyday things which I complain of, and no exceptions by any means. In my case both my front and back entrance are a disgrace to any architect, and I suppose you will own, at any

rate, that the placing of doors comes within the architect's province. Until I made an alteration, I couldn't get into my own front door without putting my arm through to push back another door, and my back door opens on to a blank wall, and has to be shut before one can get past it comfortably.

I have a case now before me of a villa in which the staircase is so badly constructed that there is no headway, and anyone of 5ft. 10in. or so is liable to a serious bump if he does not duck on going downstairs. Surely better things than these are to be expected of the architect.

There are many other things which most certainly the architect should look to, such as building chimney flues up inside walls, and not on outside, where they lose heat and are made more liable to smoke, and also the position of the fireplace in a room. But they seem to think little of these things, and only go in for outward show. A chimney breast looks so well on the outside walls and breaks the straight line, and chimneys look so nice at different elevations, so pray keep the kitchen chimney low and never mind the overblow from the main building. This is all very fine on paper, but doesn't answer in practice, and who has to pay the piper?

I must apologise for taking up your valuable space; but I merely wish to show that what I complain of is not the extraordinary work of the architect, but his everyday work.—I am, &c.,

JAMES COOPER.

Killerby Hall, Scarborough.

STEEL SPIRES AND STEEPLES.—I.

SIR,—I beg leave most respectfully to point out that if more than two members of a truss meet at a point it is necessary to know something more than the external force which acts at that point if we are to find the stresses in those members. In the particular case considered, the stress in E B is truly found, because the two members which form the rafter are in one straight line, and the stress which is said to be that in the member E C is, therefore, the resultant of the stresses in A C and C E; but how this stress is divided will depend on the other conditions of loading and support. I venture to bring this to the notice of the writer as being an important question of principle.

While I am writing, it may be as well to point out that two slips occur in the last par of "Cast-Iron in Builder's and Contractor's Work," Chapter XXVIII. Instead of as given, it should be—

Stress at lin. from } = { Bending moment divided
neutral axis } by moment of inertia.

Stress on fibres at ex- } = { Bending moment divided
treme edge of section. } by modulus of section.

I am, &c.,

J. C. PALMER.

Intercommunication.

QUESTIONS.

[11520].—Builders' Textbooks, &c.—I have a thorough knowledge of the practical part of the building trade, having served my time as a joiner, and devoted a considerable portion of time to study in connection with the trade, and should be greatly obliged to anyone who would advise me as to the best book or books on quantities, estimating, measuring up, builder's book-keeping, and general management, &c., the study of which would enable me to take up a good position in a builder's office?—T. R. E. B.

The sale of the various collections of objects of art, furniture, pictures, and silver of the late Sir Julian Goldsmid came to an end on Monday at Messrs. Christie, Manson, and Woods's, the fifteen days' sale—ten at Christie's, and five days on the premises, conducted by Messrs. Phillips, Son, and Neale—realising the grand total of £111,829.

The Manchester Corporation Gas Committee reported to the City Council on Wednesday that the net profits on the working of the electric light installations supplied by the committee amounted to £11,000 for the year. The demand for the new illuminant had exceeded all anticipations. One hundred and fifty thousand pounds originally borrowed had been expended, and it was necessary to borrow £100,000 more. The report was adopted.

At the annual meeting of the Scottish Corporation, held on Wednesday, it was decided to accept an offer of £4,750 for the freehold property of the Corporation in Crane-court and Fleur de Lis-court, Fetter-lane, E.C., and to erect a new hall and offices in Fetter-lane, from designs by Mr. J. MacVicar Anderson, their hon. architect, at an estimated cost of £8,500.

Legal.

COVENANTS NOT TO ASSIGN.

THE usual form of this covenant now is that the lessee will not assign without having first obtained the written consent of the lessor, such consent not to be unreasonably withheld in the case of a responsible and respectable assignee being proposed. Of course, this always allows the landlord to refuse unless the new tenant is responsible; but presuming that to be so, what grounds would be reasonable within the covenant? It is curious to find that this point has not been decided hitherto, so that the recent case of *Bates v. Donaldson* (*Times*, June 22) seems likely to become a leading authority. In that case the real question at issue was whether the lessor had acted unreasonably in refusing his license to assign to a tenant who was admittedly both responsible and respectable. It was also admitted that there was no ground for supposing that the new tenant intended using the house, which was in Cavendish-square, in an improper or an unsuitable manner. The truth was that the lessor wanted the premises for himself, and his ground of refusal was that as he had offered the lessee the same sum as was being paid by the purchaser, he was entitled to refuse his consent under the circumstances.

The Court of Appeal, however, thought not, and they confirmed the ruling of Mr. Justice Mathew, who had held in favour of the defendant, and that the plaintiff had had no reasonable ground for refusing to give the license within the meaning of the covenant. The Court pointed out that a lessor may be able to refuse permission to assign even to a tenant in every way responsible and respectable, and he could do so if he found it was intended that the house was to be used for purposes to which he might fairly object, although not contrary to anything in the lease. Possibly even he might do so for personal reasons of a different kind. But the covenant, while intended to protect the lessor from having the value of his premises in any way damaged by use or occupation in an undesirable way, was not meant to enable him to break the lease because he wanted the house himself, even though he had as a fact been willing to pay the price for which it was assigned. The lessee's rights were not to be limited in this way, and so the Court upheld the assignment, though made without the license, which they held had been unreasonably and therefore wrongly refused.

FRED. WETHERFIELD, Solicitor.

1, Gresham Buildings, Guildhall, E.C.

NOTE.—All questions for reply in this column must be headed "BUILDING NEWS," and must reach my offices, as above, by *Tuesday* morning to insure answer same week.

CHISWICK.—FENCE.—OWNERSHIP.—This could probably be answered by the deeds. You would, as a rule, be answerable for the fence on your ground. The way in which the nails are driven is some evidence of ownership; but is not alone conclusive.

T. G.—LAND.—FENCES.—STIPULATIONS.—Your interpretation seems to me correct, and so is your definition of the "forecourt," and what it includes.

BOLTON.—BUILDING LINE.—PULLING DOWN.—The Corporation can apply for an order to pull down that portion which is beyond the building line, and that would usually be granted, although, perhaps, they may not go so far under all the circumstances.

H. W.—RIGHT OF WAY.—USER.—LEASE.—It would take thirty years to acquire such a right by prescription. The freeholder should, however, object, if he can, to the use of the land in this way by the lessee as breach of covenant.

S. H. E.—PLANS.—ETIQUETTE.—You may have an action for your work done upon the plans, &c.; but, legally, I see no other remedy.

EPSOM.—BUILDING LINE.—SHOW-CASE.—(1) If there is no building line, you must get the plans approved by the proper authority. (2) This depends upon the by-laws and local regulations in force.

The new Alexandra graving dock at Leith has been completed, and was informally opened on Monday. The Alexandra makes the fourth public graving dock at the port, and is second in respect to size. It is 325ft. in length, having an entrance from the harbour 48ft. in width, and giving a depth of water on the sill at ordinary spring tides of nearly 20ft. It is built with heavy masonry walls, with granite copings on all the altars, and is fitted with a pair of wrought-iron gates made by Sir W. G. Armstrong and Co. The cost of the new dock, which has been constructed by Mr. John Best, the contractor for the whole scheme of dock extension, is about £10,000.

LEGAL INTELLIGENCE.

ALLEGED NEGLIGENCE.—THE LAW GUARANTEE SOCIETY v. BOYES.—(Before the Lord Chief Justice and a Special Jury.)—In this action, which occupied the Court two days last week, the Law Guarantee Society claimed damages from the defendant, an architect and surveyor, for negligence and want of skill and care in making a valuation of certain premises on behalf of the plaintiff society. It appeared that in July, 1890, the Law Guarantee Society, having been requested to guarantee the amount to be secured by a mortgage of the premises in question, which consisted of a club-house, public hall, theatre, and swimming-bath, employed the defendant, Mr. Boyes, to make a valuation of the property and report upon it. The defendant accordingly inspected the premises, and valued them at £17,000, and gave his opinion that it would be a fair business risk to guarantee the proposed mortgage, which was to be for £12,000. The Law Guarantee Society, on the faith of the defendant's valuation and report, guaranteed the amount secured by the mortgage, and it was now alleged that the premises were of a much smaller value than had been estimated by the defendant, and that, owing to the insufficiency of the security, the plaintiff society had lost large sums of money. The defendant, while contending that his report and valuation were correct, denied that the plaintiffs had guaranteed the amount of the mortgage relying on his valuation and report. A great deal of evidence was given on either side, and a number of expert witnesses were called as to the value and condition of the property in question, and in the result, after an exhaustive summing-up by the learned judge, the jury found a verdict for the defendant, and judgment was given accordingly.

FIREPROOF FLOORING PATENT APPEAL.—FACETT v. HOMAN AND RODGERS.—In the Supreme Court of Judicature, on Monday, Lords Justices Lindley, Lopes, and Rigby gave judgment in the appeal by the plaintiffs, Mark Facett and Co., against the dismissal of his action by Mr. Justice Romer. The action was brought to restrain an alleged infringement by the defendants of the plaintiff's patent (No. 2815 of 1888) for "improvements in the construction of fireproof floors." According to the plaintiff's specification, his invention consisted of "a floor formed or constructed with flanged tubular lintels as the special feature. These lintels are made of fireclay or other fireproof material, and of various sections, which are arranged to rest on the lower flanges of iron or steel joists or girders, and to pass under the lower flanges of the same, an air space being formed between the under surface of the joists or girders and the lower part of the tubular lintels. Concrete is placed between and over the tubular lintels, so as to form concrete arches, which take their bearing on the lower flanges or girders independently of the lintels." The learned Judge held that, having regard to the state of public knowledge at the time, there was not such invention by the plaintiff as could form the proper subject-matter for a patent, and that the patent was therefore invalid. The appeal was heard on June 10 and 11, when the judgment of the Court was reserved. On Monday the Court allowed the appeal. Lord Justice Lindley said: This is an appeal from a judgment of Mr. Justice Romer, and the question raised on the appeal is whether a patent obtained by the plaintiff is valid or not. The learned Judge has held it invalid on the ground of want of novelty and want of invention, having regard to the state of knowledge at the time when the patent was obtained. The patent was obtained in 1888. It is for improvements in the construction of fireproof floors, and the plaintiff's invention is to construct concrete floors more expeditiously and economically than before. His mode of doing so is, first to make a number of fireclay lintels. Each lintel is of one piece; it is hollow from end to end, and each end is notched, so that the lintel can slide along and ultimately rest on the lower flanges of two parallel ordinary iron girders. The lintels are long enough to stretch from girder to girder, and are so shaped as to form ridges and furrows above and flat plates below. These plates are so constructed as to project under, and so cover the under surfaces of the flanges of the girders, thus protecting them from fire. These lintels, when in their places, form both a continuous ceiling below and also a support for concrete above. The hollows in the lintels form hollow air spaces both above and below the lower flanges of the girders, and these spaces communicate with each other, and so make a continuous air-chamber. The ridges and furrows of the upper parts of the lintels are so many tunnels with spaces between, and when filled up with concrete assume the shape of arches between the girders. The concrete next the girders rests upon, and is supported by, their lower flanges. The concrete forming the arches between the girders rests on the hollows of the lintels, but these lintels are not necessary for the support of the concrete when set. The formation and the arrangement are such that the concrete, when set, forms a light, strong floor, the weight of which is thrown upon, and is borne by, the girders, and not to any material extent on the lintels

between them. The concrete floor thus formed is, in fact, a self-supporting concrete floor, not depending for its strength on the lintels on which it is constructed. These lintels, however, support the concrete until it is set, and permanently protect the iron girders from fire below them. The lintels also make a continuous air-space, as already stated. The lintels are a means to certain ends; the ends being—firstly, to dispense with all centring, other than themselves; secondly, to form a light, strong concrete floor, carried by the girders and not depending for its strength on underlying brick or tile work; thirdly, to protect the lower parts of the girders from fire; and, fourthly, to form continuous air passages both above and below the lower flanges of the girders. These continuous air-passages, however, appear to me to be an incidental advantage of the invention, rather than an end aimed at by the patentee. The utility of this patent is beyond controversy. It is very extensively used, and such use of itself proves utility. But, apart from this, the evidence shows that the invention attains the ends aimed at, and those ends are useful. By the plaintiff's method a light, strong concrete floor, self-supporting in the sense above explained, can be made without any other centring than the lintels themselves, and the lintels not only enable this to be done, but they also protect the girders from fire, as intended. If an invention does what it is intended by the patentee to do, and the end attained is itself useful, the invention is a useful invention; a patent for such an invention cannot be held bad for want of utility by comparing it with other known methods or things which may be preferred to it. A patent may be useful, although, owing to other circumstances, the public will not make use of it. But, if they do use it, no better proof of utility can be had. The main idea of the patentee was the construction of light, self-supporting concrete floors without the usual centring. That he has succeeded in this is proved by several witnesses, but notably by Mr. Wakefield, who mentions an instance in which a concrete floor, made according to the plaintiff's patent, stood perfectly well after the lintels on which it had been constructed had been knocked out. Colonel Edis, an architect called by the defendants, gave evidence to the same effect. The special form of lintel is the secret of this success. It is said, however, that these lintels are not new, or, at all events, are so like other known contrivances of the same sort, that no invention was necessary to hit upon them. I am unable myself to adopt this view of the evidence. Dr. Hopkinson says there is no new feature in them. In a sense this may be true, and yet it may also be true that the several features found in the plaintiff's lintel were never before seen combined in one lintel. Certainly no lintel like the plaintiff's—i.e., having all its features—was ever seen before. Mr. Swinburne, one of the defendants' witnesses, distinctly admitted this. The merit of an invention often consists mainly in clearly realising some particular useful end to be attained, or, to use Dr. Hopkinson's language, "in apprehending a desideratum." If an inventor does this, and also shows how to attain the desired effect by some new contrivance, his invention is patentable, although his contrivance involves the use of things, or parts of things, previously used by other people. Were it otherwise, no patent for a new thing composed of well-known parts could ever be sustained. This appears to me to be the case here. The plaintiff had in his mind something which never before had occurred to anyone, and the merit of his invention is attributable to this circumstance. The defendants rely on various specifications of other patents to show a want of novelty and the absence of anything deserving to be called invention on the part of the plaintiff. I have carefully considered them all, and will refer to three of them—Abord's, Snelgrove's, and Bruner's (respectively granted in 1866, 1885, and 1887), the others being so far removed from the plaintiff's invention as not to require special notice. One observation common to these three is that there is no evidence that any concrete floor was ever made according to them. All we have, therefore, are the specifications themselves. His lordship then referred to these three specifications in detail, and continued: The conclusion at which I have arrived, after a careful study of the whole evidence, is that the plaintiff has made a distinct step in advance in the construction of concrete fire-proof floors, and that his invention was by no means so obvious as the defendants want to make out. The plaintiff's lintel was new, useful, and original, combining into one form advantages not to be found combined in any previously known brick or lintel. It is true that the plaintiff might have registered the design of his lintel, for the design is new; but that is no reason why he should not patent the lintel for its utility in making fire-proof floors. In my opinion, Mr. Justice Romer underrated the merits of the plaintiff's invention. The appeal must be allowed, and judgment be given for an injunction and damages, or, if the plaintiff prefers it, an account, and the defendants must pay the costs here and below. Lord Justice Lopes briefly expressed his concurrence. He said that for a long time he took the same view as Mr. Justice

Romer; but, after a careful reading of the evidence, with some hesitation he had come to the conclusion that the plaintiff had for the first time invented a self-supporting concrete floor, not abutting on lintels, and which, if the lintels were removed, would still be a firm floor. His lordship was unable to say that there had not been a substantial exercise of the inventive faculty in thinking out and producing the result attained by the plaintiff. Lord Justice Rigby delivered judgment to the same effect. At the request of Mr. Terrell, Q.C., appearing for the plaintiff, their lordships granted a certificate of the validity of the patent.

THE BAD DRAUGHTSMANSHIP OF THE LONDON BUILDING ACT.—At the South-Western Police-court, on Wednesday, Mr. Robert Simpson, of the Hawthorns, Balham High-road, appeared to answer an adjourned summons at the instance of the London County Council, for erecting a building beyond the general line of frontage in Balham High-road, contrary to section 22 of the London Building Act, 1894. Mr. T. A. D. Chilvers supported the summons, the hearing of which had occupied the attention of the Court on several occasions. Mr. Young represented the defendant, who had erected a gymnasium in his grounds on a site where a smaller building had stood for some 20 years. The new building extended beyond the line of frontage. Mr. Lane, Q.C., gave his decision in favour of the County Council. In doing so, he remarked that it was astonishing that, after fifty years of Building Acts, there still existed some doubts as to whether or not a penalty could be imposed for one infringement of that particular section under which the present summons was issued. He had looked carefully and thoroughly into the matter, and had come to the conclusion that, according to the actual letter of the Act, he had no power to impose a penalty. He was also thoroughly impressed with the fact that, unlike the higher Courts, especially the Court of Chancery, a Court of summary jurisdiction had no power merely to declare rights or pronounce judgments, but to record convictions carrying penalties with them. Fortified with that idea, he had searched the Act carefully, and he came across sub-section 11, section 200, as to which he would say that its bad draughtsmanship was remarkable. The section dealt with penalties attached to the infringement of many more or less important matters, and it wound up with the words, "and any other thing prohibited by the Act." In his opinion, the offence of building beyond the general line of frontage came within the meaning of those words, and as it certainly came within the spirit of the Act, he was convinced in that way the deadlock was removed, and a penalty rendered permissible and possible. As the defendant promised to demolish that part of the building which extended beyond the line of frontage, Mr. Lane imposed the nominal penalty of 1s., with 2s. costs.

LORD SALISBURY'S STRAND PROPERTY.—THE ATTORNEY GENERAL AT THE RELATION OF THE STRAND DISTRICT BOARD OF WORKS V. KIRK.—Mr. Methold moved in this action, before Mr. Justice Kekewich last week, to restrain the defendants, Mr. Frank Kirk, a contractor, his servants and agents, from permitting an excavation or trench on premises in Little Newport-street, Strand, to remain open, and from allowing the footway on the south side of the said street to remain without proper pavement. Mr. Methold said that the excavation was full of water, and caused a nuisance to the neighbourhood from the smell. Mr. Horace Kent and Mr. Allan Maclean, for the defendant, said that Mr. Kirk had entered into possession of the premises under a building agreement with Lord Salisbury, the ground landlord, and had erected a hoarding. Lord Salisbury had since determined the agreement, and had taken possession of the hoarding, and claimed to be entitled to the premises. The proper course was to serve notice on Lord Salisbury, the owner, to complete the works. Mr. Justice Kekewich ordered the motion to stand over for the purpose of communicating with Lord Salisbury's solicitors.

BUILDING BY-LAWS AT LEVENSHULME.—Before magistrates at the County Police-court, Strangeways, last week, William Lucas was summoned at the instance of the Levenshulme District Council for infringing one of the council's by-laws by allowing certain houses to be occupied before being certified. The defendant said he saw Mr. Jepson, and undertook, if given till the following Monday, to comply with the council's requirements. He did not expect the council would be so strict with regard to a certificate. He had built 27 houses before, and had no trouble with regard to them. The magistrate said it was an important by-law and ought to be observed. The persons responsible for the health of the district were the district council. The defendant was fined £5 and costs.

THE SKY-SIGN AT THE SAVOY HOTEL.—At Bow-street Police-Court, on Monday, the case of the "London County Council v. the Savoy Hotel Company" came on for final hearing. About twelve months ago the County Council summoned the Savoy Hotel Company for using a sky-sign

without a license. It was stated that the sign objected to consisted of large letters on the roof of the hotel, forming the words "Savoy Hotel and Restaurant." Mr. Vaughan held that it was not a sky-sign within the meaning of the Act, as, in consequence of a board at the back, the letters were not visible against the sky. He therefore dismissed the case, and allowed the defendants £5 5s. costs. The Council appealed against this decision, and the Court above ruled that it was erroneous, and directed the Magistrate to impose a penalty. Mr. Vaughan said he had now nothing to do but give effect to the judgment of the Queen's Bench. The judges had held that the opinion he expressed and the judgment he gave were erroneous, and, whatever his own opinion might be, he was bound to impose a penalty. He fined the defendants 10s. Mr. Chilvers made an application respecting the £5 5s. costs paid by the Council when the magistrate's decision went against them.—Mr. Marshall Hall said it would be returned at once.

CHIPS.

The new organ for St. Alban's Church, Holborn, which has been built by Messrs. Willis, will be opened on Tuesday, the 21st inst. It has cost £3,109, all of which is in hand, and another £1,735 has been subscribed for the new altar, for which designs have been prepared by Messrs. Bodley and Garner. The west wall of St. Sepulchre's Chapel has been decorated by a painting by Mr. C. W. Whall.

The completion of the Indian Institute at Oxford was celebrated on Wednesday by the inauguration of the museum and a lecture-room.

A desirable restoration has been undertaken by the present Vicar of Huttoft, Lincolnshire, in memory of his parents. About 1ft. of the shaft and a half-broken base was all that remained of one of the old Lincolnshire Crosses in Huttoft churchyard. This has been preserved, and added thereto is a new Cross, representing what it was some 400 years ago. Mr. W. Scorer, A.R.I.B.A., prepared the plans for the restoration. The Cross now stands some 17ft. high, comprising base resting on two landings or steps, rising with octagonal shaft, finished with moulded and battlemented cap, the whole surmounted with a Cross proper, which is weathered and battlemented, both sides of same having figures sculptured in bold relief out of the solid, representing on one side Our Lord crucified, the other the Madonna (crowned) with Child. Weldon stone has been used, the whole of the work being from the firm of Messrs. M. Tuttle and Son, architectural sculptors, Lincoln.

The extensions to the Barrow Workhouse Infirmary, Barrow-in-Furness, are being warmed and ventilated by means of Shorland's patent Manchester stoves, with descending smoke-flues, the same being supplied by Messrs. E. H. Shorland and Brother, of Manchester.

Mr. W. J. Wetenhall, J.P., laid, on Wednesday week, the foundation-stone of a Roman Catholic chapel to be built in the St. Pancras portion of the Finchley Cemetery.

The Bishop of Chichester consecrated, on Monday, the new church of St. Peter at Eastbourne. The building stands on land given by the Duke of Devonshire, who also contributed £5,000 in money. Edna Lyall, the novelist, was a liberal subscriber, and the oak pulpit is the gift of Mr. Edgar Hoare.

As the result of conferences which have lately been held between the city parish council and the managers of the Edinburgh Royal Asylum, to consider the question of erecting a new asylum for the accommodation of pauper lunatics, it has been agreed that application should be made to the General Board of Lunacy to have the city parish constituted a separate lunacy district under the provisions of the Lunacy Districts (Scotland) Act, 1887, and for authority to erect an asylum in the new district for the housing of not less than 400 pauper lunatics.

The gymnasium, social rooms, reading-rooms, refreshment-rooms, and other parts of the Northampton Institute, Clerkenwell, were opened for the use of members on Saturday. This institute has been erected on a site given by the Marquis of Northampton, from designs by Mr. E. W. Mountford, F.R.I.B.A., selected in competition, and was illustrated in our issue of April 21, 1893. Mr. Walter Wallis, of Ramsden-road, Balham, is the contractor, and Mr. Isaac Gard the clerk of works. All the floors to corridors and stairs are of fire-resisting construction, of coke breeze and cement laid on steel girders, carried out by the contractor on his own system. The steel work has been supplied by Messrs. Moreland and Co. and Messrs. Lindsay, Neale and Co., but are being fixed by the contractor, who is also constructing all the flooring. The heating is steam, and is being carried out by Messrs. Z. D. Berry and Sons, of Westminster, and the windows are fitted with the National Accident Prevention apparatus.

PARLIAMENTARY NOTES.

PUBLIC HEALTH AMENDMENT BILL.—In the House of Lords on Tuesday night, the Order for the third reading of the Public Health (Sewers and Drains) Bill being reached, Lord Beauchamp, who had charge of the measure, asked leave to withdraw it, as, owing to the changes made in it by the standing committee, if passed as it stood, it would only aggravate the confused state of the present law which he desired to amend. Lord Russell of Killowen, while approving in the circumstances of the withdrawal of the Bill, suggested to the Government whether the time had not come for consolidating into one coherent statute the whole of the law relating to sewers and drains as connected with the public health. The Bill was accordingly withdrawn.

STATUES, MEMORIALS, &c.

NORWICH CATHEDRAL.—A memorial to the late Bishop Pelham was unveiled on Tuesday in Norwich Cathedral. It consists of a recumbent effigy of the deceased prelate in his episcopal robes, resting upon a cenotaph. The base is of Kilkenny marble surmounted by carved Derby alabaster, and inlaid with tablets in Connemara marble. On the west panel of the cenotaph there is a mitre, on the south side the arms of the See impaled with the Pelham arms, and on the north side the Pelham arms alone. The effigy, in Carrara marble, has been executed by Mr. James Forsyth, of Finchley-road, Hampstead, who was the sculptor employed upon the Goulburn pulpit erected in the nave of the same cathedral. The inscription is as follows:—"The Honourable John Thomas Pelham, D.D., 65th Bishop of Norwich, 1857. Died 1894, aged 82. Erected by a few of the many friends who loved him." The memorial is placed in the north transept, in front of the door through which for many years it was the custom of the late Bishop to enter the cathedral from the Palace gardens.

WATER SUPPLY AND SANITARY MATTERS.

CHESTER-LE-STREET.—At the last meeting of the Chester-le-street Rural District Council, it was unanimously agreed to proceed, as soon as practicable, with the execution of two comprehensive and complete schemes of main sewerage and sewage disposal, to meet the requirements of the Local Government Board and Durham County Council, per plans and estimates prepared by Mr. D. Balfour, M.Inst.C.E., F.G.S., of Newcastle-on-Tyne.

LONDON WATER SUPPLY.—The Water Committee of the London County Council have engaged the assistance of Sir Benjamin Baker and Mr. G. F. Deacon, of Liverpool, to advise them in connection with the Welsh water scheme, and have drawn up a form of reference to be submitted to them. The engineers are requested to consider the detailed proposals, plans, and estimates contained in Mr. Binnie's report of June 8, 1894, in connection with his scheme for obtaining water from the valleys of the Usk, Wye, and Towy, and their tributaries, and to advise the committee as to their suitability and sufficiency, or otherwise. They are also requested to report on the question of the practicability and the cost of carrying out schemes of storage for providing 200,000,000, 300,000,000, and 400,000,000 gallons per day respectively from the Thames on the lines of the suggestion in the report of the Royal Commission. The engineers are further asked, taking into consideration the whole of the circumstances of the case, and having regard to the increasing rate of consumption per head, to give their best advice to the council as to whether or not it would be more advantageous to bring into London from the proposed Welsh sources than from the Thames the additional quantity of water over and above the quantity at present supplied which will be required for the supply of the population of 1½ millions, as estimated by the Royal Commission. Lastly, the engineers are requested to advise generally as to whether, in their opinion, there is any other source of supply for the Metropolis which presents such *a priori* advantages over either the scheme proposed by the engineer of the London County Council or the suggested scheme of storage in the Thames Valley, as would justify the selection of such other source in preference to both of the last-mentioned schemes.

At Friday's meeting of the London County Council the Theatres and Music-halls Committee submitted for approval drawings of two new London theatres. The first is one which is intended to erect at Fulham, fronting the High-street, and close to Putney Bridge and the railway. The site is bounded on all sides by public thoroughfares, and the building will accommodate 1,105 persons. The other theatre is to be known as the Regent Theatre, the site of which has a frontage of about 96ft. to Norris-street, and of 95ft. to St. Alban's-place, Haymarket. It is proposed to widen both those thoroughfares.

Our Office Table.

MR. HOLBROOK GASKELL, of Woolton Wood, near Liverpool, has presented to the National Gallery an important picture by William J. Muller, entitled "Dredging on the Medway." The picture is hung in Room XXI. The following bequests have been made to the gallery:—A picture by Charles Brookings (1723-1759), representing "A Calm at Sea," in the style of Van de Velde, bequeathed by the late Rev. Richard G. Maul—hung in Room XVI.; and a number of small works in oil, water-colour, and pastel, including sketches by Wilkie, six miniatures, a portrait by Downman, and a portrait in pastel of Mrs. Siddons, by Sir Thomas Lawrence, bequeathed by the late Miss Julia Gordon. These will be hung in the small octagon room in the west wing. The following pictures have been purchased in Madrid:—Two small pictures by Francisco Goya—"The Picnic" (La Merienda Campestre) and "The Bewitched" (El Hechizado por Fuerza), bought at the sale of the Duque de Osuna's collection, and a half-length portrait of Doña Isabel Lobo, wife of Don Antonio de Porcel, also by Goya, from a private collection. These pictures were hung on Monday on a screen in the Spanish Room, No. XV. Mr. George Salting has lent a work of the Florentine School, "The Virgin Adoring the Infant Christ," which has been hung in Room No. 1.

In addition to the two frescoes already placed in position at the Royal Exchange—the gifts of Lord Leighton and Mr. Deputy Snowden—several promises of paintings have been made to the Joint Grand Gresham Committee in response to their appeal. Those who have promised paintings include the Corporation, the Mercers' Company, Sir Samuel Montagu, Bart., M.P., and Mr. Carl Meyer (of Messrs. Rothschild and Sons). Subject to the assent of the Joint Grand Gresham Committee, the Merchant Taylors' Company and the Skinners' Company will contribute a further painting, illustrative of the reconciliation which was effected between the two guilds by the award of Lord Mayor Sir Robert Billesden in connection with the famous "precedence" dispute four centuries ago.

SINCE the presentation of Kirkstall Abbey to Leeds in 1889 by the late Colonel North, a transformation has been wrought in the appearance of those historic ruins and the adjoining grounds. The ivy that had overgrown them has had to be removed, for its roots were slowly but surely forcing their way between the masonry and parting the stones. The task of strengthening the tottering walls and crumbling tower was a difficult one, and here and there portions had to be rebuilt. The Abbot's house now alone remains to be dealt with, and in a few months the whole of the preservation work will be finished. A 36ft. carriage drive has been made round the Abbey, and several gravel footpaths. There are, too, pretty garden plots and rockeries. A couple of hundred beeches, poplars, sycamores, and limes have been planted in various parts of the grounds, whilst several rows of willows grow on the river bank. The old barn has been practically rebuilt, and now forms a spacious refreshment-room. The whole cost is estimated at between £12,000 and £14,000.

THE Leeds Corporation have at present under consideration the advisability of carrying out an important street improvement in the centre of the city, by the widening of Wood-street, a narrow irregular thoroughfare from Briggate to Vicar-lane. The corporation recently considered a plan showing the lines of a proposed new street 42ft. wide. At present Wood-street is 12ft. wide at the Briggate entrance, then it spreads out to 26ft., and narrows again to 18ft. wide. The owners of the property offered to sell the land required for a 42ft. street for £20,000, and to erect on both sides of it shops and other business premises. A sub-committee of the corporation has inquired as to the cost of carrying out an alternative scheme—a new 42ft. street from Briggate through the Shambles into Vicar-lane, which would cost for land £22,000. A final decision has not yet been arrived at by the committee.

In a recent paper on "The City and South London Railway," by Mr. James Henry Greathead, M.Inst.C.E., the author describes several interesting details of the tunnels, which are constructed by the aid of a shield of improved design and

compressed air. It is stated that the tunnels on the City section are 10ft. 2in. in diameter, and are composed of rings 1ft. 7in. long, each ring consisting of six segments and a key-piece. Southwards of the Elephant and Castle the tunnels are 10ft. 6in. diameter, on rings 1ft. 8in. long. The flanges are 3½in. deep and 1½in. thick. The plates are nearly lin. thick on the City section. All holes were cast in the plates and flanges, and in no case was there any tooling of any kind upon the plates. They were cast from soft grey pig, and dipped into a solution of pitch and tar while hot, which formed a good tenacious glazed coating when cold. The joints of the flanges (horizontal) had soft pine packings ¼in. thick, and in the vertical joints a rope of tarred hemp between the bolts and the chipping edge. Subsequently the whole of the joints were painted with Medina cement. Through the water-bearing strata iron cement was caulked into the joints in place of Medina filling, and with excellent results, the tunnels being absolutely water-tight.

THE valuable geological collection at Peel Park, Salford, which some years ago was withdrawn from public view, has been entirely rearranged, and was opened for inspection on Tuesday evening. The process of rearrangement has been carried out by Mr. Herbert Bolton, of the Manchester Museum, Owens College, who has been occupied in the work for about a year and a half. The minerals have been rearranged according to Dana's system of mineralogy, the rock specimens in accordance with Fletcher's "Guide to the Study of Rocks," and the geological series in accordance with standard authors. Mr. Bolton has added one or two special groups, including one representing the structure of coal, and another that of building stone—the latter with a view to show the value of the various kinds of stone used for building purposes in Manchester and Salford. A number of valuable gifts have been made to the museum by the Clifton and Kearsley Coal Company (who have sent a complete illustration of the local coal measures), the Bridgewater Trustees, the Manchester Museum—with which institution exchanges of duplicates have been made with advantage to both institutions—the British Museum and the Museum of Science and Art, Edinburgh. The collection, as it is now presented, promises to become an important factor in the educational progress of the borough.

THE present code of by-laws in force in Birmingham was framed so far back as 1841, and has been frequently added to and amended. In the course of time many of the regulations have become obsolete, and others are superseded by general legislation. The corporation have now decided to promulgate an entirely new code, taking as their model in the main those recently sanctioned for Warwickshire on the initiative of the county council for that area. On Monday last, at a special meeting of the Birmingham Watch Committee, the town clerk of the city submitted the draft of the new by-laws. These were approved, subject to a few verbal alterations, and will be submitted to the Home Secretary for his provisional approval prior to their being formally submitted to the city council for confirmation.

THE annual picnic of the Bristol Master Builders' Association was held on Tuesday, when an excursion was made to Marlborough by train, and thence by road through Savernake Forest. A long drive through an avenue of lime-trees brought the party to a point where a view of the north front of Savernake Forest House was obtained. Here also was seen a lofty column, erected in 1789 to commemorate events in the life of George III. At Marlborough arrangements had been made for a view of the interior of the College Chapel, which was re-erected on the site of the old building in 1886. Subsequently dinner was partaken of at the Ailesbury Arms Hotel. The president of the Association, Mr. C. A. Hayes, occupied the chair. Mr. Mark Whitwell, jun., proposed the toast of "The Town of Marlborough," coupling with it the name of the Mayor. Mr. Allen gave "The Health of the President of the Association." Mr. Hayes having responded, Mr. G. H. Perrin proposed the toast of "Kindred Associations," coupling with it the name of Mr. E. W. Wooster, president of the Bath Association. Mr. E. G. Clarke submitted the toast of "The National Association of Master Builders." Mr. A. Krauss, in responding, said he thought it was probable the association, if invited, would consent to hold their conference in

Bristol in July of next year. Mr. Church also responded.

A LETTER in a contemporary points out that of all our hardwood timbers ironbark holds the first position for sleepers, as while many other hardwoods are excellent for other purposes, their life as sleepers is not more than from eight to ten years. Ironbark has been in use for this purpose for 30 years. The above information is given on the authority of a Sydney firm, who relate that a permanent-way inspector had sent to the Railway Institute several samples of hardwood, amongst them a piece of ironbark (still sound) used as a post, taken out of a house that is alleged to have been built 85 years ago. Anent timber, we hear of rival companies in Western Australia who are trying to decry each other's timber. There are now rival companies, each of whom contends that the jarrah it supplies is better than that cut from another district. In selection and cutting there no doubt are differences of quality. Those who specify should be aware of these, and name accordingly.

THE first number of the *Architects' and Builders' Review*, an illustrated architectural journal, published at 29, Broadway, New York, contains excellent portraits and biographical notices of the architects of Bowling-green Offices in New York, and the Layton Art Gallery at Milwaukee, the brothers William James and George Ashdown Audsley, who will be recollected by most of our own readers as formerly in practice in Liverpool and London, and as old contributors of serial articles to the *BUILDING NEWS*.

CHIPS.

The memorial-stone of a hall which is being added to the Young Women's Christian Association in Bolton-lane, Ipswich, was formally laid on Wednesday. Mr. Brightwen Binyon, of Ipswich, is the architect, and Mr. Pipe has taken the contract for the building at £661.

The Freehold Board School at Rochdale was opened last week. It faces Tweedale-street, and accommodates 440 scholars. The plan is that of an assembly hall, 60ft. by 30ft., with classrooms at each end, and other four classrooms at the rear. The walls are of Ruabon bricks, with buff terracotta dressings. Messrs. Woodhouse and Willoughby, of Manchester, were the architects, and Mr. James Lord, of Entwisle-road, Rochdale, was the clerk of works. The general contract was let to Messrs. W. A. Peters and Sons, of Rochdale, who have themselves carried out the joiners' work, brick-setting, plumbing and glazing, gas-fittings, &c.

The Local Government Board have sanctioned the borrowing of various sums, amounting to £4,900, for new gas-mains, storm-water sewer, and other public improvements at St. Helen's, Lancs.

The memorial-stone of a new school, which is being erected by the Bothwell School Board in the mining village of New Stevenston, was laid on Monday. The school will accommodate 584 children, the estimated cost being between £6,000 and £7,000.

Messrs. Whitaker Brothers, contractors, of Horsforth, near Leeds, have just entered into a contract with the North-Eastern Railway Company to construct a double line of railway from Neville-hill to Hunslet, and also to build a large goods station for the company at the latter place.

On Thursday in last week Mr. David Gray, president of the Peterborough Master Builders' Association, caught his hand in a planing machine, and the ends of the two first fingers of his left hand were amputated.

On Saturday, the new Episcopal church dedicated to St. Columba, and situated on Dumbarton-road, Clydebank, was opened with special services. The church is of red stone, in the Early English style, and consists of chancel, nave, two transepts, side-chapel, and vestries.

The Burnley Town Council decided, on Monday, by 36 votes to 9, to accept the offer of Lady O'Hagan to dispose of Towneley Hall and 62 acres of the park surrounding it, for the use of the town. The purchase price is £17,500.

At the Trowbridge Cottage Hospital on Wednesday week, an inquiry was held by Mr. Sylvester, district coroner, into the death of George Bailey, of Wingfield. From the evidence it appeared that on the previous Friday evening Bailey, while engaged upon some carpentering work on the roof of the new Technical Institute at Bradford-on-Avon, fell to the ground, a distance of some 30ft., fracturing his right thigh and arm, besides receiving injuries to his chest. He died at the Trowbridge hospital on the Tuesday. The jury returned a verdict of "Accidental death."

MEETINGS FOR THE ENSUING WEEK.

SATURDAY (JULY 11).—Architectural Association. Visit to the new Metropolitan Fever Hospital at Lewisham Park. Cannon-street Station, 2.20 p.m.

CHIPS.

The will of Mr. George Ambrose Wallis, surveyor and estate agent, of Fairfield Court, Eastbourne, has been proved, the personal estate being £85,438.

A new mortuary is being erected at Ratcliffe. Special consideration has been given to the ventilation, which will be carried out on the Boyle system.

The memorial-stone of the new Industrial School for Girls at Ayr was laid on Monday. The buildings are situated on the east side of the Glasgow and South-Western Railway, near the Boys' Industrial School, and supersede premises in Carrick-street, and the total cost will be about £5,000.

Ex-Provost M'Lean, of Govan, on Saturday unveiled, in the Southern Necropolis, Glasgow, a granite Celtic cross, which has been erected by the Clan Maclean Association to the memory of Lachlan M'Lean, of Coll (1798-1848), author of "The History of the Celtic Languages."

The Keighley Corporation have been applying for sanction to the borrowing of £9,000 for the purchase of 67½ acres of land belonging to the Riddlesden Hall estate, as a sanitary tip for dry ashes. This will make the Corporation owners of land along the right bank of the Aire from the Gasworks to the Bingley boundary. The new ground may also afford further facilities for sewage treatment. Col. W. Langton Coke, M.Inst.C.E., held a Local Government Board inquiry at Keighley on Monday, and found no opposition to the application.

The new mission church at Par Green, near Tywardreath, built at the sole cost of the Bishop of Truro, was opened last week. It has been erected from designs by Mr. Edmund Sedding, of Plymouth; Mr. Philip Blowey, of the same town, was the contractor. The materials are Luxulyan granite, supplied by Messrs. Freeman, with Polyphant stone dressings, and Delabole slate roofs. The roof is of the Cornish barrel type and 30ft in span. The style is local 15th-century, and the cost has been about £1,000.

Trade News.**WAGES MOVEMENTS.**

THE RECENT DISPUTES IN THE LONDON BUILDING TRADES.—It is highly satisfactory to be able to report that the disputes in the Metropolitan building trades, which came to a crisis on May-day, are now settled in every department. On Wednesday afternoon a conference took place between the representatives of the plasterers and the Central Association of Master Builders, which resulted in a settlement of the plasterers' strike, which has now been going on for nine weeks. The employers conceded an advance in wages of ½d. per hour, and a code of working rules was drawn up, the most important of which run as follows:—(10) "That in the event of any dispute arising on any job or works, the district officials of the National Association of Operative Plasterers shall send a written notice to the Central Association of Master Builders, who shall inform them whether the said builder is a member of that body. If so, the strike shall not be sanctioned by the National Association until six clear days shall have expired from the receipt of the notice, during which time the matter shall be considered by the employers and the workmen with a view to an amicable settlement." (11) "This code of working rules shall exist until six months' notice to terminate it shall be given by either party, to expire on the first Saturday in March." The strike has thus come to a close. The bricklayers, plasterers, carpenters, mill-sawyers and wood-cutting machinists, and plumbers have returned to work at an advance in wages of ½d. per hour and a code of working rules which, with more or less stringency, provide that unionists and non-unionists shall work amicably together, and that no dispute shall be undertaken until it has been referred to a joint committee of employers and workmen. The labourers, after being on strike for six weeks, resumed work on the old terms, having refused to accept an advance of ½d. per hour, coupled as it was with the signing of a code of working rules.

Earl Percy has consented to act as President of the forthcoming Congress of the Sanitary Institute, at Newcastle-upon-Tyne, from the 2nd to the 9th of September.

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TENDERS.

* * Correspondents would in all cases oblige by giving the addresses of the parties tendering—at any rate, of the accepted tender: it adds to the value of the information.

BILSTON, STAFFS.—For the erection of new technical schools, for the district council:—
Tildesly, T. (accepted) ... £5,087 0 0
(Lowest tender received.)

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This well-known firm have refused to accept agencies for any one method, whether Interior Conduit, Concentric, or other system, as they recognise that each have their advantages under certain working conditions, and they prefer to be free to advise upon the results of their large experience. Both Partners have been exclusively engaged since 1881 in electric lighting and the application of electricity to power in every branch. A list of 400 houses lit by this firm, to any of which references may be made, will be furnished on application. It includes:—

Chatsworth and Devonshire House, for His Grace the Duke of Devonshire.

Wynyard Park and Londonderry House, for the Right Hon. the Marquis of Londonderry.

Lansdowne House, for the Right. Hon. the Marquis of Lansdowne.

The Bank of England and Branches. North British and Mercantile Insurance Co.

New Scotland Yard; and Prudential Assurance Co., Holborn Bars.

AUDENSHAW.—For flagging and kerbing a portion of Droydsden-road, for the Audenshaw District Council. Mr. J. H. Burton, Warrington-street, Ashton-under-Lyne, surveyor:—

Fielding, H., Droydsden ...	£120 0 0
Underwood Bros., Dukinfield ...	110 4 0
Kinder, H., Hooley Hill (accepted) ...	107 15 1
Worthington & Pownall, Manchester ...	106 12 3
(Surveyor's estimate, £106 1s. 4d.)	

BLOOMSBURY.—For providing covered playground, &c., at the Drury-lane School, for the London School Board:—

Johnson and Co. ...	£315 0 0
Hornett, W. ...	270 0 0
Grover, J., and Son ...	267 0 0
Lilly and Lilly, Ltd. ...	259 0 0
Minter, F. G. ...	235 0 0
Nightingale, B. E. ...	217 0 0
Nicholson, T.* ...	200 0 0

* Recommended for acceptance.

BURTON-ON-TRENT.—For the supply, fitting, and laying of steam-heating pipes at the workhouse:—

Truswell and Sons, Sheffield ...	£375 2 3
(Accepted.)	

[Thirteen tenders received, ranging from £356 7s. to £699 10s.]

CHATHAM.—For erecting at the workhouse a new receiving ward and coal yard, for the Medway Board of Guardians. Mr. G. E. Bond, Rochester, architect:—

A.		B.	
Harris, J. H. ...	£413 5 9	£339 2 0	
Skinner, C. E. ...	420 0 0	360 0 0	
Trueman, J. L. ...	384 0 0	342 0 0	
Phillips, H. E. ...	399 0 0	321 0 0	
Filley, E. W.* ...	410 0 0	302 0 0	
Coker, W. ...	425 0 0	350 10 0	
West Bros. ...	429 0 0	340 0 0	

* Accepted for both.

A.—Receiving-ward. B.—Coal-yard.

CHELSEA.—For removing one iron building and offices from the Rollins-street site, and two iron buildings from the Fiercroft-road site, and re-erecting them in Fulham Palace-road, for the London School Board:—

Hawkins, T. J. ...	£1,186 0 0
Croogin and Co., Ltd. ...	907 10 0
Harbrow, W. ...	900 0 0
Cruwys ...	965 0 0
Humphreys, Ltd. (accepted) ...	963 0 0

CHELSEA.—For interior painting at Allen-street School, for the London School Board:—

Neal, G. ...	£177 0 0
Clifton, H. C. ...	173 0 0
Flood, E. ...	161 0 0
Hornett, W. ...	159 0 0
Lathey Bros. ...	153 0 0
Foxley, G. ...	150 10 0
Hide, W. R. and A. (accepted) ...	116 10 0

CHELSEA.—For exterior painting and interior cleaning at Marlborough-road School, for the London School Board:—

Hornett, W. ...	£378 0 0
Lilly and Lilly, Ltd. ...	357 0 0
Lathey Bros. ...	330 0 0
Foxley, G. ...	321 0 0
Flood, E. ...	312 0 0
Gurting, C. ...	286 0 0
Stimpson and Co. (accepted) ...	260 0 0
Christie, T. ...	237 0 0

CHELSEA.—For exterior painting and interior cleaning (old portion), and exterior and interior painting (new portion), at Westville-road School, for the London School Board:—

Neal, G. ...	£425 0 0
Hornett, W. ...	418 0 0
Cruwys, T. ...	406 0 0
Hide, W. R. and A. ...	335 14 6
Nicholson, T. ...	333 0 0
Christie, J. ...	320 5 0
Flood, E. ...	297 0 0
Brown, W. (accepted) ...	280 0 0

EARLS BARTON.—New stores, manager's house, cottages, butchers' and bakers' shops, and public hall for the Earls Barton Co-operative Society. Messrs. Mosley and Anderson, Northampton, architects:—

Tebbutt and Pratt, Wellingborough ...	£3,100 0 0
Henson, G., Wellingborough ...	3,045 0 0
Sharman, J. C., Cogenhoe ...	2,995 0 0
Grant, J., Bambury ...	2,980 0 0
Branson and Son, Northampton ...	2,950 0 0
Abbott, C. W., Wellingborough ...	2,850 0 0
Johnson and Son, Earls Barton ...	2,825 0 0
Berrill, T. and C., Irchester ...	2,753 0 0
Garrett, J., Northampton ...	2,737 10 0
Chown, A. J., Northampton* ...	2,695 10 0

* Accepted.

(Architect's estimate, £2,775.)

FINSBURY.—For exterior and interior painting at Blundell-street School, for the London School Board:—

McCormick and Son ...	£772 0 0
Dearing, C., and Son ...	663 0 0
Riley, J. ...	624 0 0
Williams, G. S. S., and Son ...	605 0 0
Foxley, G. ...	542 0 0
Steven Bros. (accepted) ...	540 0 0

FINSBURY.—For exterior and interior painting at Church-street School, for the London School Board:—

Britton, F. ...	£688 9 0
McCormick and Sons ...	474 0 0
Grover, J., and Son ...	446 10 0
Dearing, C., and Son ...	429 0 0
Steven Bros. ...	309 0 0
Nicholson, T. ...	295 0 0
Barker, G. (accepted) ...	263 10 0

FINSBURY.—For removing three iron buildings and offices from the Durrell-road site and re-erecting them on the Montem-street site, and providing foundations, drainage, fencing, and new cloak-room at the Montem-street School, for the London School Board:—

Cruwys, T. ...	£1,000 0 0
Charteris, D. ...	950 0 0
Croogin and Co., Ltd. ...	875 0 0
Harbrow, W. ...	745 0 0
Humphreys, Ltd. (accepted) ...	730 0 0

FINSBURY.—For providing and fixing Kindergarten gallery at Vittoria-place School, for the London School Board:—

Dearing, C., and Son ...	£98 0 0
Grover, J., and Son ...	95 0 0
Williams, G. S. S., and Son ...	90 0 0
McCormick and Sons ...	88 0 0
Stevens Bros. ...	80 0 0
Marchant and Hirst ...	73 10 0
Cruwys, T.* ...	70 0 0

* Recommended for acceptance.

EAST LAMBETH.—For erecting offices and providing drainage, &c., at Hollydale-road School, for the London School Board:—

Parker, G. ...	£2,120 0 0
Goad, W. V. ...	2,033 0 0
Holliday and Greenwood ...	1,997 0 0
Dowds, W. ...	1,984 0 0
Lathey Bros. ...	1,963 0 0
Marland, J. ...	1,940 0 0
Bowyer, J. and C. ...	1,896 0 0
Akers, W., and Co.* ...	1,869 0 0

* Recommended for acceptance.

HACKNEY.—For providing and fixing Kindergarten gallery, &c., at the Sidney-road School, for the London School Board:—

Dove Bros. ...	£152 0 0
Staines and Son ...	144 0 0
Grover, J., and Son ...	138 0 0
Dearing, C., and Son ...	134 0 0
Martin, W. ...	126 10 0
McCormick and Son ...	120 0 0
Cruwys, T.* ...	108 0 0

* Recommended for acceptance.

HACKNEY.—For providing and fixing Kindergarten gallery at Tottenham-road School, for the London School Board:—

Dearing, C., and Son ...	£96 0 0
Grover, J., and Son ...	88 0 0
Ballard, W. T. ...	85 0 0
Knight, H., and Son ...	85 0 0
Martin, W. ...	80 0 0
Britton, F. ...	75 0 0
Cruwys, T.* ...	75 0 0

* Recommended for acceptance.

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THE BUILDING NEWS

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AUTHORITY, ANCIENT AND MODERN.

ACCORDING to the present system of art, the professional architect is the general arbiter and supervisor of every trade. He is expected to be a master of all branches, to lay down the rules and method of procedure, to decide in case of dispute, though, as a matter of fact, he may be very much influenced and directed by those whom he presumes to direct. He designs in the mass; but in practical detail a great deal is left to the judgment and operative skill of the builder or workman. We often, indeed, wonder how much of the actual building belongs to the architect. Its general design and conception may have been to a very large extent borrowed. How much of its plan, its proportions, and its details have been indirectly derived from previous types, handed down, so to speak, according to a law of heredity, from original germs, stored up as it were, unconsciously in the architect's brain, and ready to be laid under contribution at a moment's notice, like a maxim remembered, or a rule or formula that has become a very part of one's individuality. We learn to repeat a story, or to copy or draw from memory a work of art: the elements have become part and parcel of our education. They are not so much dependent on thought as on memory, and an instinct to conjure up the image in the mind. We call it design, and so it is in a sense; it is the putting together ideas we have acquired by study and experience into a harmonious whole that pleases. But it is not wholly the creation of the brain; it may be very largely an imitation, an amplification, a paraphrase if we like, of something we have seen before. Our study of examples, of types, of plans furnish the mind of the well-educated student with these elements, and enable him at a moment's notice, with the facility of being able to express them on paper, to design any building he requires; and if the general design is thus derived, how much of the construction and technical details of it belong to the architect? Although invested with supreme authority in the contract, whose opinion and decision are to be regarded as final, and therefore ostensibly a master himself of every trade, it would be extremely hard to say how much of the actual work and execution of the building belong to him, and how much to the client, to the builder, and to the separate contractor. Each of these has had some share in the building. The client himself has been troublesome from the very first. Has he not forced upon his architect's attention a plan or an idea? How much of the plan is not due to the client and his lady; to their insistence on some little piece of arrangement they have seen before? How much of the real domestic convenience of the plan is not due to her keen sense of the way the connection of the drawing-room with conservatory, the dining-room and butler's pantry, or the dressing-room and bedrooms and closets are planned? Her eye for artistic upholstery and decoration has made a *coup de main*, or her experience of the *cuisine* has improved the original arrangement. One of the hardest lessons the strong architect has to learn is the art of complying. When he is not sure that there is no great harm in doing so, the lesson is easily enough learnt. The man who has no idea of his own worth fighting for, easily gives in to the client; and he is, after all, perhaps, the most popular. The compliant architect is sure to meet with the smiles and

good graces of all ladies, unless, indeed, something turns out wrong, and then he is blamed for his want of firmness. And when one comes to think, Mr. Tenderly may fully comply with everybody—with his client, his wife, the contractor, clerk of works—that his own design is practically frittered away. He can no longer call it his: it is a compromise—no one is satisfied. But there is a good deal in this easy-going compliance that goes down, and may really be commended to the notice of the young "Sprouts" of the profession who indulge in the social observances, or those "ornamental phases" which go to make up the equipment of a young architect. He may bear "five letters," have gone through the courses of the Association, be licensed to practise architecture; but it is all of no use if he is not well up in those little social customs and usages which are to be acquired over and above the attainments that are regarded as necessary. He is dependent, as we are told, on prepossession with his client, to be "nice," and to be "the thing," never to differ nor agree too readily, "have two little ways, one for the girls, another for their mothers." All this is true enough, and serves to point out how much in modern practice depends on a spirit of compliance and affability, of avoidance of extremes.

Authority then is frittered away to a desire to please. And is it not so with the architect's relation to the contractor? Though he has complete authority over the builder, he is often afraid to exercise it. He knows how low the contractor has accepted the work, and he is unwilling to insist upon an exacting compliance with the specification. In another case, he is not willing to insist on the standard because he is not sure that his specification is practicable in all points; he is afraid, in other words, of exposing his ignorance in many ordinary matters, like qualities of stone and timber, in details, plumber's work, heating, and such like. He specifies a good deal that he knows nothing about, he is well aware of his own vagueness in respect of certain things, like plumbing, details, or heating arrangements, and if he is sensible he will not insist on points about which he is not quite sure. It is not worth while to jeopardise one's authority by an open exposure of ignorance to a carpenter or plumber about a detail of a truss or a "wiped" joint. So he lets it pass. The contractor gets the benefit in one shape or another, so that the architect's authority is bartered for peace and quietness. The separate contractor who undertakes a branch of the work or a certain trade, say the engineer's work, is perhaps even more master of the situation. Though the architect under the terms of the contract is empowered to direct and approve of all he does, he practically has the control, and often he makes his own details. Let us suppose it is an iron roof over a hall or a swimming-bath. The architect leaves the details entirely to the engineer; he calculates the stresses, specifies the sectional areas and the details of connection; the former can scarcely insist that any of the details are wrong, or that the particular sectional area of principal or strut is not sufficient. He may give general directions, but is hardly competent to condemn or approve with the same confidence as he would a detail of a moulding or a piece of woodwork. And is he not in the same powerless condition in the case of a sub-contract for an hydraulic lift or a system of heating? He specifies what is wanted; but it would be unwise for him during the progress of such work to interfere and say he wanted a ram of certain diameter or construction, or steam-pipes arranged in a particular way. In all these matters, implicit reliance is placed in the specialist. Very few competent tradesmen would tolerate interference in the details of their special work, and even the workman himself, little individual interest as he may have in the building,

has an influence on it. Even the framing of a door and the arrangement of a mitre may be different from the architect's intention—in fact, every craftsman, however humble, imparts to the workmanship a certain personality of his own. How much, then, does a building represent the thought and intention of the architect in its various parts? No doubt it is true to say that the conscientious and artistic architect impresses the building far more than the simply "professional" practitioner, who, as the "general agent" of his employer, is satisfied to generally supervise the arrangements of the building, and control everything from his office. This is apparently the sense in which the modern architect carries on his work; but it is not the sense implied by the contract, which is expressly that he is to be arbiter and judge of the work, and not merely a manager of the tradesmen engaged—a sort of commercial agent. The Vitruvian standard of accomplishments, which requires him to be a master of all the sciences, and a skilful operator, as well as a judge, far exceeds also this perfunctory nineteenth-century view of the architect's duties.

If his control is supreme, as it is assumed to be, the modern practitioner has very far gone from his original state. He is no longer an artist or a judge. With few notable exceptions—and those among the leaders of the profession—he is simply the "figure-head" of a number of transactions and trades; an intermediary between the owner and the builder. A supreme control in its best and highest sense means a good deal more than a general external supervision. It is well for the professor of the present day to ponder over these anomalies of his present position. He pretends to be the master builder, the "master workman," the "magister" who designs and directs every detail; but in point of fact he has very little left him to do after his official duties are discharged and the contractor enters upon the work. The authority of the architect is limited to his office and drawing-board; the supervision and control are divided between client, contractor, and workman. Who has the control, except it be the man who employs the workmen, who orders them to do the work in the easiest and cheapest way they can? The supreme control will only be centred in the architect when he again enters into the life of the crafts, carries his design into the workshop instead of leaving it with the builder outside the office doors, and impresses his own spirit on the work. To again hold the position of "master builder" or "master of the work," described by Viollet-le-Duc, and represented by such men as Erwin de Steinbach and the Williams of Canterbury, the professional man must do as they did. Le Duc sums up the position correctly when he says "during the 15th century the high position which the architects of the 13th and 14th centuries occupied declined, and the buildings lost that grand character of unity which they had preserved. One perceives," he adds, "that each body of tradesmen worked on its own line without one general direction. This fact is striking in the many documents which remain to us from the 14th century; the bishops, chapters, and nobles, when they desire to build, summon the master masons, carpenters, sculptors, carvers, ironworkers, and plumbers, and each makes his estimate and his independent bargain. Of the architect there is no question: each craft executes its own proper project." In these days the workers are always under "general directions," often vague and misleading. To return to the old and better standard thus put before us, the architect must again live amongst his craftsmen—come from his office into the workshop—come to dwell, so to speak, in the flesh amongst the workers of the art, and permeate them with the spirit and life of it.

VULNERABLE CLAUSES.

THE London Building Act, despite its remodelling and consolidation, continues to give work to both lawyers and litigants. Every now and again some one finds out a weak point in some section in its bad draftsmanship, and refuses to do such and such a thing that he must know the intention of the framers was should be done. There are those who like to evade an Act of Parliament, if they can do so by the means of any vagueness or looseness of description; they contravene a section or a rule, believing that any doubt as to the meaning of a phrase may be given in their favour; others there are who deliberately transgress certain provisions of the Act, and when the case is brought before the magistrate endeavour to take advantage of any technical objection that may be raised, rely on some previous decision of the Court, or boldly deny the meaning of the Act. Both classes of litigants are fond of appealing to the letter of the Act when it suits their purpose, and are equally ready to appeal to the spirit whenever they avoid the strict terms. One of the most fruitful sources of dispute is the meaning of the Act respecting "lines of building" frontage. Owners and builders like to avail themselves of the opportunity of taking advantage of a few inches or feet of ground—of building as far in advance of the general building line as they can—although if there is one point of the Act more decidedly laid down than another, it is the rule that no building should be erected beyond the general line of frontage in any street, under certain conditions of distance from the highway. The other day a defendant, of Balham, was summoned by the London County Council for erecting a gymnasium on a site where a smaller building had stood, beyond the line of frontage. Mr. Lane, Q.C., decided in favour of the County Council. He remarked that it was astonishing, after fifty years of Building Acts, there still existed a doubt as to whether or not a penalty could be imposed for one infringement of that particular section under which the summons was taken. According to the actual letter of the Act he had no power to impose a penalty. A court of summary jurisdiction had no power merely to declare rights or pronounce judgments, but to record convictions carrying penalties with them. Section 200, sub-section 11, dealt with penalties attached to the infringement of many matters, and winds up with the words "does any other thing prohibited by this Act," &c., making a person liable to a penalty not exceeding forty shillings. The above infringement came within the meaning of those words. Mr. Lane referred to the "bad draftsmanship" of the latter section—a castigation fully deserved. The sub-section (j) to which we have referred is a general clause which includes almost all infringements of the law, neglects, omissions, and failures; but its position as one of a number of sub-sections in this part of the Act is unfortunate, and must have failed to attract the attention of builders and others. What the magistrate said about this section applies to a great many other clauses to which we need hardly refer our Metropolitan readers.

Several instances of vagueness and bad drafting of sections have been the subjects of summonses during the operation of the new Act. To some of these we have drawn attention. If we confine our present remarks to the section 22, which relates to "lines of building frontages," we shall perceive there are "loopholes" through which any unscrupulous builder may manage to escape. The new part of the clause which states that the line of building shall (if required) be defined by the superintending architect "by a certificate, such certificate to be issued within one month from the date of the

application therefor," is open to dispute. It is subject to appeal; but how far a magistrate can interfere with it is a question yet undecided. Clause 182, it is true, provides that the Tribunal of Appeal may state a case for the opinion of the High Court on any question of law. The defining a line seems to rest with the architect mainly, though section 23 gives power to any person aggrieved by the architect's certificate to appeal to the tribunal. Equally open to misunderstanding is the next section (23), which refers to buildings projecting beyond general line when taken down to be set back. The extent to which the building so projecting is to be taken down (*one-half* the cubical extent) will always be a question of doubt. Who is to say whether a house has been taken down to the prescribed extent? The cubical contents would have to be very exactly measured before a brick is touched, and who is to say whether the half of the cubical extent has been exceeded? One foot-cube or less within that limit would save the building. Every effort will doubtless be made in such a case to show that the statutory limit has not been exceeded, and it can easily be managed with care to pull down to an extent that will save the line of building. The Act is full of vulnerable clauses which the shrewd and evasive builders may easily turn to their advantage.

CONSTRUCTION OF STEEL SPIRES AND STEEPLES.—II.

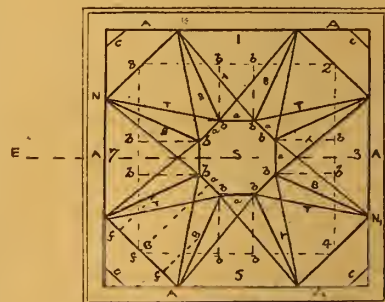
IN our preceding article on this subject we described and illustrated the general principles both theoretically and practically which will be found to govern the design of steel spires and steeples so far as the skeleton vertical section is concerned. Previously to applying these principles to an actual example, which we propose to do, and to thoroughly investigate and "work out," some attention must be given to the plan, or, as it is frequently termed, the horizontal section. It cannot be too carefully borne in mind that all buildings and structures, of whatever material they may consist, but especially when they are of an open work or braced character, must be designed as a whole, and that however excellent and meritorious a plan or horizontal section may be, it will be rendered useless unless it is, so to speak, matched by correspondingly accurate and efficient sections and elevations. It is scarcely necessary to mention that the old motto of *vice versa* applies to the statement just put forward. It is perfectly well known that both the architect and the engineer—especially the former—are frequently terribly hampered by the tremendous discrepancy that exists between the site that is available for the plan, or which, in reality, is almost the plan itself, and the elevation and section, which outsiders ignorantly imagine can be adapted equally well to any site, whatever may be its size or shape.

Although the circular contour has been used for the base or plan of spires and steeples of masonry, it is not well adapted for similar structures of steel, although there is no absolute prohibition against the employment of the cylindrical form. A polygonal base, of which the sides may be equal or unequal, will generally be found to give the best results, both aesthetically and constructively. The number of sides of of which the polygon should consist will depend chiefly upon two circumstances, the one being the size of the tower or support carrying the spire, and the other the shape of it. Hexagons and octagons have both their own especial advantages in this respect, the former answering remarkably well for small examples, and the latter for those on a larger scale. Whether the polygonal adopted be, geometrically speaking, regular or irregular, one condition is imperative in both cases. In the former it is immaterial which side ranges with the façade of the main building, but in the latter it should be the longest side. In neither instance should an angular elevation of the spire be permitted in the centre of the tower or pier acting as the support. Whatever may be the actual shape or dimensions of the sub-structure upon which the spire is built up, the first essential condition is that it should, though

of a different material and of a different description of construction, constitute part and parcel of its stone and brick support. Notwithstanding that to a certain extent the tower or pier upon which it is erected may be regarded as its own particular foundation, a mere simple super-position of the steel openwork fabric upon such a foundation will not suffice to insure the requisite degree of strength, stability, rigidity, or durability. It must be borne in mind that while the dead load or insistent weight of a spire of iron or steel is comparatively small, its sheeted sides and the exposed situation in which they are—in the case of large examples—invariably placed, render them especially liable to be affected by the force or pressure of the wind. It will be subsequently shown, when investigating that part of our subject, that the amount of the leverage tending to overturn the spire, that is to shear it clean away from its supporting tower or base, is very great. This tendency becomes accentuated in foreign countries, which are subject to the occurrence of violent storms, hurricanes, and tornadoes. Yet it is in these very countries that spires and steeples wholly of metal are particularly serviceable, because there they provide no timber upon which the white ant and other equally destructive insects can exercise their depredations, which are well nigh impossible of prevention.

Assuming, therefore, that the stone or brick tower has been completed to such a height above the belfry as is desirable, and the upper surface of the side walls levelled, the erection of the spire can be proceeded with. The shape of the tower will be supposed to be square with sides 30ft. in length, and the first and lowest part of the spire will consist of a steel frame, or platform, or flooring, which must be solidly connected with the upper and—to a certain depth—with the inner surfaces of the walls of the tower. We shall now proceed to ascertain how this connection

FIG. 1.



between the two dissimilar materials is to be satisfactorily accomplished.

In Fig. 1 let the square represent the base of the tower, and the thick black lines the steel cradle or gridiron attached to it, as will be hereafter shown in detail. This gridiron, or veritable *grille de fer*, as our French neighbours term it, is composed of a number of steel sections differing both in size and weight. Those marked "A" may consist of an ordinary rail section, such as what was very extensively employed in the "raft" foundations for the monstrous "skyscraper" buildings erected in New York and Chicago and other large towns in the United States. Ordinary steel rail sections are cheaper than rolled beams, probably on account of the enormous demand for the former. More material is required in the rail section, but the cost per ton is less in that form than in the other. When the span and the load both exceed certain limits, then the rail section must give way to the rolled joist with its greater depth and larger flange area. This has been the case with respect to all the more recent examples of buildings of the type just referred to.

Referring to Fig. 1, all the octagonal sides of the steel cradle 1, 2 . . . 8, the radiating sides B, B . . . B, which if produced would pass through the geometrical centre of the polygon at S, are steel beams. In the centre of the cradle there is provision made for an octagonal-shaped space with sides a_1, a_2, \dots, a_8 , corresponding and parallel to the sides of the primary polygon. This space might be utilised for a staircase or the purpose of ventilation, or for affording temporary access to the spire for inspection, painting, or any repairs that might be required. The sides a_1, a_2, \dots, a_8 ,

in fact, constitute a curb to receive the free ends of the steel girders. B B . . B may be built up of angle, tee, or channel section, or as a plate or lattice girder, either single or in pairs, according to the general dimensions of the design. Those members lettered T T . . T in Fig. 1 are ties introduced for insuring the indeformability in a horizontal plane of each of the separate eight polygons forming the "gridiron." One of these ties is theoretically redundant, for employing the equation—

$$S = (2 \times A - 3),$$

we obtain—

$$S = (2 \times 5 - 3) = 7,$$

whereas in Fig. 1, the value of S is equal to 6. If, however, we remove one of the ties, and it should be observed that as a consequence in so doing one of the angular points or apices, A, also disappears—we obtain from our formula the required identity—

$$5 = (2 \times 4 - 3) = 5.$$

Practically, in construction both ties are needed, because as "the wind bloweth where it listeth," its force and pressure must be adequately allowed for in all possible directions. The whole frame in Fig. 1 is also held together at the four angles by strong gusset or knee pieces cccc.

It will be apparent from Figs. 1 and 2, the latter of which represents a vertical section through the line E F of the former, that the cradle or horizontal base-frame of the spire is supported partly by the side walls of the tower itself, and partly by the octagonal curb which surrounds the opening S. The next point to ascertain is, how is the curb itself supported? For this purpose there are eight cantilevers springing from the side walls of the tower shown in Fig. 1 by the dotted lines b b, and by similar letters in the vertical section in Fig. 2. To the extremity of these cantilevers are riveted the angles, or the junctions made by each pair of sides of the octagonal curb as very clearly shown in Fig. 2. These cantilevers might have been

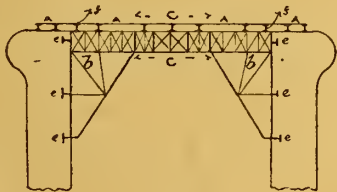


FIG. 2.

differently arranged, and the number halved by causing them to project from the side walls at the centre of the sides of the polygon 1, 3, 5, 7. Such a disposition would have been bad constructively considered, as, although supporting the segments or sides of the curb in the centre, the free ends of the sides, or their joints which are the weakest points, would have had no support whatever, except the actual strength of the connection itself. It would be very false economy, and bad designing also, to adopt so defective a method of setting out steelwork. In Fig. 2, the curb C, which really comprises three sides of the octagon, is a lattice-girder, and the cantilevers b b which carry them are solidly attached to the side-walls of the belfry by powerful cramps, e e . . . e. The joists or rolled girders f f, which are riveted to the steel beams A in Figs. 1 and 2, are laid at right angles to the sides 1, 2, 3 . . . 8, of the cradle in Fig. 1, and are shown connected with the side 6 by the lines f r, f a, and f b. They are not shown on the other sides of the polygon, to avoid confusing the figure with too many lines. The upper surface of the steel frame may be covered with flat steel plates, corrugated iron, or, in fact, any of the ordinary descriptions of metallic flooring, care being taken to arrange it so that it should not interfere with the attachments which connect the superstructure of the spires with the steel base just described.

It will be seen, from the plan of the cradle in Fig. 1, that the opposite angles of the opposite faces of the spire are not directly connected in any way. Take, for instance, the two angles N and N₁. These points are, it is true, indirectly connected by a very circuitous route along the component parts of the frame; but the central open S prevents all through-bracing, which is severed at the points b b . . . b, which are opposite to one another, and in the same straight line, such as N N₁. So far as the base in question is

concerned, the want of direct continuity is of little moment, as nearly every part of it is firmly fixed in some one way or another to the solid walls of the tower or the supporting cantilevers. But the case is far otherwise with the trusses which constitute the actual superstructure of the spire itself. The members B B in the line N N₁ represent the lower boom of one of the main trusses, which cannot be severed at the points b b, but must be braced together throughout the whole length N N₁, whether it take the form of a single truss or of a pair of trusses meeting over the centre of the opening. If of the former type, there will be in all four main trusses, and if of the latter eight. In any case, they must all intersect at the centre of the primary polygon, and their junction will assume the direction of the vertical geometrical axis of the spire, and will consist practically of an internal shaft or column running nearly the whole height of the superstructure. The design and construction of these main trusses are peculiar, as will be evident from future description and drawings.

"BUILDING NEWS" DESIGNING CLUB.

A GOLF CLUB HOUSE.

THIS is the concluding subject for the present session of our popular Designing Club, and we think that the way in which the members have sustained the quality of the work done, thereby maintaining the interest and valuable character of their designs, leaves little room for doubt as to the utility of our Club's programme. The subjects given for the year 1895-6 were as follows:—A, "A Country House to cost £3,000"; B, "A Small Public Bath"; C, "A Small Town Church in a Workman's Neighbourhood"; D, "A Gamekeeper's Cottage on the Skirts of a Wood"; E, "A Fall-down Fronted Secretaire"; F, "A Village Public House"; G, "A Block of Stables and Cow Standing"; H, "A Small Branch Bank in a County Town"; and J, the last, "A Golf Club House." This series is as fairly diversified as could well be desired, affording sufficient scope for inventive originality, without attempting special subjects with which students as a rule would not be familiar. The Golf Club House is an up-to-date problem, and, moreover, has a seasonable fitness for a summer exercise. The following are the rather ample conditions printed for the use of contributors, and we thus defined the requirements more fully than usual in order to secure plans which would compare one with the other, and enable a somewhat precise choice to be made in awarding the order of merit:—

J.—A Golf Club House for links on a moor; to be built in brick and timber, with roofs covered by tiles. The accommodation to comprise a general club-room, about 38ft. long by 28ft. wide, with a small refreshment-bar counter, which is not to project more than a few inches into the room, and to be served from the rear; a ladies' room, about 14ft. square, having an E.C. and lavatory attached; a dressing-room for gentlemen, and a drying-room adjoining—the former, say, 15ft. by 18ft., and the latter near 15ft. by 12ft.; a good lavatory and a bath, two E.C.'s, and some urinals to be provided; an attendants' kitchen and scullery, with larder, will be required of suitable size, and not too big. A spacious verandah, about 12ft. wide, is to extend on the first floor along the front of the clubhouse, overlooking the links. This may be contrived over a portion of the ground-floor rooms. The remainder of the first-floor space is to be used for a luncheon-room, 38ft. by about 18ft.; and besides a committee-room of near 300ft. super., a bedroom is required for the two servants, a man and his wife. The luncheon-room must have a small service-room attached, and a lift. The stairs to the first floor are to be 4ft. wide, and convenient to the entrance hall, which is to be 10ft. wide. A water-tank (supplied from a well) will be needed, and this may be located in a square-planned tower, of which a feature may be made externally. The treatment is to be simple and substantial, with due regard to an exposed situation. The building faces the south-west, and being near the east coast, the rear of the premises should be planned to keep out the winds from the North Sea during the winter months. Two plans—one elevation and a view; scale, 8ft. to the inch. Plans may be to 1/4 in. to the foot if a second elevation or section are given—and this may be desirable.

"The Owl" comes first, "Tadpole" wins the second position, and the third place is hardly

won by "Invicta." This last qualification is due to the merit of "Moor" and "Pantile," who run the third design very closely. "The Owl," on the whole, is decidedly the best, and by an adjustment of levels introduces the committee-room ingeniously. The elevation looks a little too much cut up; but it is contrived naturally and quaintly without an entire loss of breadth, even if we are obliged to point out a lack of repose in the treatment of the angle of the building where the ladies' room occurs. Inside this half-canted bay would be pretty enough, but outside a plain piece of brickwork would have been more satisfactory; and, besides, a solid wall would keep out the weather better, for the site, be it remembered, is in an exposed situation, overlooking the North Sea. It is true that "The Owl" has remembered this condition in locating his offices and windows. His club and luncheon rooms are sheltered from the N. winds, and, speaking generally, his design merits commendation. The ceiling of the verandah might have been a little higher in pitch, perhaps, and the lift would curtail a little the bedroom space. These and other minor points of objection, though not overlooked, are reckoned at their true value, and there is no doubt "The Owl" has much improved.

"Tadpole" gives us a different plan, and a great objection to his arrangements is the exposed doorway out of the club-room facing the N.E., the same difficulty telling against him with the big window to the rear of the luncheon-room. The door from the clubroom should open towards the south, if an external door is provided at all, and by sheltering it as "The Owl" has done by a little recess between two bay windows, the doorway obtains some protection from the driving S.W. rains. "Tadpole" gets a through-way verandah; but with the open ends devoid of glazed screens, the draught would be very unpleasant. His elevations call for no special comment, and must speak for themselves.

"Invicta," the third man, has not this advantage—a loss on his account, which is due, to some extent, because his drawing is too broken and slight; aiming presumably at brightness, the author has sacrificed substantiality. His plan is an excellent one, save that the kitchen, too small in itself, is cut up on all sides with doors, hatchways, fireplace, and windows, a perfectly inadequate convenience to serve a luncheon room 38ft. 6in. by 18ft. The external door to the ladies' room lavatory, in this and in the first design, would be best omitted. The covered roof to the tower is not very pretty, and the perspective makes the S.W. end elevation look very thin from back to front. "Moor's" building is sturdy looking, and in some ways effective; but the author has failed to grasp the grace of good proportion, and the ill-effect of partial forms, as for example, in the mal-shaped gable next the quasi-tower, or again, the columns flanking the entrance, with the same diameter at their base as at their necking, the swell in between being inordinate and ungainly. To devote so prominent a position on plan towards the main front to a tank space and store is a thoughtless waste of opportunities. "Pantile" is less ambitious, and so pleases us more, for there is a degree of good taste in quietness which always deserves recognition. Notwithstanding, however, beyond the power of reserve exists a call for inventive conception, and the merely unobjectionable sinks readily, of course, into the commonplace. "Pantile's" gable in timber is not quite that, and his balcony front might pass muster, though the struts to the framing are very much in the way of the onlookers. We judge by the whole effect, and can but condemn the spiritless and uncouth fenestration of the lower part of the façade. The plan is a good one, straightforward and simple; a special note of commendation is due to the author for locating his sanitary arrangements together compactly, without loss of privacy and isolation. "Winton" is a painstaking student, and thus merits recognition, though we should hardly recognise his pavilion, which, with its sort of central tower, might easily be mistaken for a nondescript church, the one-story building to the east looking like a chancel. His plan is excellent, and much in advance of his elevations, and, at any rate, they would withstand the weather better than some. "Winton" ought to improve. "Brian" has a more free fancy, and in execution it is likely that his design would look rather well. The hipped roof is a mistake, and cuts up the design just where it wants breadth and simplicity. The posts in

the club-room intrude upon the floor-space, and in a general way the contrivance is a little too involved; otherwise it is a good plan elaborated with care. A little more skill in drawing and design will make "Brian" a useful man and practical architect. The balcony floor should be lower than the floor inside, and on the ground level the floor ought to be at least 18in. above the ground outside. "Shamrock" suggests figures well and draws freely; but he is careless and untidy and not very clever. The kitchen is placed too close to the main entrance, and the bar should not open into the scullery. His elevation is crude, and his tower is spiritless and squat, finishing considerably below the main roof ridge. "Lancastrian" isolates his kitchen too much from his other administrative buildings. Two porches are not necessary. Externally the design has merit, but the author is wanting in a sense of fitness; and, judging by his drawings, ought to do better than this. "K. K." in a shield, is unobjectionable and poor. His plan shows attention to detail in several particulars, but the main entrance towards the N.E. in so exposed position as our site really is, makes a fatal objection to the adoption of "K. K.'s" plan. "Boer" has much to learn. His architecture we will not criticise, but his plan we may, for it calls for notice. The elevations do not, unless it be a warning to avoid them. The hall is roomy, but dark. The ladies' retiring-room is too prominently located. The bath-room for members should not be reached past the servants' w.c.; if the staircase leading to the serving-room, as shown by the first-floor plan, was drawn in on the ground floor, as, of course, it should have been, this way to the bath-room from the men's dressing-room would be entirely blocked up. If the author, however, intends this stairway to the serving-room to lead off the main staircase, there would be space to get through below it; but even then the arrangement is a very poor one, unsatisfactorily worked out. "Pickwick" is bold and coarse in his drawing, with some idea of planning, for which he is fully credited. The corridor to the rear of the club-room would have to be top-lighted. We cannot admire the elevation, though the three curved bays are pretty. "B" in a circle comes next. The north windows to the club-room would be cold, and no sun could ever enter the apartment to cheer and warm it. The men's urinals are so placed that the ladies' E.C. could never be attended to, excepting through the ladies' lavatory and retiring-room by way of the front entrance—a fatal mistake. "Young 'Un" works like one. Time may overcome inexperience; but in this case the author must learn to draw properly and cultivate good taste. "Onward" and "Vulture" disregard the rules as to the size of the sheets specified.

SCIENCE AND ART GRANTS.

THE Lords of the Committee of Council on Education have decided, with the concurrence of the Lords Commissioners of Her Majesty's Treasury, to modify the existing rules for grants for instruction in science and in art, contained in the Science and Art Directory, and the minute of the 21st August, 1895, as follows, except as regards organised science schools and training colleges, to which these alterations do not apply:—

1. In place of payments on the results of examination, an attendance grant, except as stated below, will be made, on the certificate of the committee of the school, for each attendance of at least an hour's duration on the part of a student who has given not less than ten such attendances during the session. The minimum grant specified will be allowed if the inspector of the department reports that the teaching and equipment of the school are satisfactory, and that the class or classes are not too large for instruction by the staff of teachers. But these grants may be increased in any subject for efficiency up to the maximum specified; the efficiency being determined by the inspector's report, and the success of the class in that subject at the May examination.

(a) 2d. to 6d. for each attendance in a night science class in the elementary stage, and 4d. to 1s. 4d. in the advanced stage; and for each attendance of 1½ hour's duration given to practical work in chemistry, physics, metallurgy, or biology, in a properly equip-

ped laboratory, 3d. to 9d. in the elementary stage, and 6d. to 1s. 4d. in the advanced stage. But no more than 60 attendances in any one subject of science will be counted during one session on behalf of a student, or more than 120 attendances altogether. The payments for attendance in a day science class will be at half the above rates; and no more than 120 attendances in any one subject of science will be counted during one session on behalf of any one student, or more than 240 altogether.

(b) ½d. to 3d.; 1d. to 4d.; 3d. to 6d.; or 4d. to 8d. for each attendance in an art school or class, according to the subject or stage as set forth below. But no more than 20 attendances in any one subject or stage of a subject in art will be counted during one session on behalf of a student, or more than 30 altogether in the elementary stages of two or more subjects; or more than 60 altogether in the advanced stages, or in the elementary and advanced stages together, of three or more subjects.

The grant of ½d. to 3d. applies to geometrical drawing, perspective (elementary stage), and drawing 2b, 3a, 5b (elementary stages).

The grant of 1d. to 4d. applies to modelling 18a, principles of ornament and design (elementary stages), and drawing 3b, 5a, 5b (advanced stages).

The grant of 3d. to 6d. applies to painting from still life, and painting ornament, and perspective (advanced stage).

The grant of 4d. to 8d. applies to advanced stages of principles of ornament, design, and modelling design; to architecture, anatomy, historic ornament, drawing and modelling from the antique, and drawing the antique from memory.

2. No student may be registered in the advanced stage of any subject until he has passed the examination of the department in the elementary stage, or has passed some corresponding examination which is considered by the department to sufficiently meet the requirements of the case. A day attendance is one which commences before 6 p.m., and an evening attendance one which commences after that hour, except on Saturdays, when an attendance after 2 p.m. may be counted as an evening attendance.

3. No student may be registered for more than two years for attendances in either the elementary or the advanced stage of any one subject, or in an art subject without stages.

4. The above grants will only be made if the student is of the industrial class as defined by the Science and Art Directory; and if the attendances for which the grant is claimed are such as can be legitimately registered under the rules. It will be necessary to keep special registers for the attendances in practical work in chemistry, physics, metallurgy, and biology. It will also be necessary to keep separate registers for each stage of a subject in science, and for each stage, or subject without stages, of instruction in art.

5. No attendance can be registered both for a grant under the code of the English or Scotch Education Department or the National Board of Education, Ireland, as well as for a grant from the Department of Science and Art.

6. Honours in science, honours in art, as well as drawing and modelling from the life and architectural design, will continue to be paid upon as at present.

CAST IRON IN BUILDER'S AND CONTRACTOR'S WORK.—XXIX.

By JOSEPH HORNER.

THE terms which were made use of at the conclusion of the last article require some explanation.

The differences in the bending moments on beams differently supported and loaded were illustrated in Fig. 115. The bending moment at the point of support, or fixture, is simply the measure of the force, or weight \times leverage. In Fig. 121 it is $W \times l$, producing a tendency in the beam to turn about a . This, therefore, is a problem of leverage. In a beam fixed at both ends, the problem is that of two levers, for if the beam were cut through at the centre each half would be a single lever like Fig. 121. It follows that all beams when loaded are in effect, and for the

time being, rigid bodies, because their particles are kept at rest by the action of balancing forces about the turning point. The forces acting also on the lever at any distances from a are proportionate to that distance, the exact proportion depending on the manner of loading and support. This is represented graphically in Fig. 121. If the length $a-b$ represents the magnitude of the bending moment at a , then at b the magnitude of the bending moment will be represented by the line $b-l'$.

The stress upon the beam at any unit section of the breadth is uniform, which is the same as saying that the strength of a beam is proportional to its breadth. But in considering the effect of the bending on the depth of the beam the conditions are of a

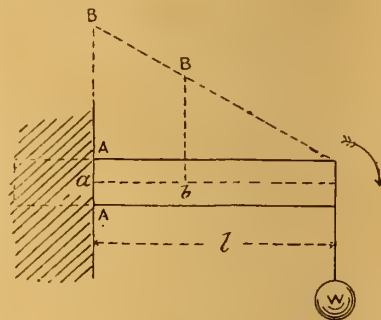


Fig. 121.

different kind. If the cross-section of the beam is supposed to be divided into an infinite number of planes, the force acting upon each plane above and below the neutral axis, or plane of no mechanical effort or stress, is exactly proportionate to the distance of each plane from the neutral axis. That is, a force acting at a distance of 4in. away from the neutral axis will be twice as great as one acting at a distance of 2in. away from it, and the amount of stretching or compression of the fibres will be twice as great also. But the turning effect on the beam, or "moment," is as the square of the distances, so that a force acting at a distance of 4in. would have four times the effect of one acting at the distance of 2in.

In a beam which is to be in equilibrium under the action of bending stresses, and, therefore, practically a rigid body, the bending moment must be opposed by the moment of resistance of the section. That is, the material in the beam must be so arranged as to counterbalance the bending moment, for, if otherwise, the beam would no longer be in equilibrium or rigid under its load. The forces may, for convenience, be represented by a system of levers and weights, Fig. 122, in which the bending moment—viz.,

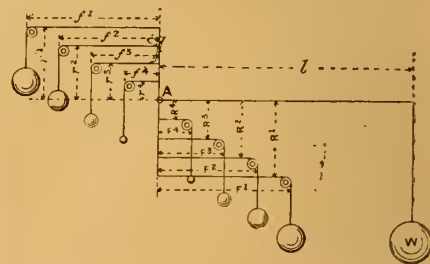


Fig. 122.

$W \times l$ —neglecting the weight of the lever itself, must equal the sum of the moments of the internal stresses or resistances if the lever is not to turn about the point A. If the f 's represent stresses in tension, and the F 's stresses in compression, the r 's, the radii at which the first-named forces act, and the R 's, the radii at which the second-named forces act, then if the system is not to revolve about A,

$$W \times l = f^1 \times r^1 + f^2 \times r^2 + f^3 \times r^3 + f^4 \times r^4 + F^1 \times R^1 + F^2 \times R^2 + F^3 \times R^3 + F^4 \times R^4.$$

From the consideration of the bending moment, to that of the moment of inertia is a natural step. The moment of inertia "I" is a measure of the inertia in a body. It is expressed as "The sum of the products of the mass of each particle of a rotating body into the square of its distance from the axis

of rotation"; or, put into other words:—The section of a body is divided into planes parallel with the neutral axis, and the area of each is taken. Each area is multiplied by its distance from the neutral axis. The results added together give the moment of inertia for that section. The greater the number of sectional areas taken, the more exact will the result be, and if an infinite number are calculated a mathematically accurate result will be obtained. The neutral axis is the axis around which the flexure of the body takes place. And it is found convenient to consider beams and other structures subject to stress, as rotating and gyrating bodies, although they are not so in ordinary language; but only so in respect of the turning effect of loads upon them. In this way the calculation of the strengths of beams brings them into the category of revolving bodies. The method of calculation of stresses by the use of moments of inertia for various sections is one which is adopted in modern offices. The moments I for different sections differ also, and to calculate them involves knowledge of mathematics, for which practical men as a rule have neither aptitude nor time. But formulæ for these moments have been carefully calculated for all common sections, and are available for immediate use.

The moment of resistance or strength of a beam is calculated from its moment of inertia. Since dimensions are always taken in inches, it is only necessary to know the unit stress or stress per inch on a beam and the moment I. The strength of the beam, which has to be equated to the bending moment, is obtained by means of the modulus of the section. It is clear that what is wanted is not merely the strength or resistance of a beam at one section only, but mainly its resistance at and near the outer faces, where the stresses chiefly operate. The particles near the neutral axis are of equal strength with those near the faces, but their strength is scarcely called into play. Now the modulus Z, or strength modulus, supplies the data required, and the formula for this too, like the moment I, has been calculated for all usual sections. Substantially it is obtained by dividing the moment of inertia by the number of inches x , at which the extreme edge of the beam is situated away from the neutral axis, $\frac{I}{x} = Z$. And the greatest stress at the extreme edge equals $\frac{\text{bending moment}}{Z}$. And the

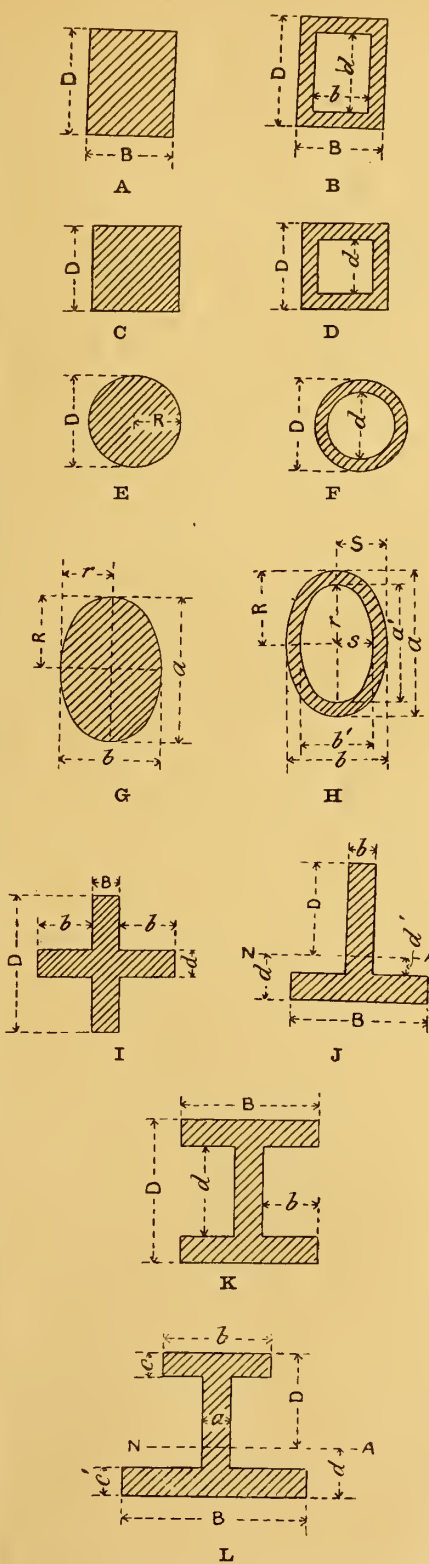
bending moment at any section divided by the modulus Z must not exceed the breaking strength of the material.

The illustrations which have accompanied the foregoing remarks have been those of rectangular beams. But as these are seldom used, except sometimes in the hollow form, in iron castings, the application of the general principles laid down to the forms of beams of various sections will require some explanatory remarks. The differences due to the tensile and compressive strengths of cast iron, with corresponding differences in the position of the centre of gravity, and neutral axis of sections will be considered.

MOMENTS OF INERTIA AND STRENGTH MODULI FOR VARIOUS SECTIONS.

Section.	Moments of Inertia, I.	Modulus. Z.
A	$\frac{BD^3}{12}$	$\frac{BD^2}{6}$
B	$\frac{BD^3 - b d^3}{12}$	$\frac{BD^3 - b d^3}{6 D}$
C	$\frac{D^4}{12}$	$\frac{D^3}{6}$
D	$\frac{D - d^3}{12}$	$\frac{D^4 - d^4}{6 D}$
E	$\cdot 7854 \times R^4$	$\cdot 0982 D^3$
F	$\cdot 7854 (D^4 - d^4)$	$\cdot 0982 \frac{D^4 - d^4}{D}$
G	$\cdot 7854 r (R^3)$	$\cdot 0982 b a^2$
H	$\cdot 7854 S (R^3) - s (r^3)$	$\cdot 0982 \frac{b a^3 - b' a'^3}{a}$
I	$\frac{BD^3 + 2 b d^3}{12}$	$\frac{B D^3 + 2 b d^3}{6 D}$
J	$\frac{b D^3 + B d^3 - (B - b) d^3}{3}$	Depends on dimensions
K	$\frac{BD^3 - 2 b d^3}{12}$	$\frac{BD^3 - b d^3}{6 D}$
L	$\frac{(b D^3 - (b - a) (D - c)^3) + (B d^3 - (B - a) (d - c')^3)}{3}$	Depends on dimensions

Sections referred to in first column of Table.



The preceding table gives a list of the moments of inertia and strength moduli for all sections usually employed in cast-iron work.

SOCIETY OF ENGINEERS.

AN extremely interesting visit was made by a party of the members of the Society of Engineers on Tuesday, July 7, to the M. S. and L. Railway Extension to London Works (Rugby to Byfield section). Among those present were Mr. W. Worby Beaumont (vice-president); Mr. A. T. Walmisley (past president); Mr. George Burt and Mr. Percy Griffith (members of council); Mr. John Etherington, J.P.; Mr. R. Sitwell; Mr. R. Foster; Mr. Ernest Hulburd; and Mr. G. A. Pryce Cuxson (secretary).

DESCRIPTION OF WORKS.

The object of the extension works is to establish an independent depot for the company in the

Metropolis, and, in doing so, to open out new and extensive coal-fields in Yorkshire and Nottinghamshire, and to facilitate the transport of the mineral and agricultural products of the districts passed through. The works were sanctioned by Act of Parliament in 1894. The total length is some 95 miles, commencing at Annesley, and passing through Nottingham, Loughborough, Leicester, Lutterworth, Rugby, Catesby, Woodford, and Brackley, to Quainton-road, where it joins the existing Metropolitan Railway, over which the M. S. and L. Railway Company will have running powers. On approaching London, the line branches off to form a new route into the Metropolis, where it terminates at Marylebone-road, a little to the west of Baker-street. The entire works are divided into three main divisions—viz., the Northern, Southern, and Metropolitan Divisions.

The Northern Division is under the management of Mr. E. Parry, of Nottingham, and comprises that portion of the work lying between Annesley and Rugby. This, again, is sub-divided into separate contracts, taken respectively by Messrs. Logan and Hemingway, Messrs. Lovatt, and Messrs. Topham, Jones, and Raiton.

The Southern and Metropolitan Divisions are under the management of Sir Douglas Fox and Mr. Francis Fox, of Westminster. These comprise the works lying between Rugby and London, and include the works in London. These, again, are sub-divided into four contracts, taken respectively by Messrs. Thomas Oliver and Son, Messrs. Walter Scott and Co. (who have two contracts), and Messrs. Firbank, who have the Metropolitan works.

Contract No. 4, which includes the works from Rugby to Woodford, and which the Society of Engineers visited, is in the hands of Messrs. Thomas Oliver and Son. The works were commenced in the early spring of 1895. In describing the most interesting features of the works, the first to be noticed is the crossing of the Oxford canal by means of four steel girder spans of about 91ft., 91ft., 110ft., and 91ft. respectively. At present the abutment on the south side of the canal is the only portion erected. The Clifton brook is next crossed by a 12ft. culvert, 280ft. long. Then some 100 yards beyond commences the Rugby Viaduct, consisting of a brick viaduct of 13 arches, each 36ft. clear span, and one of 14ft. Abutting on this follow in succession for carrying the railway across the L. and N.W.R. main line, steel plate girder spans of 60ft. and 75ft. span, lattice girder spans of 111ft., 171ft., and 111ft. spans respectively, and a steel plate girder span of 40ft. clear, over the new street diversion about to be carried out. The total length is 385 yards, with a clear width of 26ft. 3in. The height of rails above ground varies between 32ft. and 42ft. The steel work here, as also throughout the contract, is being carried out by Messrs. John Butler and Co., of Leeds. After leaving the viaduct, the line almost at once enters the Rugby cutting of some 3,000 yards in length, having a maximum depth of 48ft. The excavation = 1,300,000 cubic yards. Five important road bridges will span this cutting. The Rugby station and goods yard also form a part of the cutting. An island platform 420ft. long will be approached by staircase from road above. Then follows an embankment $1\frac{1}{4}$ mile long of 49ft. maximum height, intersected by four bridges and two culverts. Comparatively light country is now passed until the main road is crossed leading from Dunchurch to Daventry. Here will be the Willoughby station and goods yard on bank, $4\frac{1}{2}$ miles from the Rugby station. Half a mile beyond is the Leam Valley, spanned by a brick viaduct of 13 arches of 34ft. 3in. spans, 38ft. average height above ground. The Oxford canal is again crossed a little further on by a steel girder bridge of 48ft. span, giving clear height of 11ft. above water-level and 9ft. above tow-path. The line shortly afterwards crosses the Leam and Daventry branch of the L. and N.W.R., by spans of 52ft. between abutments. Another cutting of about a mile in length is entered. Then follow two deep valleys intersected by the River Leam, each valley being spanned by brick viaducts of nine and ten arches respectively, similar in design to the Willoughby Viaduct; a short distance beyond the line enters the Catesby tunnel, 3,000 yards long straight from face to face, and built of red brick, faced throughout with blue brindles, the thickness of the lining varying with the nature of the ground passed through. The tunnel is ventilated by means of shafts placed in the centre line. Immediately south of the tunnel

is Charwelton station. The line then runs through various cuttings and banks to Woodford Station, immediately north of which are extensive engine-sheds, waggon repairing shops, sorting sidings, &c., to be constructed. South of Woodford, the line passes under the East and West Railway, with which there is a junction. This junction forms the end of Contract No. 4. The geological formation of the country through which the line runs on this contract is the blue lias clay. The maximum number of men employed at any one time is about 2,000. The chief bulk of the plant consists of about twenty locomotives, seven steam navvies, and a large number of portable engines and plant of various kinds.

WARMING BUILDINGS BY HOT WATER.—III.

By FREDK. DYE, Author of "Hood on Warming Buildings," &c.

THE LATEST INFORMATION.

THE OVERHEAD SYSTEM.—This style of apparatus owes its name to the horizontal mains (except one) being all carried on the top floor of the building, instead of in the basement as with other systems. In consequence of this, all vertical branches may be said to descend instead

service reaches the highest point, it is terminated with an expansion pipe in the usual way and as shown. From the flow-pipe up at the top is carried the horizontal service (or services), and as they commence to descend immediately they leave the flow-pipe, they constitute return-pipes from that point all the way to the boiler. From the flow-pipe to the point where the return is branched and distributes its work, the pipe would be of the same size as the flow, but directly it is branched the different branches may be of smaller size. In other words, the sizes of the pipes should be proportioned to the work they have to do, much the same as with the older two-pipe system already explained.

As stated, from the point at which the horizontal pipe is branched from the flow, the whole of the apparatus consists of return services, the water pursuing a descending course at every point down the building. It is practically a vertical one-pipe system—a one-pipe apparatus where horizontal mains are impossible—but the whole of the radiating surface is on the returns. The writer has in mind a building that this apparatus was specially adapted for. It was a large furnishing establishment of five floors, with four distinct departments of about 50ft. by 50ft. on each floor. The floors were solid ironwork and concrete, and no horizontal pipes were permitted on the floors nor along the ceilings. This meant that horizontal pipes had to be totally absent from the business parts of the building. The overhead plan was so well suited, as it only necessitated a single vertical pipe in most of the angles of the departments, and a radiator connected up in each corner of every department on the different floors. The horizontal pipe appearing in this part of the work would, therefore, be limited to something less than 12in. connections where the radiators are joined up to the vertical descending branches.

In the illustration the descending services are shown connected into a horizontal main return in the basement, this pipe being carried beneath the floor-level. This latter plan is only necessary when the basement space is of considerable value in being let as offices, in which case a large visible ceiling or floor-pipe would be objected to. Except for this, it is best to have a pipe of this size and importance somewhere in sight; but it might, if desired, be run in a floor-channel with grating over (as in church-work). This would make a neat job, and help to warm this floor; but the writer has never seen it done with this system of apparatus. If this was done, there would still have to be some lengths of smaller pipe beneath the floor from where the descending branches reach the ground and pass to the main return. These, however, would not be objectionable, like burying a large pipe and all its junctions. The junctions or connections are, in fact, the parts which it is wrong to place completely and permanently out of sight.

The horizontal return-main would be graduated as to size the same as the flow-pipe, being largest near the boiler, and smallest at the furthest point from it. There would be no advantage in having this pipe, say, 4in. its whole length, although it may require to be this size from the boiler to the point where the nearest branch enters it. This piece of pipe has to carry the water from all the verticals, and be large enough to allow the water to come away from them with a successful degree of rapidity. On the other hand, the further extremity only receives the water of one vertical with three radiators on it. If these were of moderate size, then the vertical pipe would only be 1½in., and the horizontal return need be no larger until the next vertical joins it. This graduation of mains will be spoken of more fully in the next article.

Assuming the different mains and branches are proportioned correctly, the degree of regularity with which this system of apparatus works is very pleasing and quite reliable. There is more than one thing goes to make the circulation perfect. In the first place, there is the utmost quantity of vertical pipe, which is always conducive to good results. The flow pipe which takes the ascending column of water can usually be taken by a nearly direct perpendicular route to its top extremity, and it is a full-sized pipe, giving the minimum of frictional resistance. There is also an absence of connections, and the detail of connections, that go to impede circulation. An important feature is that the maximum bulk of water, work, pipe, &c., are on the return part of the system which favours the descending motion in that part, and consequently favours the ascent of heated water in the flow-pipe. Whenever

there is a little problem in heating works in which some part of the apparatus has no circulation, or acts sluggishly, it is quite frequently traceable to there being something making the work of the flow-pipe more difficult than it should be, and in no way favouring the descent of water in the return. In this apparatus it will be seen that the cold water cannot hang up in the radiators when there is a lighter column in the flow-pipe. It simply drops or falls away from them, allowing hotter water to flow into its place. A difference of 10° causes a very rapid circulation in an apparatus erected on this principle. If any vertical branch gave more sluggish results than another, it could only be caused by a choked pipe (too small a pipe probably); but except some real fault exists, the results can be regulated to the greatest nicety by a stop-valve in each vertical pipe.

It will be seen that in the centre of the illustration one of the vertical branches is shown in duplicate, and advantages are claimed for this when a fair number of radiators exist in the line of one vertical service. By the addition of this pipe the water of each radiator is drained away and does not pass into the next, the contention being that after the water has passed through one radiator it must have lost heat, and is, therefore, scarcely suited to go through the next one. This is correct in a sense, but a very limited one, for if it was correct in practice, no one-pipe system of apparatus would be of much use. No doubt people have in mind that mistake which can be met with sometimes (frequently a few years ago), in which the connections are effected so that the whole of the heated water is made to pass through the first radiator, then the second, next the third, fourth, and so on. This is a distinctly bad way of doing the work, and there occurs an unmistakable difference in temperature between the first and the fourth radiators. In all one-pipe systems of apparatus it is essential that the main or sub-main pass clear by the radiator, as well as branching into it, so that it is only a proportion of the hot water that passes through any single radiator. By this plan there is scarcely a difference in heat between a first and a fourth radiator, certainly not sufficient to be perceivable except by a thermometer skilfully applied. Where, however, there are perhaps two large radiators connected to one vertical main on each floor of a high building, this auxiliary return or relief-pipe is desirable, although it need not commence at the top pair of radiators. It would suffice to commence at the pair below. The pipes might then be graduated similar to the plan shown in the next article.

ARCHITECTURAL ASSOCIATION EXCURSION.

WE were misled last week by the following official notification published to members by the hon. secs. of the Architectural Association:—

"THE ANNUAL EXCURSION.—The Annual Excursion will take place from the 10th to the 15th August. The headquarters will be Arundel. Members wishing to join the Excursion are requested to send their names to the Hon. Secretary of the Excursion, Mr. H. D. Seales-Wood, 157, Wool Exchange, Coleman-street, E.C.—BANISTER F. FLETCHER, and E. HOWLEY SIM, Hon. Secs.

And this Editorial "note" in the July number of A.A. Notes is equally misleading:—

"An interesting and beautiful district has been suggested for this year's excursion, during the second week of August, with Arundel as the headquarters, and Chichester, Boxgrove, Bosham, Cowdray, Parham, and Goodwood as points of interest. As Midhurst will be included, we should all like to see Mr. Norman Shaw's 'Wispers' in the flesh."

The headquarters, it seems, will not be in West Sussex, after all, but at Tunbridge Wells, on the eastern borders of that county, with excursions as far into Kent as Canterbury, covering some of the same ground which was taken in 1886 by the A.A., when West Malling was made the head centre.

It is a pity that such want of management should be allowed to create misunderstandings of the kind thus pointed out. We supplemented the official information about the Arundel district by outlining a programme likely to prove interesting in that part of Sussex. The hon. sec. of the Excursion has now sent us the following list of places to be visited from Tunbridge Wells, but we do not propose to amplify these particulars, which we presume may be depended upon, but which will probably interest comparatively few. The ground to be covered has been traversed so many times, the list is devoid of novelty, and it remains

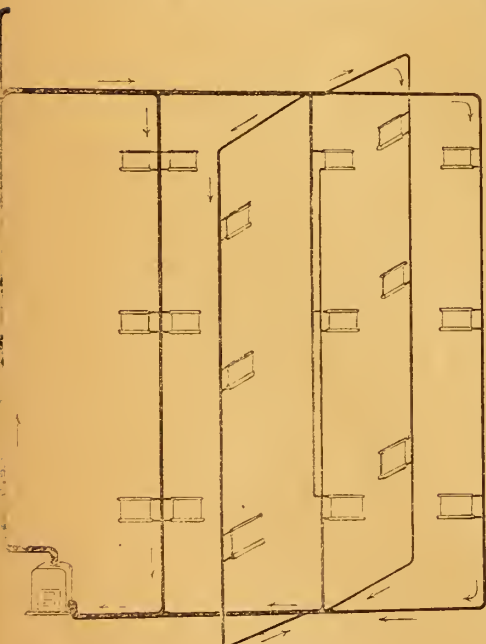


Fig. 5.

of ascend, as they usually do, and the water pursues a descending course in all of them.

Those who advocate and practise this system under all possible conditions contend that it has an important advantage in being so regular and uniform in its work—more so than any other system can always insure. This contention will bear modifying, although when the conditions are favourable, it is a form of apparatus that can be strongly recommended for those very reasons. Where its adoption is particularly favourable is in buildings devoted to offices, and in which we may suppose the basement is a valuable space. In such cases the value of the basement is prejudiced if there are several sets of main pipes carried about the ceiling, and the overhead system of apparatus obviates this.

Fig. 5 illustrates this style of apparatus, and the peculiarity of the arrangement is that the flow-pipe has no radiators or branches connected to it, but runs by the most direct route possible to a point higher than the highest radiators to be heated. If the apparatus is at all extensive, then the flow-pipe may have to be of good size—that is, sufficient to furnish the hot water needed by the whole of the returns. If desired, there may be two or more flow-pipes, as the system does not make a single flow-pipe necessary under all conditions. It would depend on the form of the building.

Only one flow-pipe is shown in Fig. 5, and it is supposed that this extends away from the boiler to the attic floor, as radiators are required on all floors below this. Radiators can be put on this floor as well, if desired. As soon as the flow

to be seen whether the excursionists will be allowed to sketch at Knole, even if the owner allows the party within the precincts. The late Lord Sackville would not consent to a visit being made by the A.A. at the time of the Malting Excursion, and so the place had to be omitted from the programme.

This is the list now to hand for next month:—Wadhurst Church and Village; Mayfield, with perhaps the Palace; Groombridge Moated-house; Etchingam Church, Bodiam Castle; Burwash Church and Village; Penshurst; Chiddingstone Village; Hever Castle; Canterbury Cathedral and Town; Knole; and Igham Mote and Village. Date as before noted.

FELLOWSHIP AT THE R.I.B.A.

THE much-vexed question as to the election of Fellows at the Institute will be considered at a special meeting on the 27th inst., and without divulging all the details of the interim report, confidentially issued by the council of the Royal Society of British Architects, a few facts procurable from the calendars of that body serve to show the existence of a retrograde movement resulting from a combination of circumstances more or less possibly beyond the control of the members, but, notwithstanding, mainly due to the unfortunately unpopular character of that body. The class of Fellows, instead of increasing, has sustained a loss of 27 during the years 1894 and 1895. During the eight years ending in 1893 the Fellows increased 222, giving an average annual gain in strength of 28; but taking the past ten years as a whole, a net gain of 195 has been recorded, which over that period reduced the yearly advance to 19. The class of Associates during the same ten years has shown an advance of 22 annually, or a total of 222. In 1895 the register shows the comparative numbers of Fellows at 588, and of Associates at 933. These figures combined, and including 62 Hon. Associates, gives a total roll of 1,583, producing an income of £4,547 11s.

The report naturally enough records the fact with unqualified regret, that too many practising architects of repute form no part of the Institute. The proposal of Mr. Penrose, the ex-president, that the election to the class of Fellows should be confined to the council, is, however, abandoned, on the ground that the council consider the evidence insufficient to justify such a revolutionary change; and, indeed, the report adds the opinion of the council—that the present system has undoubtedly resulted in the introduction of much "new and healthy blood, to the increased vitality of the Institute." The principal modifications proposed, therefore, are confined to the altering of the proportion of black balls from one vote against to two in favour, in the place of one to four. The names voted against in the form of voting-papers are to be crossed through, and the conditions as to the submission of drawings by candidates is to be more closely insisted on. With a view to increasing the class of Fellows, it is recommended that Associates of more than ten years' standing are to be urged to join the ranks of the senior members. It has, however, to be observed that not a few men of the so-called junior class are scarcely to be correctly described as practising architects, and, moreover, in consequence of the open voting by a show of hands, persons have been admitted as Fellows who really ought to have been excluded. Mere numbers do not necessarily mean strength, and the much-desired accession of outsiders of unquestionable repute can only be expected by rendering the position of Fellowship at the Institute a guarantee of architectural qualification, and that in an artistic sense more than heretofore. A man's executed work is the only reliable test worth anything.

The following gentlemen are the candidates now before the electors:—Messrs. C. H. Worley, F. W. Mee, H. A. Prothero, M.A., A. C. A. Norman, Beresford Pite (President of the A.A.), W. L. Mason, F. G. Knight, F. T. Verity, John Tavenor Perry, and F. H. Reed. This list does not agree quite with the one previously issued, and which was withdrawn, as remarked upon in our "Office Table" for June 12 last.

ST. JOHN'S CATHEDRAL, NEWFOUNDLAND.

THE unfortunate Cathedral of St. John the Baptist at St. John's, Newfoundland, which, it will be remembered, was burnt down some time

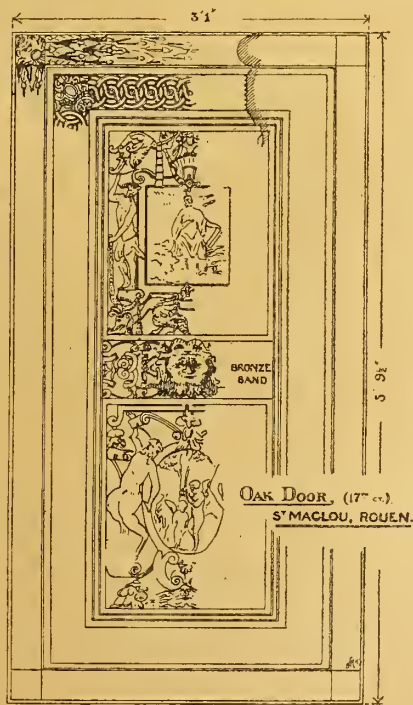
ago, is gradually being rebuilt, from the designs of Messrs. G. G. and J. O. Scott, F.S.A., of Spring Gardens, S.W., its architects. The section just completed embraces the choir fittings, all of which, of massive character, are of carefully selected English grown oak. There are well-designed stalls, with carved standards and fronts. The back seats are divided from each other by large projecting elbows. They afford accommodation for 22 singing men and 14 boys. There is also a triple sedilia, upon the back of which is an inserted brass, inscribed simply "In Memoriam, Grace Farrar," together with a handsome Litany desk and credence. The bishop's throne is some 15ft. high, and is groined and canopied, the projecting canopy being supported by octagonal columns. Above the apex of the central gable is a representation of the Crucifixion, the figure itself and cross being one piece of oak. On pedestals at either side are statues in the round; that on the west represents the patron saint, who, dressed in camel-skin, appears to direct the attention of the spectators to the suffering Christ; that on the sinister side represents Dr. Llewellyn, Bishop of Newfoundland and Bermuda, and is said to be a capital likeness of that earnest cleric. He is dressed in full canonicals, with cope and mitre, and bears his episcopal staff in his left hand. The upholstery of the actual seat is in imperial purple velvet. The whole of the work is of Decorated type, and the motif for the carved work has been that in the choir of Exeter's cathedral. The work has been carried out in its entirety by Messrs. Harry Hems and Sons, the well-known church-workers of Exeter, and the whole was sent out last month in the ss. *Capulet*, the unfortunate vessel that foundered last week in her return voyage across the Atlantic.

SOME MINOR EXAMPLES OF THE FRENCH RENAISSANCE.*—III.

By G. A. T. MIDDLETON.

THE DOORS OF ST. MACLOU, ROUEN.

THE church of St. Maclou at Rouen is best known as one of the most lace-like examples of the French Flamboyant Gothic extant; yet



its group of western doors are rich specimens of the Renaissance. The portion illustrated is only an insignificant portion of the whole—a mere door within a door, and that only one of three great entrances, which can all be opened when occasion demands: rich in foliage and figure carving, intricate in design, and yet at the same time by no means devoid of dignity, the feeling of breadth being given by the contrast of the dark colour of the oak with the lighter stonework framing.

The most notable point in the drawing accom-

panying this is the care with which, by means of its broad frame and bold roll moulding, the idea of detachment is given to the door. The delicate enrichment in low relief, and the bronze band with its massive head, are striking features, too, and indicate wealth as well as appreciation for the beautiful; but they are adjuncts only, as is well shown by some of the other doors, which are just as fine in general effect, though the enrichment is less lavish.

CHIPS.

On Saturday, the new parish mission buildings, consisting of hall, class-rooms, built by the congregation of the parish church, of Irvine, N.B., at a cost of £1,800, were formally opened by the Very Rev. Donald Macleod, D.D., Glasgow.

Colonel Langton Coke, of the Local Government Board, held an inquiry at Barnsley, on Friday, into a proposal of the Corporation to expend £1,486 in laying water-mains in new streets in the borough.

A cross of grey Devon granite, profusely ornamented with carving of Celtic type, has been placed in Braunton Churchyard, Devon, as a memorial, Messrs. Harry Hems and Sons, of Exeter, carried out the work.

The opening ceremony in connection with the new storage reservoirs constructed by the West Middlesex Waterworks Company at Barn Elms, Barnes, took place on Saturday, when Mr. E. Boulnois, M.P., chairman of the company, turned on the sluices of the two completed reservoirs. The new reservoirs are designed to supply increased capacity for the storage and subsidence of water before filtration. They are four in number, two being in course of construction, and the water surface will have an area of over 86 acres, with a total available capacity of 300 million gallons. Mr. M. W. Hervey was the engineer-in-chief, with Mr. Rutter as principal assistant, and Mr. John Aird, M.P., was the contractor.

The Vienna master joiners have resolved to lock out their journeymen till the latter have left off boycotting three masters who have refused to accede to the demands of their workmen for shorter working hours. The lock-out began on Monday. The number of joiners' assistants in Vienna amounts to about twenty-five thousand. A lock-out involving such large numbers has never yet been known in that city.

A stained-glass window, placed in St. Leonard's Church, Exeter, in memory of the late Rev. A. H. Sheldon, was unveiled on Wednesday week. The window represents the Call of St. John, and is the work of Mr. F. Drake, of the Cathedral-yard, Exeter.

Colonel A. G. Durnford, R.E., an inspector of the Local Government Board, held an inquiry at the Guildhall, Nottingham, last week, into the application by the corporation to borrow £40,000 to extend the electric lighting works of the town. In the evening he held another inquiry with reference to the scheme of the M.S. and L.R. Co. for providing 150 workmen's dwellings in the town to replace those demolished in the course of the construction of the new line.

In connection with the movement for the reconstruction of the Bishopric of Bristol, it is officially announced that a house in Berkeley-square, the gift of the Rev. H. A. Daniel, has been accepted by the commissioners as a residence for the bishop, subject to alterations in structure and arrangement, and the erection of a private chapel for the use of the bishop. The premises have been surveyed by Messrs. Christian, Caröe, and Co., the architects to the commissioners, who have reported that the alterations and additions, including the chapel, will require an outlay of £5,000. This report has been accepted by the commissioners, and sent to the committee. The committee, therefore, now appeal for this sum of £5,000, which has to be paid over to the commissioners before the see can be reconstituted.

After a prolonged inquiry, a committee of the House of Commons have rejected the Dee Sluices Bill, promoted by the corporation of Chester.

Application having been made by the Stapleton District Council for sanction to borrow upwards of £6,200 for the purposes of street improvements and works of sewerage, an inquiry was held on Friday at Fishponds by Mr. F. H. Tulloch, a Local Government Board inspector. Mr. A. J. Saise, surveyor to the authority, explained the plans.

Mr. Andrew Foote, borough surveyor of Oldham, died of pleurisy early on Saturday morning last, after a short but painful illness, at his residence, Alderley Edge. The deceased was appointed borough surveyor in September, 1871, and during his term of office has carried out many improvements, including the construction of the tramways. He was a member of the Institute of Civil Engineers.

OBITUARY.

OUR readers will learn with regret of the death of Mr. GEORGE HANNAFORD, originally a pupil with, and for long years a trusty and expert clerk of works, representing the late Sir Gilbert George Scott, R.A., on many important works in different parts of the country. Soon after the death of his master he retired from active life, and building himself Newport House on the heights over and above Ventnor, in the Isle of Wight, spent the evening of his days in quiet content. A serious illness of a week's duration, caused by an internal obstruction, however, proved fatal on the 27th ult., and he passed quietly away.

WE regret to announce the death of Mr. ANSELM NICHOLSON, of the firm of Waring and Nicholson, 55, Parliament-street, Westminster, which occurred on the 23rd ult. after a short illness, at the early age of 35. Mr. Nicholson became a partner in the firm in 1889, which has been established for over a century, and which of recent years has had the management and development of several large building estates at Clapham, Wandsworth, and Bromley, and has carried out a large number of important commercial works, including nearly all Messrs. Doulton and Co.'s buildings at Lambeth, and the Hayles Buildings in Southwark, now in progress. Mr. Nicholson was a Fellow of the Surveyors' Institute, and leaves a widow, but no issue. The firm will be continued under the same name as heretofore by the remaining partners, Mr. Banister Smith and Mr. Charles Hunt, who have for many years been associated with the business.

MR. WILLIAM ARTHUR BROWN, A.P.S.I., architect and surveyor, late of Compton-road, Canonbury, N., died on Sunday last, in his 42nd year.

CHIPS.

The death is announced from Beer, South Devonshire, in the fifty-fifth year of his age, of Mr. Hamilton Macallum, a popular sea-painter, who began to exhibit in London in 1866, and since then has scarcely ever omitted to send works to the Metropolitan galleries.

MR. A. H. Smith, of the department of Greek and Roman Antiquities in the British Museum, has been directed to proceed to Cyprus without delay to take charge of the excavations at Enkomi, which are being conducted by the trustees of the Museum, and which promise to yield finds of exceptional importance.

The Brighton Corporation have arranged to purchase the Shoreham waterworks, a private undertaking, situated on the downs above Shoreham, having powers over the district from Lancing to Aldrington, a coast-line of about seven miles. The purchase money will be £56,700, and about £190,000 will be spent on sinking new adits and laying new mains.

It is proposed to form an association of the art workers of Manchester and the district. In furtherance of the movement, Mr. Walter Crane presided at a meeting held on Wednesday night last at the Municipal School of Art.

The Royal Linnatic Asylum at Cheadle, Cheshire, is being extended by the addition of two wings—one on the female, and one on the male side of the institution. The new buildings provide accommodation for fifty patients. The works are being carried out by Messrs. Storrs, Sons, and Co., builders, under the superintendence of Mr. Charles Heathcote, Manchester, architect.

Ald. Charles Wray, of Barusley, appeared by counsel before the borough Bench on the 15th July, to answer a summons issued by Mr. A. J. Straker, surveyor to the Barnsley Rural District Council, for a breach of the building by-laws at Cudworth, by the omission of a damp-course from six houses in course of erection. The Bench decided that the by-laws had been infringed; but as it was the first case heard, defendant was fined £1, and the costs.

On Thursday, June 25, Mr. Robert H. Bicknell, C.E., one of the inspectors of the Local Government Board, held an inquiry at the Town Hall, Carlisle, into an application by the corporation for sanction to borrow the sum of £8,660, for the purposes of street improvement. The town clerk said the sum sought to be borrowed was made up as follows:—£5,000 for the purchase of property to be demolished in the widening of Lowther-street; £550 for the purchase of property at the corner of Rickergate and East Tower-street; £1,000 for the widening of Bridge-lane; £960 for the reformation of Lancaster-street; £180 for the reformation of Crown and Anchor-lane; and £970 for the reformation of Albert-street and Spring Garden's-lane. The inspector inquired minutely into the necessity for the purchase of the property and the contemplated improvements.

Building Intelligence.

COCKINGTON, TORQUAY.—The dedication and opening services of the church of St. Matthew were held on the 14th inst. by the Right Rev. Bishop Knight-Bruce (assistant bishop of Exeter). It has been built from the designs of Messrs. Nicholson and Corlette, architects (now of 28, Theobald's-road, Gray's Inn, London, W.C.), selected in open competition, the acting clerk of works being Mr. C. Noble (now superintending the building of St. Andrew's Church, Paignton, Devon), and Mr. R. F. Yeo, Rock-road, Torquay, the contractor. The church has been designed to hold 600 worshippers, and is built after the old Devonshire manner, with open-span roofed nave and aisles, and no clerestory. The tower is planned on the south side of the chancel, and the north aisle of the nave is prolonged to form a chancel aisle, which will be used for the daily offices. The heating-chamber is placed under the chancel aisle, the choir vestry being under the chancel, and the clergy vestry in the basement story of the tower. The organ will stand in the tower. The external walls of the church are built of Livermead Lane rubble, all external moulded work, traceries, &c., being of Doulton stone. The quoins and buttresses are of Paignton stone. The roofs are open-timbered, and of "cradle" form throughout, boarded, felted, and slated with Delabole slates. The work up to the present has been executed in three separate contracts: the first, consisting of nave and north aisle; the second, south aisle and tower and foundations to ground level; the third, foundations to future completion of the whole church. The cost of work done has been about £4,500. The remainder of the church (including tower) will cost about £3,000, boundary walls and gates in addition. The whole of the carving has been done by Messrs. Charles Trask and Sons, of Norton, Stoke-under-Ham, Somerset.

FULHAM, S.W.—A new theatre is about to be provided for Fulham on an isolated site. The building will include vestibule, crush-room, saloons, and retiring-rooms, with an auditorium to hold upwards of 2,500 persons; whilst the stage will have a clear width of 75ft. and a depth of 40ft., the height from stage to grid measuring 56ft. The construction of the theatre will be concrete and steel. The proprietor is expending upwards of £30,000 on the building and land. The dressing-rooms will be situated in a separate block. The planning and designing of the new theatre have been intrusted to Mr. W. G. R. Sprague.

HALIFAX.—The new infirmary will be opened on Saturday, the 25th instant, by the Duke and Duchess of York. It replaces one built in 1838, and has been erected from designs by Messrs. Worthington and Elgodd (now Messrs. Thomas Worthington and Son), of Manchester, selected in a limited competition, in which Mr. Alfred Waterhouse, R.A., was the assessor. The total costs of the contracts executed, and of the work yet to be done (exclusive of the fresh site of 13 acres, and of the boundary wall and lodge, which are left over for the present), is estimated at £72,625. The style of the buildings is a Free Renaissance. All the buildings are constructed of local stone obtained from the quarries at Southowram, Hipperholme, and Ringby. The outer walls are hollow, and have damp-courses throughout, and the whole of the buildings, except two floors of the front block, are fireproof. The main frontage is to Free School-lane, the front administration block, three stories in height, except at the wings, in the centre. This block is flanked by ward pavilions detached from each other, and only one story high. All administrative offices, dining-rooms, and kitchens are, like the wards, upon one floor, which is raised from the ground level upon arches. The various departments, though connected with each other by corridors, are otherwise distinct, so that there is free circulation of air all round them. The front block facing Free School-lane contains upon the ground floor waiting and secretary's rooms, matron's office and sitting-room, house surgeon's rooms and board-room, with separate lavatories, &c., in the wings. The complete scheme provides for a nurses' home on the easterly side.

By 30 votes to 16 the city council of Leeds have, after a long discussion, decided to roof-in the open square in front of Kirkgate Fish Market in that borough, at an estimated cost of £11,000.

COMPETITIONS.

ABERDEEN MUNICIPAL BUILDINGS.—Five competitive plans have been lodged for the reconstruction of the municipal buildings at Aberdeen, and these were submitted for the inspection of the members of the town council on Saturday. The increase of official work has outgrown the present accommodation, and the alterations will involve the remodelling of the different departments, the external architectural features of the present buildings being, of course, preserved. It is estimated that the reconstruction will cost from £8,000 to £12,000. A premium of £50 will be awarded to the author of the first design, and one of £20 to the second.

BELFAST.—The city council have advertised in our columns for sketch designs for the proposed new City Hall, showing that they are determined to proceed with the erection of the new building without any delay. The resolutions of the corporation on the question sanctioned an expenditure of £125,000, and architects are now asked to send in designs on an estimate of £150,000, including all special embellishments and fittings. The special Act of Parliament gives the council power to borrow £180,000 for the purpose. From among the sketch designs sent in, three will be selected for a further and final competition. £300 will be equally divided among such of these competitors as shall fulfil the conditions attached to the final competition, but the premium awarded to the architect whose designs shall be carried out will merge in his remuneration. Mr. Alfred Waterhouse, R.A., and Mr. J. C. Bretland, M.I.C.E., City Surveyor of Belfast, will act as assessors.

CHELTEMHAM.—The Kursaal competition at Cheltenham has been settled; but the Municipal Council, at their meeting held on Monday last, resolved that, in their opinion, none of the 16 designs sent in are suitable for execution as they stand. It has consequently been determined to pay the author of the design selected by the professional referee the premium of £100. Had this design been adopted for erection by the Council this sum would, under the terms of the competition, have been divided equally between the authors of the three next best designs, and the amount named for the first premium would have merged in the commission due to the architect engaged for the work. The author of the design placed first is Mr. C. V. Johnson, 1A, Keston-road, East Dulwich, S.E.; the architect placed next is Mr. J. B. Lewis, 9, Rowcroft, Stroud. Messrs. Hannaford and Wills, Gower-street Chambers, Swansea, come next, and then Mr. G. H. Elphick, of New Broad-street, E.C. As it is, we presume these three last named will receive nothing.

LIVERPOOL.—The select competition for the museum extensions about to be carried out by the City Council, has been settled, and the authors of the premiated designs are Mr. E. W. Mountford and Mr. J. M. Brydon. Mr. Aston Webb was the assessor. Among the other competitors are Messrs. J. Belcher, H. T. Hare, and T. E. Colcutt.

THE EMMANUEL CHURCH, EXETER.—440 sets of plans for this church have been received by this committee, who, after consideration, have rejected 320. The remaining 120 are still under consideration; but their numbers will probably be considerably reduced before the general meeting of parishioners on Friday, the 17th inst., when it will be finally decided which are to be sent to the assessor for his professional advice and selection.

HALIFAX PUBLIC HALL AND POLICE STATION.—The plans for these proposed buildings, to be constructed on the old infirmary site, will be on view to the public next week at the Mechanics' Hall. Fifteen sets of competitive designs have been received. The architect retained to advise the council in awarding the three premiums offered, Professor T. Roger Smith, F.R.I.B.A., of London, made an examination of them on Friday last, but his award has not yet been published.

Before the House of Commons Committee appointed to consider the Government Offices Bill, Mr. John Taylor, C.B., senior surveyor to the Board of Works, produced, on Friday, a plan of the scheme, which involves an extensive rearrangement of Government offices and the further concentration of them in new buildings proposed to be erected in Parliament-street. The estimated cost of the new sites he stated at £1,362,000, and the new buildings at £1,280,000. The net cost of the scheme to the taxpayer would be £1,509,000.

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Our Illustrations.

CITY GUILDS, NO. XXI.—THE HALL OF THE DRAPERS' COMPANY.

THE buildings of this great Company are located in the very heart of the City, close to the Bank of England in Throgmorton-street, and the unique character of the premises is largely due to the small garden, with its mulberry trees, adjoining the offices, giving the name to the famous centre of the stockbroking community known as Drapers' Gardens. The Great Fire of London stopped at Drapers' Hall; but the buildings, once the Earl of Essex's historic mansion, were entirely consumed. Jarman was the architect for the rebuilding, but another fire nearly destroyed the hall in 1774, soon after which the brothers Adam were engaged in its reconstruction and repair. In this condition the buildings remained till rather more than twenty years ago, when Mr. Herbert Williams, the architect to the Drapers' Company, designed the present hall and adjacent drawing-rooms and other buildings, which are executed externally in Portland stone, and are treated in a sumptuous style in accord with the magnificence of the hall herewith illustrated. A handsome winding staircase, enlivened by coloured marbles and decorated by statues of Edward III. and Philippa, leads to the reception-rooms and hall. The quadrangle and cloister round which the buildings are grouped makes a special and pleasing feature with the tubs of laurel-trees which adorn the little quad. Over the arcades are sculptured representations of allegorical figures and groups by Mr. E. W. Wyon. The site of the buildings is that of a mansion belonging, as already stated, to Thomas Cromwell, Earl of Essex in the reign of Henry VIII. This house, figured in Aggas's plan with four embattled turrets and from thence the open country upwards Hampstead and Highgate, could clearly be viewed and commanded by Cromwell, “Mayster of the King's Jewel-house.” Upon his attainder, the property was purchased by the Drapers, and made their “common hall.” Previously the Guild were housed in St. Swin's-lane. The first charter of their incorporation dates from 1364 granted by Edward III., and in 1439 Henry VI. conferred a fresh charter of more considerable privileges, as the Guild or fraternity of the Blessed Mary, the Virgin of the Mystery of Drapers. A ladies' chamber, always and still a feature with the Drapers' Company, was used solely by the sisters of the confraternity. Married ladies only dined in the hall, “a chekker chamber being for maydens” specially reserved. In 1515 a ladies' feast was held, including “brawn and mustard, capon boiled, swan roasted, pike, venison baked and roast, jellies, pastry, quails, sturgeon, salmon, and wafers and ipocams.” The splendid feasts of the Drapers' Company have always been foremost in splendour, and the

dignified clergy and conventual brothers usually figured among their guests, and, of course, the Lord Mayors, who often started their processions from the hall of the Drapers' Company. It is claimed that Henry Fitz-Alwyn, the first Lord Mayor of London (who was elected in 1191 and held office for 25 years), belonged to the Guild of Drapers. Stow and other writers say he was a Goldsmith. The Drapers' Company have many works of charity, and hold vast estates. Several females are free of the Company, and participate in its benefactions. Almost every modern educational movement has been aided by the Drapers' Company in nearly every trade. The charities of the Drapers' include Queen Elizabeth's College at Greenwich, several almshouses at Tottenham, Stamford by Bow, Stepney, Mile End, Shoreditch, and Southwark, and in Surrey and Berks; the Green Coat School, the Tottenham Orphan School, and two girls' school in Wales. Many pensions and scholarships are given by the company. We shall publish other illustrations of the buildings shortly.

ACCRINGTON MUNICIPAL TECHNICAL SCHOOL.

THIS school was opened in September last, and since that time has been occupied during the day as an organised science school, in addition to the evening technical instruction classes. The cross-wing to the rear has not been included in the completed portion. The main block is three stories high, the chemical laboratory, masters' room and balance-room, and the weaving-room being built one story high in the central area, and lighted chiefly from the roofs. In addition to the above, the basement floor comprises a chemical research room, a physical laboratory, three science classrooms, a cookery kitchen, and cloakroom. On the ground floor the lecture theatre, accommodating 160 students, is prominent, the adjacent preparation-room being placed at the angle of the building, in conjunction also with the physics lecture-theatre. The rest of this floor is occupied by science classrooms, the secretary's offices, and cloakrooms. The art rooms occupy the whole of the first floor, and comprise an elementary room, masters' room, designing and intermediate rooms, antique and painting-room, with north light, modelling-room, and females' common room. Provision has been made for extension by means of a left-hand wing, which, when built, will communicate directly with the existing corridors. The main stair is of ample proportions, extending by easy flights from the basement to the top floor. A second stair will be provided in the rear cross-wing previously referred to. All the rooms and corridors are abundantly lighted, the former from the left of the students when seated in class. An open area 20 yards deep from the street-line is left in front of the building. The external walls are faced with stone from the neighbourhood of Halifax. All inside walls are of brick. Pitch-pine has been used for the roofs, and concrete and wood blocks for the corridor floors. Messrs. Cunliffe, of Accrington, were the builders. Up to the present time the amount expended on the building and fittings is about £11,000. Mr. J. W. Floyd acted efficiently as clerk of works, under the direction of the architect, Mr. Ross, of Accrington.

TENEMENT, CASTLEBANK STREET, PARTICK, N.B.

THIS building is erected on a corner site facing the new station of the Lanarkshire and Dumbartonshire Railway, Partick. The plan includes a ground floor of shops with cellarage below, and three upper stories devoted to working-class dwellings. The style adopted is a free rendering of Scotch work of a plain type, suitable for a building of this class. Two different qualities of red sandstone are used, the dressings, &c., being of a deeper shade than the rubble work. A clock turret of teak wood, with copper roof, surmounts the corner. Mr. Henry Mitchell, of Glasgow, is the architect, and Mr. John Smellie, jun., Partick, the builder.

NEW HOTEL, WEYMOUTH.

THIS design, by Mr. E. O. Cummins, A.R.I.B.A., for the proposed new hotel at Weymouth, to be built on the site of the old Royal Hotel, was submitted in competition early in December last, in accordance with the requirement for a first-class hotel, at a cost at £17,000. Three prizes of £200, £100, and £50, were offered for the three best designs, the first prize being awarded to Mr. C. Orlando Law, M.S.A. It is well known that the quaint and beautifully-situated town of Wey-

mouth flourished in the time of the Georges, and it has been the designer's aim to produce a building that should have a dignified appearance, and at the same time harmonise with the prevailing architecture of that period. The lower portion of the front of the building, given in our illustration, which faces the sea, is of Portland stone, the upper portion of local red brick, with Portland stone dressings. The plan of this design comprises about ninety rooms in all, including three suites of rooms that might be let as flats. A large dining-room has been provided on the ground floor to the right to seat 150 persons, a door from which opens on to the verandah, while a spacious public drawing-room opening on to the balcony is situate on the first floor. In spite of the existing buildings adjoining, the great advantage has been secured to all the rooms of light and ventilation from outside windows. There is a second main entrance at the back in case of stormy weather, which also forms the approach to a large ball-room that can be let for entertainments.

Y.M.C.A. PREMISES, NEWCASTLE-ON-TYNE.

IN THE BUILDING NEWS for June 19th, we illustrated the first premiated and selected design for the new premises about to be erected in Grey and Blackett-streets, Newcastle, for the Young Men's Christian Association. We now illustrate the second design, the authors of which are Messrs. Armstrong and Knowles, and besides a view of the building, we give a copy of the first floor, or principal plan. The ground story is devoted to shops, as required by the instructions. The main staircase is 6ft. wide, and runs the full height of the building. The reception-room to the right, on the first floor, is 40ft. by 18ft. The reading-room beyond is 34ft. by 30ft. In between these main apartments are a game-room on one side, and two private offices on the other. The large hall is seated to accommodate 600 persons, with a platform for 50. On the next floor there is a minor hall for 300 people, and the gallery of the large hall provides for 190. These are included in the 600 before named. In the basement there is a café, entered from Grey-street. The material proposed is stone, and the cost is named at £16,300.

“BUILDING NEWS” DESIGNING CLUB: A GOLF CLUB HOUSE.

(See description on page 37).

HIGH-STREET BUILDINGS, SYDENHAM, S.E.

THIS block of business premises, with living accommodation over, is now being erected in the High-street, Sydenham, S.E. The materials are terracotta and red brick, the lower portions of pilasters on the party-walls up to level of the first floor windows being in faience. Messrs. Black and Son, of Forest Hill, are the builders; the terracotta and faience being supplied by the Burmantofts Co. The architects are Messrs. Hennell and Son, of Essex-street, Strand.

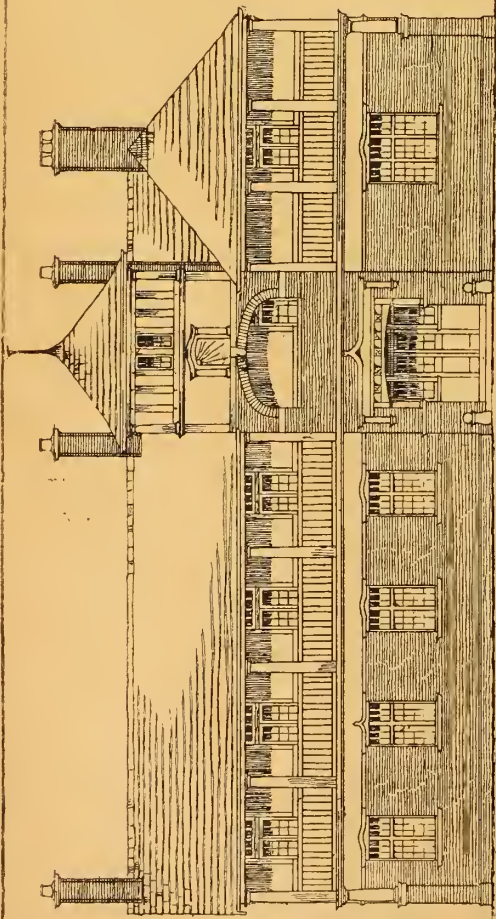
CHIPS.

The members of the Society of Architects will make a day excursion to Shoreham, Sussex, on Saturday, the 25th inst.

A stained-glass window has been placed in Clifton-on-Dunsmore church to the memory of Mr. Norman Muntz. The window, which consists of two lights, containing respectively the figures of St. Paul as an aged man and St. Timothy as a youth, was executed by Mr. C. E. Kempe, London.

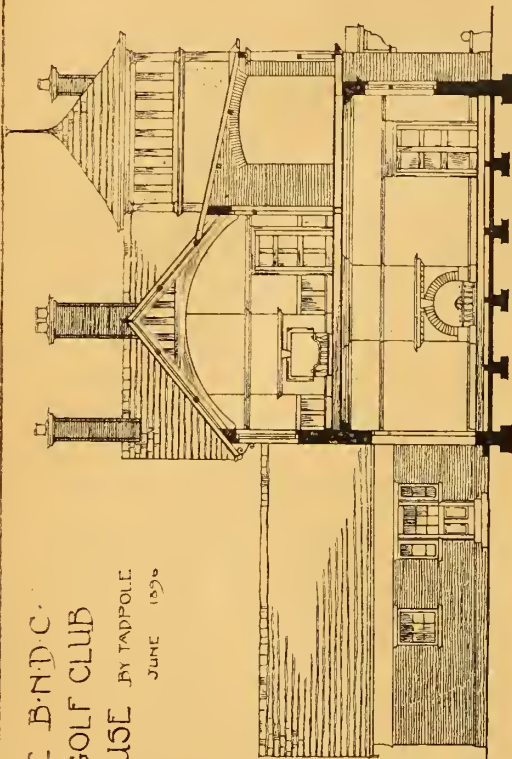
Last week a brass lectern, subscribed for by the children of the town, was placed in the Lady Chapel at the Cathedral Church of St. Alban's. It bears the inscription:—“To the Glory of God. The gift of the Children of St. Alban's to the Lady Chapel, A.D. 1896.” A few weeks since a stained-glass window, with an inscription to the memory of Comilla Toulmin, wife of Newton Crossland, was inserted on the east side of the south transept of the same church. There is a figure of S. Catherine, with the verse “Be thou faithful unto death, and I will give thee a crown of life.”

The grave of Edward Capern, the postman-poet, in the little churchyard of Heanton Punchardon, Devon, has just been marked by a block of Dartmoor granite inscribed with an epitaph from the pen of the Poet Laureate, and a quotation from one of Capern's own poems. A recessed and traceried panel enshrines the bell which Capern used while walking his rounds in the neighbourhood of Bideford at the time when the earliest fruits of his poetic genius were given to the world. Messrs. Harry Hems and Sons, of Exeter, carried out the memorial.

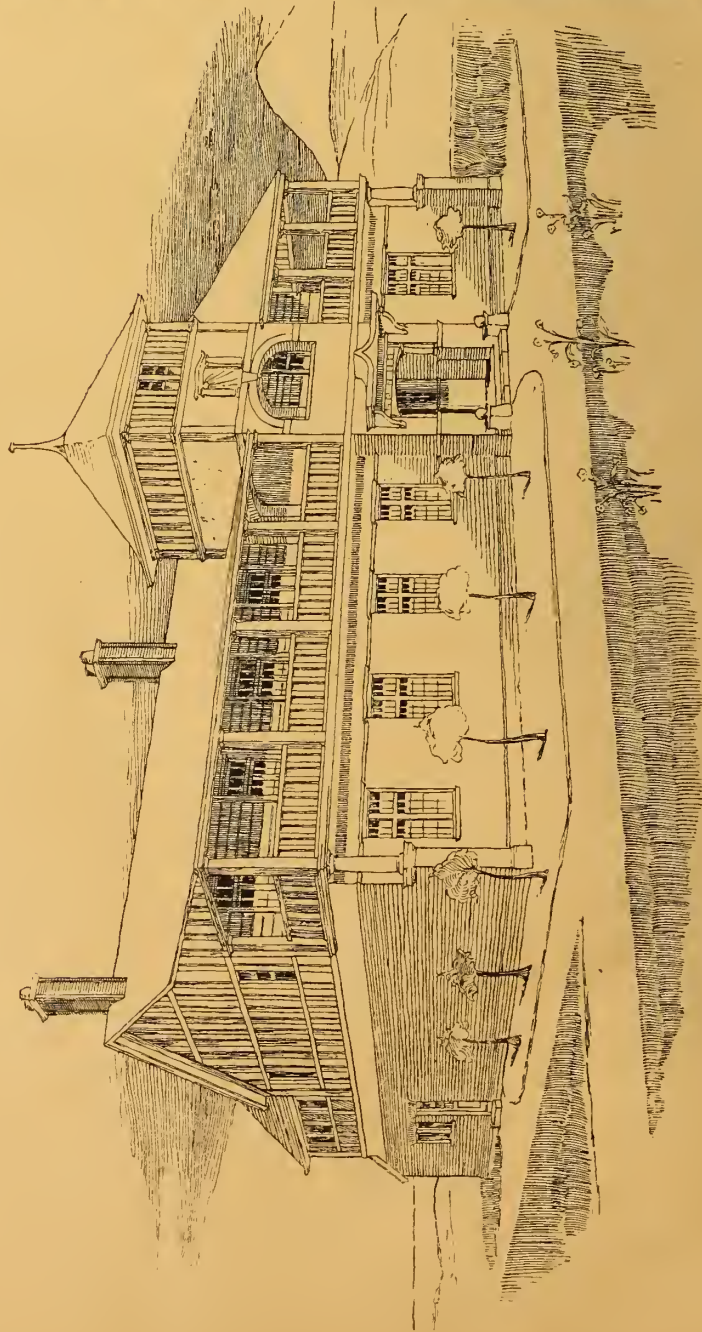


FRONT ELEVATION

THE B.N.D.C.
A GOLF CLUB
HOUSE BY TADPOLE
JUNE 1896



SECTION



PLACED SECOND



FIRST FLOOR



GROUND FLOOR

FEET
100
50

40

30

20

10

5

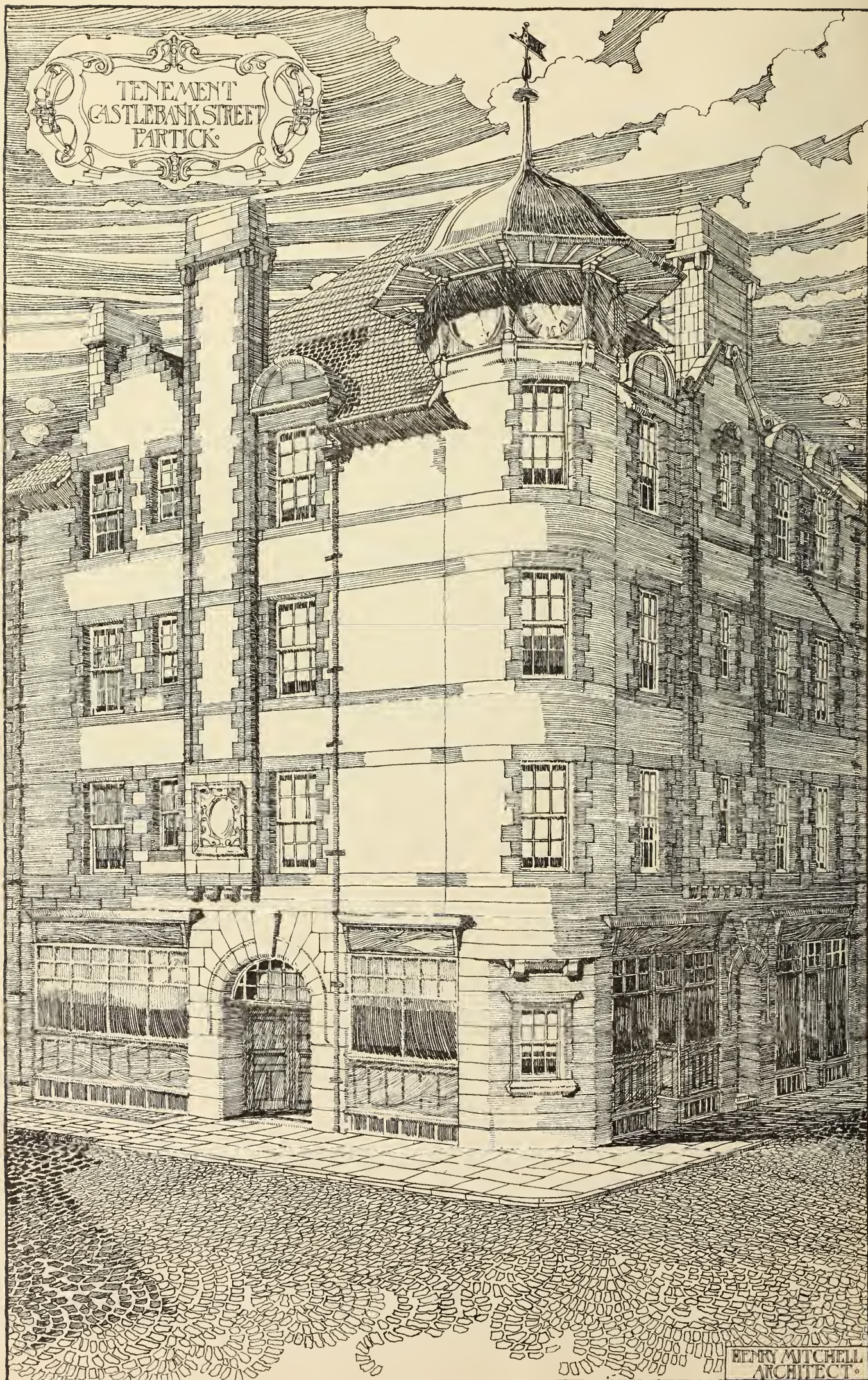
SCALE FOR
PLANS

SCALE FOR
ELEVATIONS

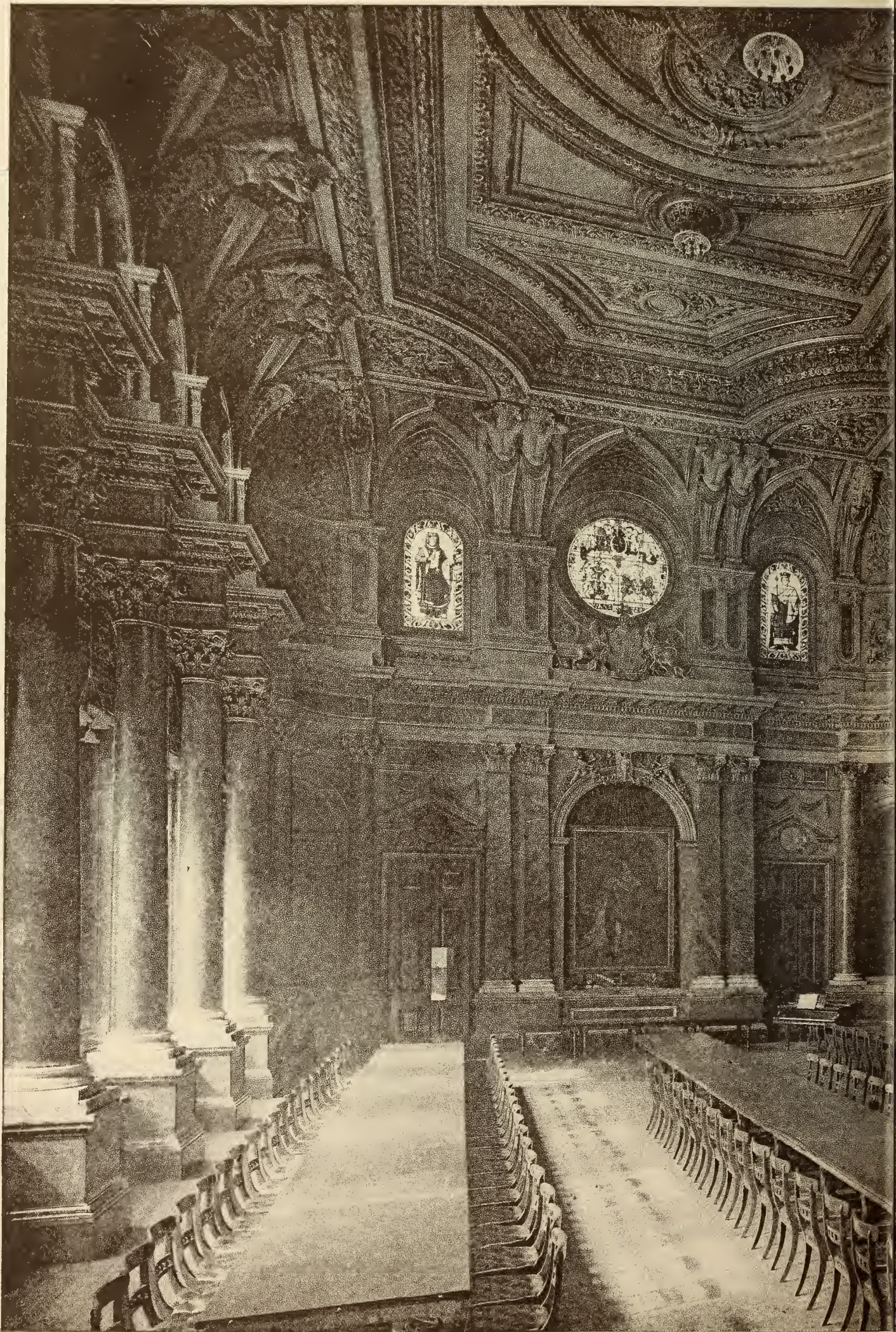


"PHOTO-TINT" by James Aketman, 6, Queen Square, London W.C.

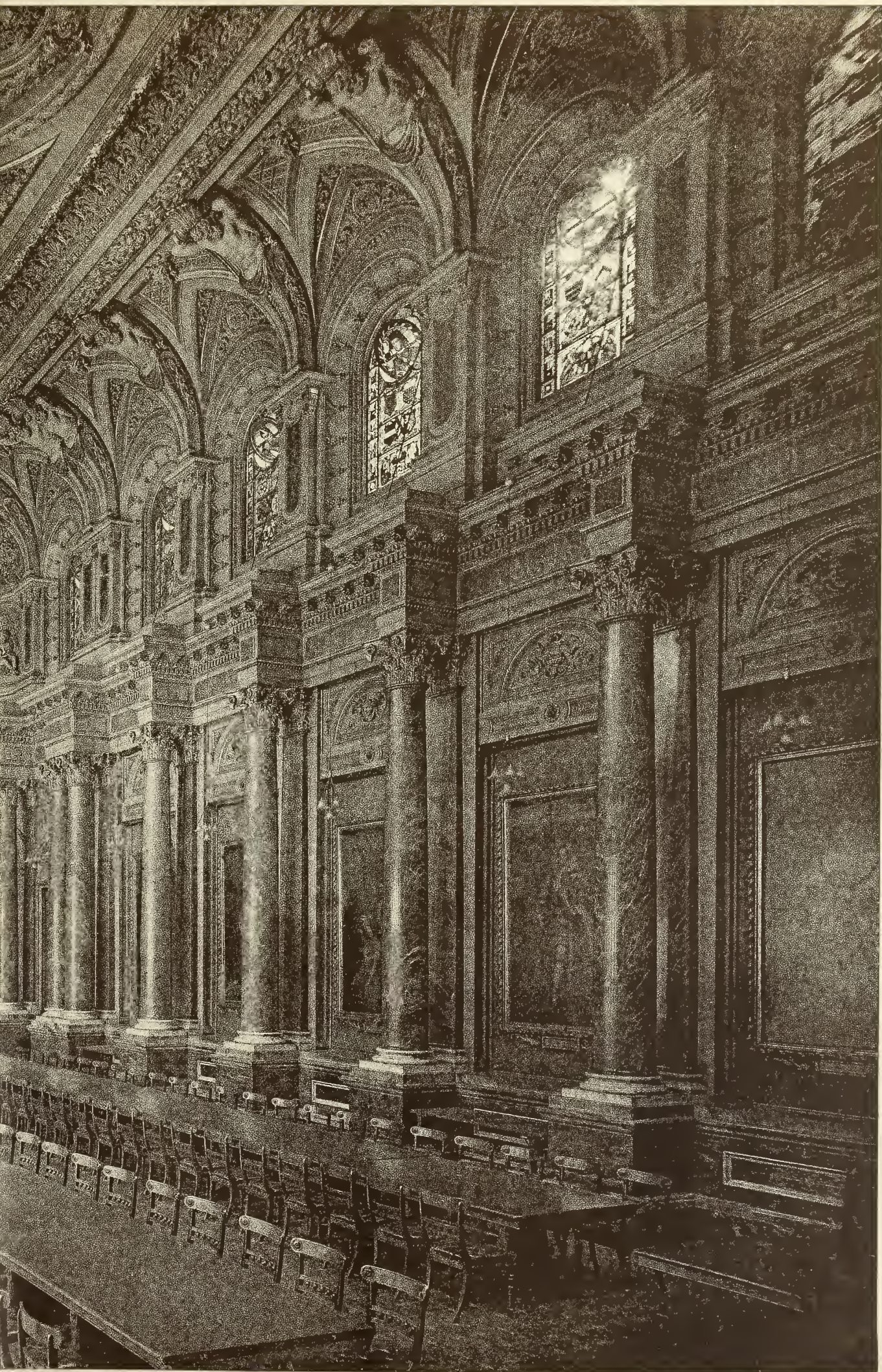
PROPOSED HOTEL WEYMOUTH · ERNEST CUMMINS ARCHT



HENRY MITCHELL
ARCHT.

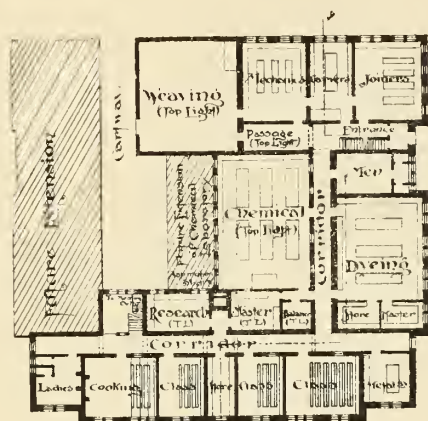


PHOTOGRAPHED WITH A SANDELL PLATE.

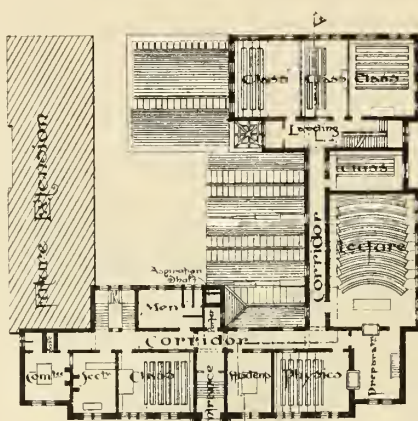


"PHOTO-TINT" by James Akerman, 6 Queen Square, London, W.C.

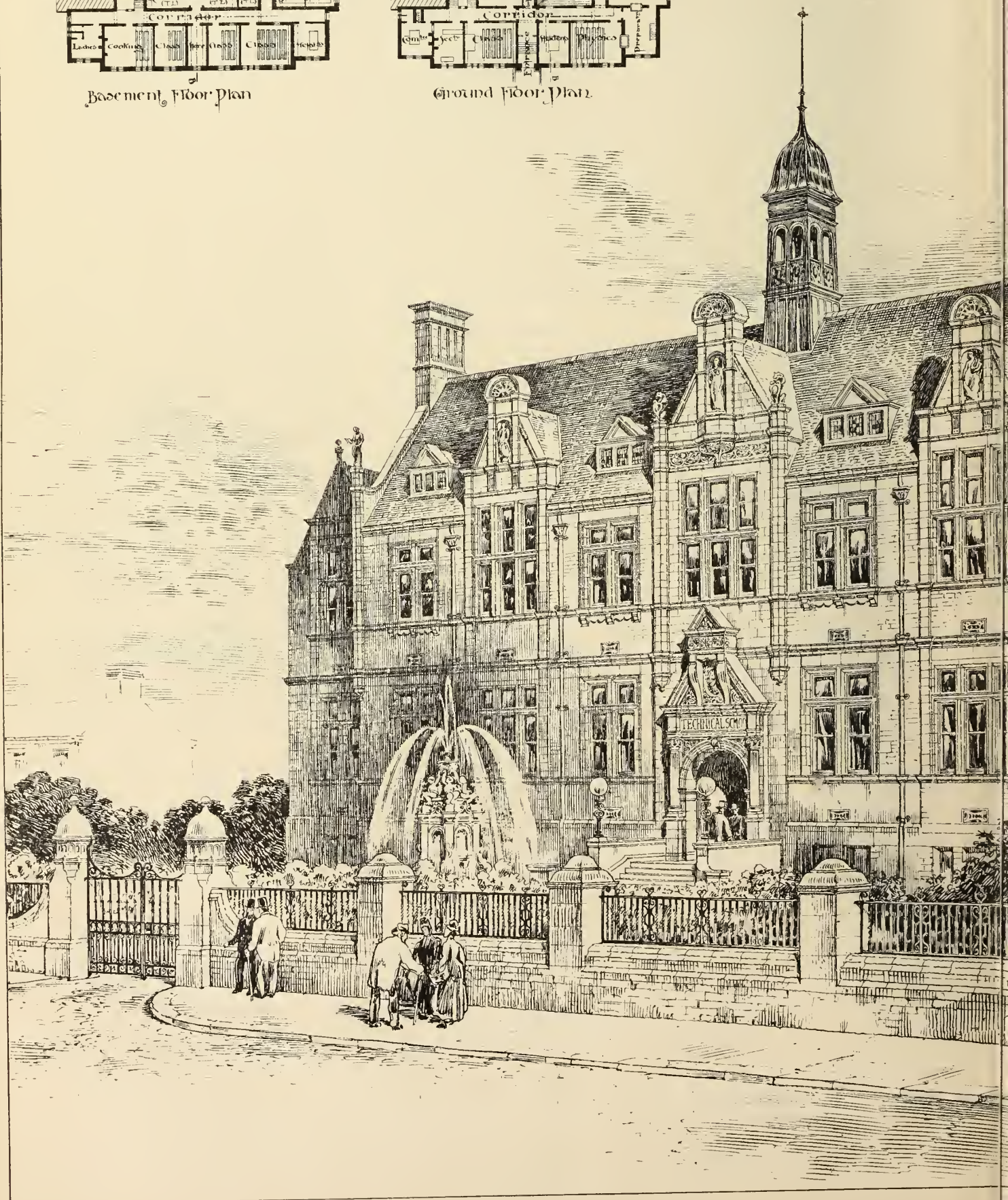


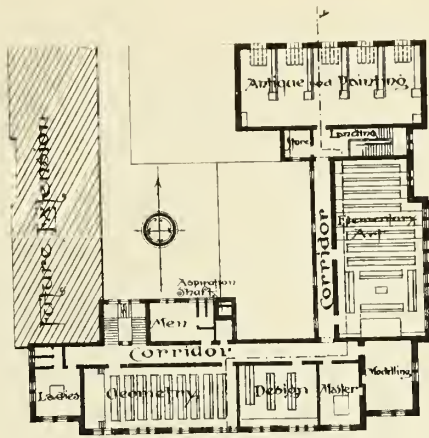


Basement Floor Plan

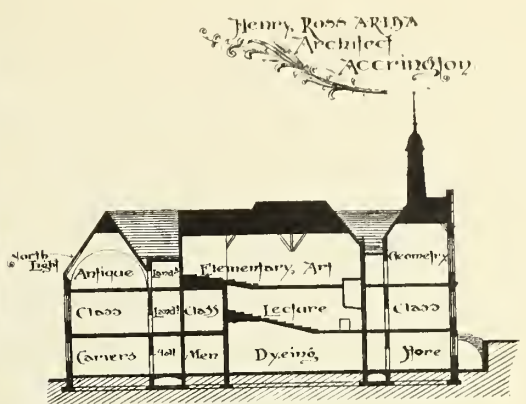


Ground Floor Plan.



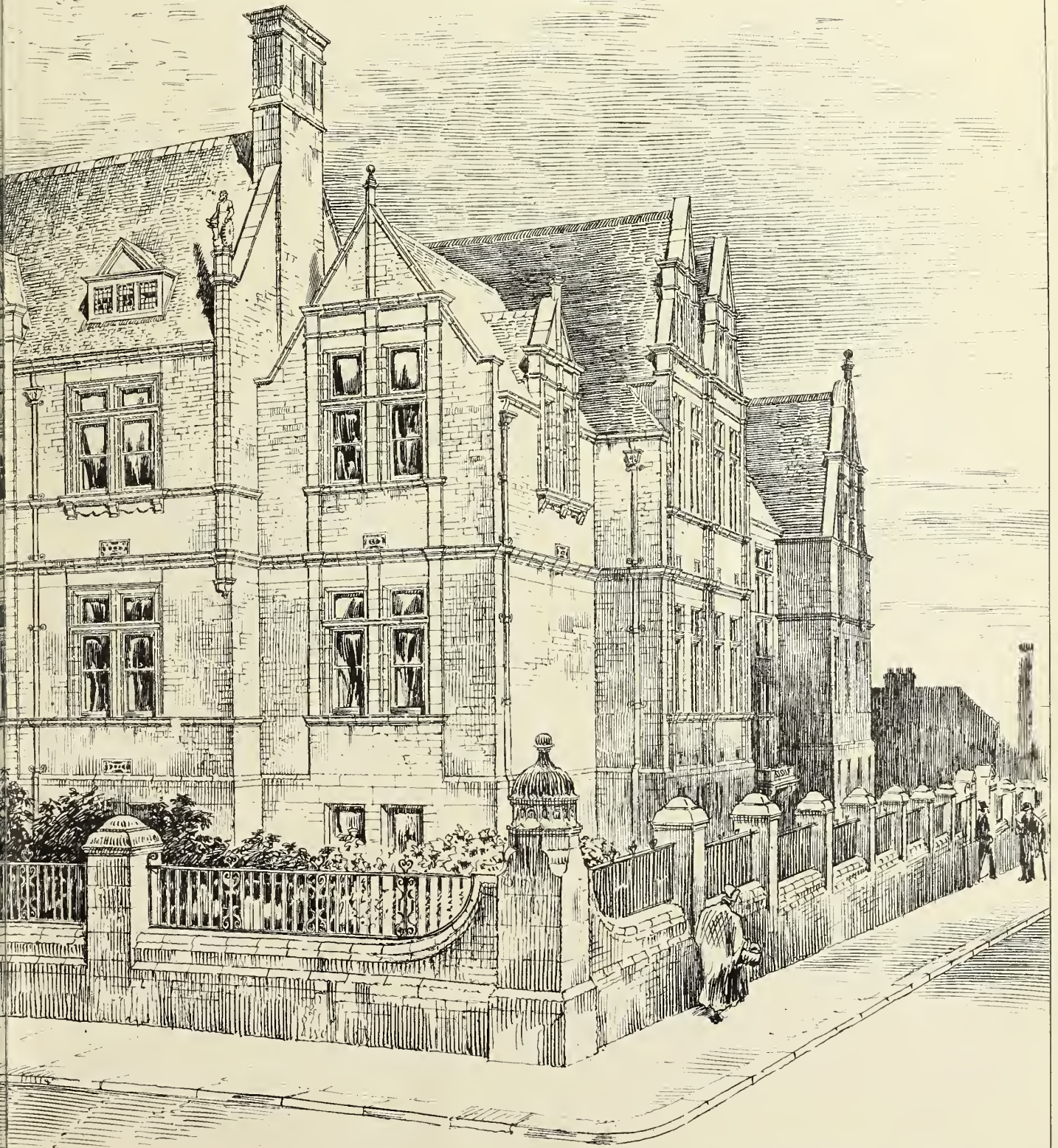


First floor plan.

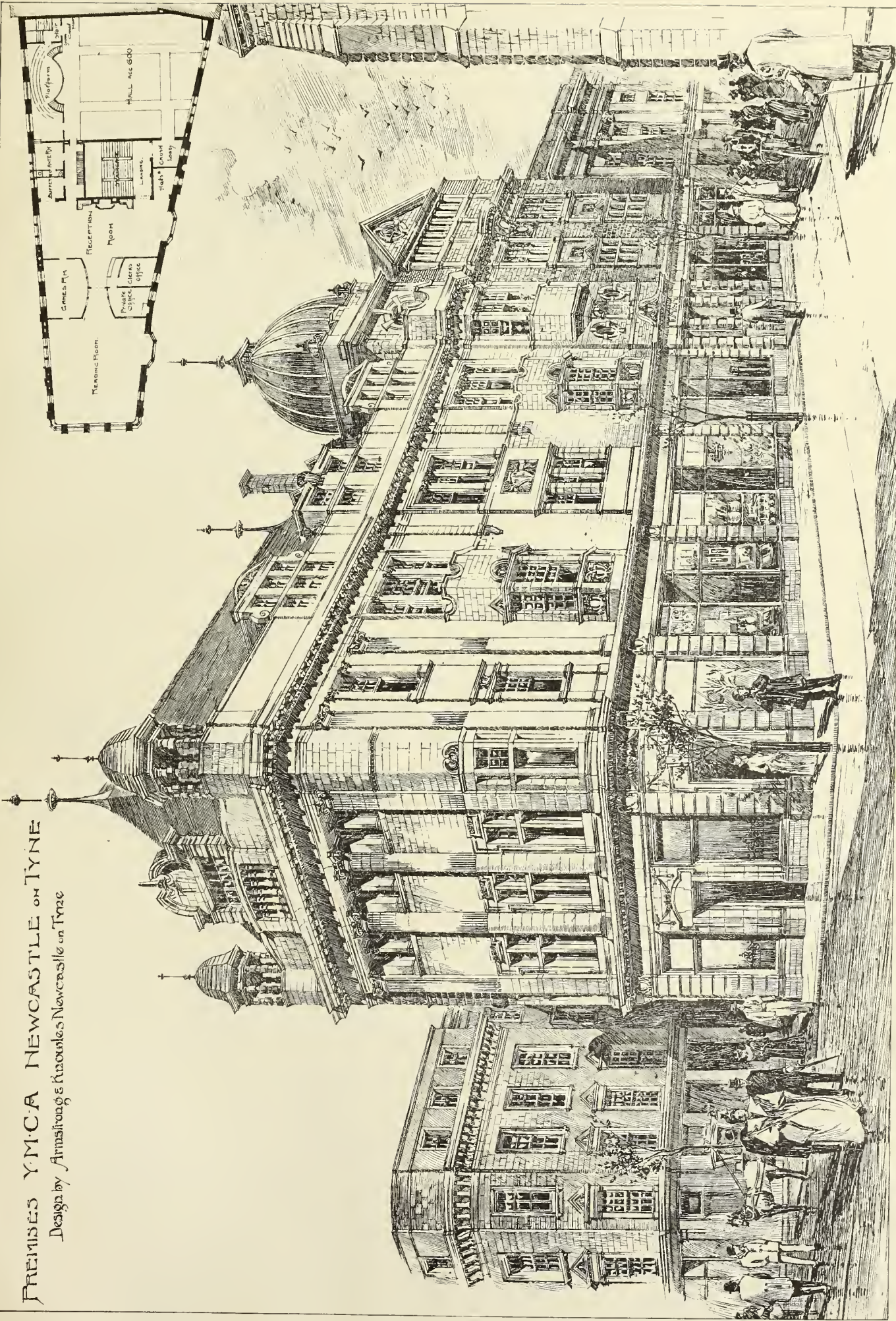


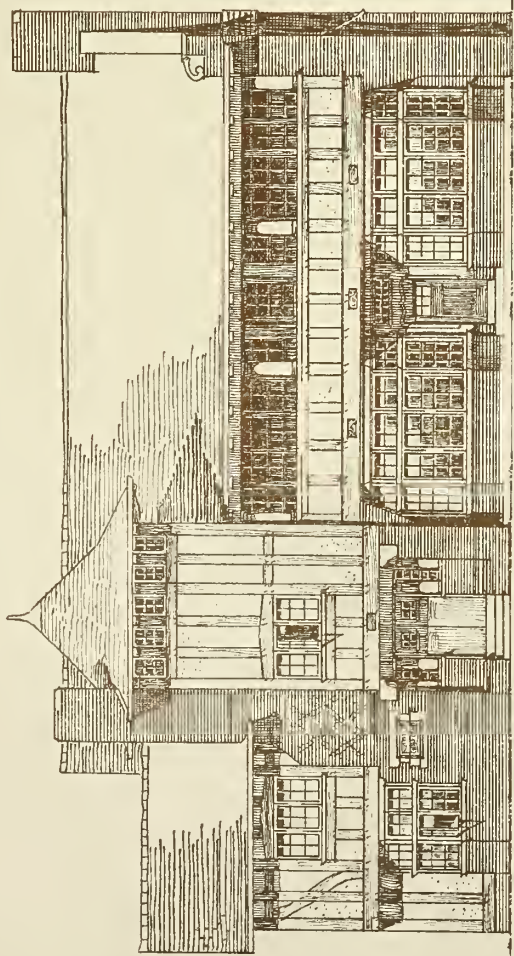
Section A-B

Scale of Feet 0 20 40 60 80 100

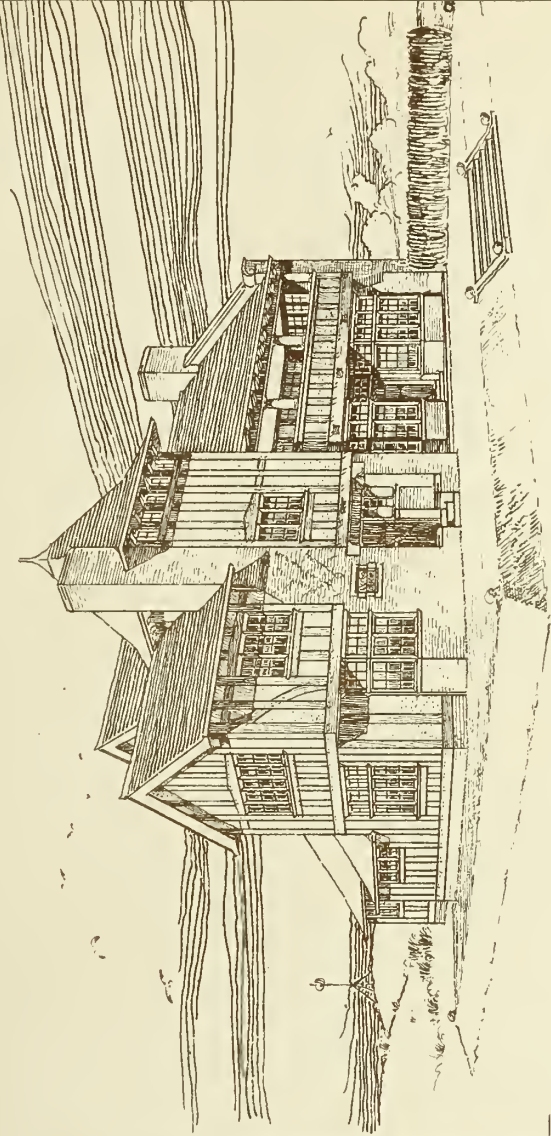


PREMISES Y.M.C.A. NEWCASTLE ON TYNE Design by Armstrong & Knowles Newcastle on Tyne



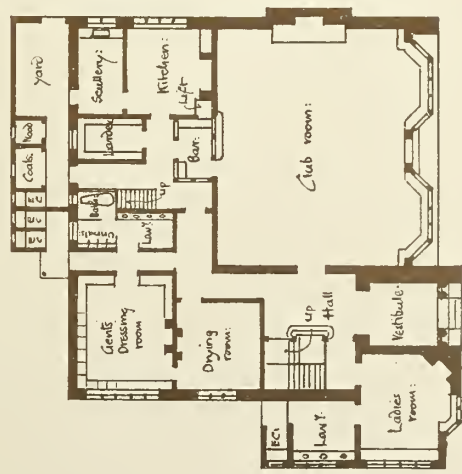


FRONT ELEVATION:



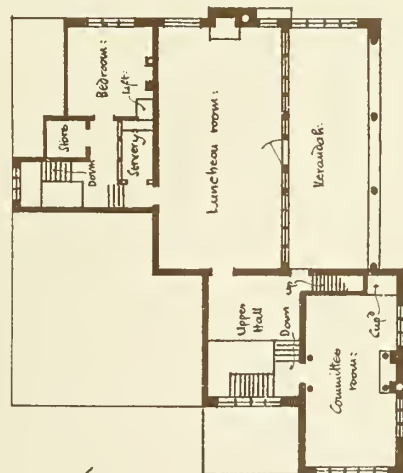
B.N.D.C. : A GOLF CLUB HOUSE :
BY THE OWL :

VIEW :

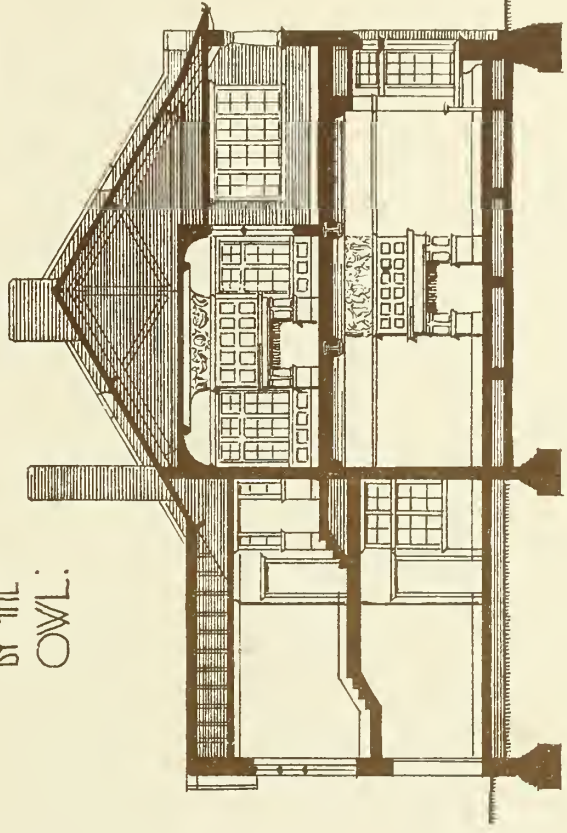


GROUND PLAN :

Scale for Elevation: 10 20 30 40 50 60 70 feet.
Scale for plans: 0 10 20 30 40 50 60 70 feet.



UPPER PLAN :



SECTION :
PLACED FIRST.

HIGH STREET BUILDINGS
SYDENHAM SE
HENNELL & SON ARCHT^s



ARCHITECTURAL & ARCHÆOLOGICAL SOCIETIES.

THE SOCIETY OF ARCHITECTS.—On the invitation of the council of the East London Trades, Industries, and Arts Exhibition, the members of the Society of Architects paid a visit to the People's Palace, Mile End-road, where this exhibition is on view, on Tuesday evening. A reception was held in the Wilkie Collins' Library of the Palace by Mr. E. J. Hamilton, the President of the Society, who was supported by Mr. Ellis Marsland, honorary secretary; Major Seymour Leslie, R.E., hon. corresponding secretary; Mr. H. G. Quartermain, treasurer, and by many members of the council. After an introductory address by the President, tea and light refreshments were partaken of, and the visitors then made the tour of the exhibition, reassembling later on at the Queen's Hall, where reserved seats were provided at a concert. Among the trade exhibits some well-made specimens of asphalted felt-roofing are shown by Messrs. F. McNeill and Co., of 14, Lamb's-buildings, Bunhill-row; but the group comprising the building trades is a very small and unrepresentative one.

CHIPS.

A new peal of eight bells has been placed in the tower of the parish church of Brewood, Staffs, by Messrs. Taylor and Son, bell-founders, of Loughborough, to whom the contract was intrusted.

A Wesleyan chapel, with school and classrooms attached, is about to be built at Tawyffron, near Wrexham. Mr. William Lloyd-Jones, of Bangor, is the architect.

In the Mayor's Parlour at the Town-hall, Wolverhampton, on Monday, Mr. R. E. W. Berrington, who recently resigned his position as borough engineer, was presented by the mayor, on behalf of a number of subscribers, with a silver tea and coffee service, in recognition of his many years' work on behalf of the town.

At Monday's meeting of the Trowbridge urban council, the names of four candidates for the position of surveyor and inspector of nuisances were laid before the council by a committee, and Mr. F. E. G. Bradshaw, from the borough surveyor's office at Brighton, was appointed. The salary is £150 per annum.

The Loudon County Council and the City Commissioners of Sewers, who have already agreed to widen the eastern end of Fleet-street on the south side, between Ludgate-circus and Bride-lane, from 45ft. to 60ft., have under consideration a proposal to carry the improvement a step westward by acquiring the property No. 89, Fleet-street (midway between Bride-lane and Salisbury-court) at a cost of £7,160.

The restoration and enlargement of Nempsett Church were commenced last week. Mr. Edmund Buckle, the diocesan architect, has prepared the plans, and the contract has been given to Mr. J. Flower, of West Harptree. The plans show an enlarged chancel, with a new vestry. The walls externally are to consist of dressed local stone, with an internal lining of Dundry stone, which will also be used for the window tracery.

At Salford, on Friday, Mr. Rienzi Walton, one of the inspectors of the Local Government Board, held an inquiry as to the application of the corporation for sanction to borrow £13,500 for technical instruction purposes. The town clerk explained that the money had already been expended, and was in excess of the estimated cost. The excess of expenditure on the land was £164, £6,941 on the buildings, and £3,800 on the fittings. The architect's commission, which was originally put down at £2,157, had been increased to £4,000. The salary of the clerk of the works, which amounted to £880, was not in the original estimate, so that the total sum required was £15,193. Mr. Henry Lord, the architect, gave a detailed account of how the extra money had been spent. Subsequently Mr. Walton held an inquiry with reference to an application of the corporation for sanction to borrow £50,000 for works for the disposal of sewage, required for altering and enlarging the works at Mode Wheel. Mr. Corbett, the borough engineer and surveyor, produced plans of alterations and additions.

Mr. J. P. Lawson, late city engineer of Vancouver, B.C., died on June 12th. He was a native of Scotland, and was educated in engineering in Edinburgh. His engineering service took him in turn into Ireland, South Wales, Nova Scotia, and Manitoba. He was appointed the first city engineer of Vancouver, and laid out the greater part of the city, holding that position until 1891.

The Indian Institute at Oxford, the completion of which, by the erection of a museum and reading-room, was celebrated last week, has been built from designs by Mr. Basil Champneys.

TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. All communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondents.]

It is particularly requested that all drawings and all communications respecting illustrations or literary matter should be addressed to the EDITOR of the BUILDING NEWS, 332, Strand, W.C., and not to members of the staff by name. Delay is not unfrequently otherwise caused. All drawings and other communications are sent at contributors' risks, and the Editor will not undertake to pay for, or be liable for, unsought contributions.

Cheques and Post-office Orders to be made payable to THE STRAND NEWSPAPER COMPANY, LIMITED.

TERMS OF SUBSCRIPTION.

One Pound per annum (post free) to any part of the United Kingdom; for Canada, Nova Scotia, and the United States, £1 6s. 0d. (or 60s. 30c. gold). To France or Belgium, £1 6s. 0d. (or 33fr. 30c.). To India, £1 6s. 0d. To any of the Australian Colonies or New Zealand, to the Cape, the West Indies, or Natal, £1 6s. 0d.

ADVERTISEMENT CHARGES.

The charge for Competition and Contract Advertisements, Public Companies, and all official advertisements is 1s. per line of Eight words, the first line counting as two, the minimum charge being 5s. for four lines.

The charge for Auctions, Land Sales, and Miscellaneous and Trade Advertisements (except Situation advertisements) is 6d. per line of Eight words (the first line counting as two), the minimum charge being 4s. 6d. for 40 words. Special terms for series of more than six insertions can be ascertained on application to the Publisher.

Front-page Advertisements 2s. per line, and Paragraph Advertisements 1s. per line. No Front-page or Paragraph Advertisement inserted for less than 5s.

Advertisements for the current week must reach the office not later than 3 p.m. on Thursday. Front-page Advertisements and alterations in serial advertisements must reach the office by Tuesday morning to secure insertion.

SITUATIONS.

The charge for advertisements for "Situations Vacant" or "Situations Wanted" is ONE SHILLING for TWENTY-FOUR WORDS, and Sixpence for every eight words after. All Situation Advertisements must be prepaid.

NOTICE.

Bound copies of Vol. LXIX. are now ready, and should be ordered early (price Twelve Shillings each), as only a limited number are done up. A few bound volumes of Vols. XXXIX., XL., XLI., XLII., XLIII., XLIV., XLV., XLVI., XLVII., XLVIII. may still be had, price Twelve Shillings; all the other bound volumes are out of print. Most of the back numbers of former volumes are, however, to be had singly. Subscribers requiring any back numbers to complete volume just ended should order at once, as many of them soon run out of print.

RECEIVED.—W. E. B.—Land Agent.—C. W. Goodman.—B. R. and Co.—H. P.—R. D. (Cheltenham.)

Correspondence.

CENTRAL HALL AT LAW COURTS.

To the Editor of the BUILDING NEWS.

SIR,—With reference to the above matter noticed in your issue of 26th ult., it may be interesting to call to mind Mr. Street's remarks concerning it when he conducted a party of the Architectural Association over the works while yet unfinished. Speaking from memory (and I suppose it was over 20 years ago), I remember that when he was explaining the plans, he said that various people had differed as to on which floor the great hall should be. Some had advocated the ground floor, and some the first floor. So, he explained, taking advantage of a considerable fall in the ground level between Carey-street and the Strand, he had altered the axis of the hall to a direction at right angles to what was originally intended, and, by so doing, placed the hall on the ground floor when entered from one thoroughfare, and on the first floor when entered from the other, and thus had met the ideas of both parties. Those present then will remember probably the applause which greeted the exposition of this skilful device.—I am, &c.,

W. G. MERRICK.

A new Congregational Church was opened on Sunday last at Stonehouse, Lanarkshire. The building is in Early English Gothic, built of white freestone from Overwood quarries, and is roofed in a single span with open-timber roof, and gallery at end only. The number of sittings is 404, and there are also a small hall, classroom, vestry, &c. The architect is Mr. John B. Wilson, A.R.I.B.A., Glasgow, and the contractors are principally local.

Messrs. E. H. Shorland and Brother, of Manchester, have just supplied their patent Manchester stoves to the new infirmary, Rochdale, and also their patent exhaust roof ventilators and inlet-tubes to the Spotland Reform Club, Rochdale.

Intercommunication.

QUESTIONS.

[11521].—**Cromer**.—I shall be obliged to any of your readers if they will kindly furnish me with a list of interesting old churches, houses, &c., worth a visit within a radius, say, of 30 miles from Cromer?—HOLIDAY.

[11522].—**Sewage**.—I shall feel obliged if any of your readers would kindly give me an accurate and simple test for ascertaining whether water is polluted with sewage, or not—i.e., not merely whether such water has become polluted by subsoil water, but by sewage alone?—POLLUTION.

[11523].—**Examination**.—Will some reader who has passed the Municipal and County Engineer's Voluntary Exam., kindly inform me what method of study he adopted in qualifying for same? Also whether a coach is necessary, and if the expenses are very heavy?—STUDENT.

[11524].—**South Africa**.—Can any reader give me any information of the building trade in South Africa? I am a bricklayer by trade, am a good draughtsman, have passed first class Science and Art Building Construction (advanced course). Should like to go out if there is any prospect of work. Any information, and the best part to go to, will be thankfully received.—F. B.

REPLIES.

[11520].—**Builders' Textbooks, Book-keeping, &c.**—"T. R. E. B." cannot do better than purchase the following books—viz., "The Builders' Clerk," a treatise on the management of a builder's business, by Thos. Bales, price 1s. 6d.; "Quantity Surveying," by J. Leaning, price 8s., both from E. and F. N. Spon, Charing Cross; "Estimating," by a Practical Estimator, 5s. 6d. net, from B. T. Batsford, High Holborn, and Lockwood's "Price Book," price 4s., from Kelly and Co., 51, Great Queen-street, Lincoln's Inn. For book-keeping, I shall be glad to supply "T. R. E. B." or any other reader of the "B. N." with full-size worked sheets of a simple and complete system.—F. J. WEBBER, Feltham-road, Ryde, I.W.

The partnership heretofore subsisting between T. Batterbury and W. F. Huxley, architects and surveyors, John-street, Bedford-row, W.C., under the style of Batterbury and Huxley, has been dissolved.

A new Roman Catholic church, dedicated to St. Edmund, is in course of erection at Miles Plating, near Manchester. The architects are Messrs. Pugin, of London, and the contractors Messrs. Robert Neill and Sons. The church will provide accommodation for 1,100 persons. At the corner of Monsall-street and Mary-street a tower will ultimately be erected. The total length of the church internally will be 125ft., the width 65ft., and the apex of the roof will be 62ft. above the level of the ground.

Of the collection of Impressionist pictures bequeathed to the French Government by the late Gustave Caillebotte, forty have been accepted by the keeper of the Luxembourg, where they will be placed in a new gallery, to be built on the garden terrace. They include eight examples of Monet, eight of Pissarro, six of Renoir, six of Sisley, two of Manet, seven pastels of Degas, and two drawings of Millet.

At the last meeting of the Lancaster Town Council, the borough engineer was instructed to proceed forthwith with the construction of Bleatarn reservoir, estimated to cost £60,000.

A new factory is being built at Elderslie in connection with Glenpatrick Carpet Factory, of which Mr. C. B. Renshaw, M.P., is the head. The cost is about £25,000, and the building covers nearly four acres.

A dedication service in connection with the reopening of Bruera Church, one of the oldest in Cheshire, was held on Sunday. The building has undergone a thorough renovation at the expense of the Duke of Westminster.

The town council of Inverness recently raised grave objections to the selected design for the statue of Flora MacDonald, to be erected in the burgh, on the ground that the feet were left bare. On Thursday the council received a letter from Mr. Davidson, the selected sculptor, stating that he would add shoes, and also remodel the costume of the statue. He complained that the motif and sentiment of the memorial were being lost sight of in criticism of minor details.

A committee of the House of Lords has passed the Bill to empower the Midland Railway Company to construct a harbour at Heysham in lieu of the existing harbour at Morecombe. The estimated cost of the works is £500,000. The Bill has already passed the House of Commons.

Lord Cross, Master of the Worshipful Company of Clothworkers, will lay to-day (Friday) the foundation-stone of a research laboratory in connection with the dyeing department of the Yorkshire College, Leeds. The expense of the new buildings, £15,000, is to be borne by the Clothworkers' Company. Messrs. Waterhouse and Son are the architects of the additions, as well as of the entire existing range of buildings.

Legal.

DRAINS AGAIN.

THE Public Health Amendment Act, 1890, in section 19, set a new puzzle for our Courts of Law to work out at their leisure. It provides that when two or more houses belonging to different owners are connected with a public sewer by a single private drain, an application can be made under section 41 of the Public Health Act, 1875, and the local authority may recover any expenses incurred by them in executing any works under that section from the owners of the houses. In the recent case of the Mayor of Eastbourne v. Bradford (*Times*, June 19), this clause came before a Divisional Court for construction. The defendant had been sued for his proportion as one of the owners of a "single private drain," which drained his and several other houses into the main public sewer. The County Court judge found for the plaintiff, and gave leave of appeal. The Lord Chief Justice now delivered a very full judgment, and went through the various conflicting and confusing cases affecting this complex subject.

The point was to decide the meaning of the words, "single private drain." It was a drain, because the new definition in the last Act makes a "drain" include one that is used for the drainage of several houses—otherwise it would seem to be a sewer. Possibly it might safely be said that such a conduit is a drain as regards the main sewer, and a sewer as far as it affects other smaller drains, though this is confusing. Then the Court wanted to know how a "drain," which was used by several houses in common, and which was vested in the local authority, could be a "private" drain at all? It may be said that the judges gave it up as an insoluble problem, and came back to the Act, which they said was intended to increase the power of the local authorities in this respect. They finally held that this conduit or pipe was a single private drain connecting two or more houses belonging to different owners with the main public sewer, and so the defendant was liable to pay his proportion of the expenses incurred by the corporation. For the rest, the judges held that existing sanitary legislation is not founded upon logical principles, is unsystematic and confused, and needed reducing into some kind of order. With which conclusions we can all heartily concur.

FRED. WETHERFIELD, Solicitor.

1, Gresham Buildings, Guildhall, E.C.

NOTE.—All questions for reply in this column must be headed "BUILDING NEWS," and must reach my offices, as above, by *Tuesday* morning to insure answer same week.

The Vineyard Congregational Church, Richmond, Surrey, which has been closed for repairs, was reopened on Sunday. The church has been repainted and decorated by Messrs. Campbell, Smith, and Co., of Newman-street, W., under the architectural direction of Mr. P. E. Pilditch, of Parliament-street. The ventilation has received special attention at the hands of Messrs. Boyle and Son. The gas has also been abolished, not only in the church, but throughout all the premises, and replaced by electric light.

A People's Palace, erected near the railway station at Bridlington Quay, was opened on Monday. It is faced with pressed bricks, the dressings being of stone. Over the vestibule is a tower, surmounted by a flagstaff. The greater part of the building is two stories high, but there are additional rooms in the basement. A refreshment-room, 50ft. by 30ft., and two dining-rooms form a wing of the premises. The dimensions of the concert-hall are 90ft. by 50ft., and there is accommodation to seat about 1,300 people—900 in the area, and 400 in the gallery, or promenade balcony, which extends round three sides of the room. The builder is Mr. Robert Bailey, of Bridlington, who took the contract at £7,000, and the architect is Mr. Joseph Earnshaw, of the same town.

In the ventilation of St. Joseph's Industrial Schools, Tranent (Messrs. Buchanan and Bennet, Edinburgh, architects), the "Climax" patent direct-acting turret ventilators are being used and supplied by Messrs. Cousland and Mackay, ventilating engineers, Glasgow, the sole makers of these ventilators.

Alterations are being made to the West Norfolk and Lynn Hospital, under the directions of Mr. H. J. Green, architect, Norwich. The ventilation of this building will now be effected on the Boyle system.

LEGAL INTELLIGENCE.

THE BUILDING OF A THEATRE.—BEAR, PERKS, AND CO. v. BATLEY AND ANOTHER.—This action, heard by Mr. Justice Mathew in the Queen's Bench Division on July 2nd, was brought by Messrs. Drew-Bear, Perks, and Co., ironfounders, carrying on business in Queen Victoria-street, against Messrs. Batley and Linfoot, of Birdhurst-road, South Croydon, to recover £289 16s., the balance of an account for work done and goods supplied in connection with the building of a theatre at Croydon. Defendants paid £289 13s. 1d. into court, and counter-claimed to recover penalties. In May of last year the plaintiffs contracted to supply certain ironwork in connection with the building of a theatre at Croydon, and, having completed their work, they brought the present action to recover the balance of their account. Defendants admitted liability to the extent of £289 13s. 1d., which sum they paid into court. They, however, contended that they were entitled to recover £200 in respect of penalties, the plaintiffs having delayed the works ten weeks beyond the time specified in the contract for its completion. Plaintiffs, in reply, said that whatever delay had occurred was due to the action of the defendants in altering the plans for the construction and the internal arrangements of the theatre. Mr. Justice Mathew held that, upon the evidence and the correspondence, the plaintiffs had been guilty of no delay, and gave judgment for them on the counter-claim, with costs. Judgment for plaintiffs accordingly.

LORD SALISBURY'S STRAND PROPERTY.—In the Chancery Division, on Friday, before Mr. Justice Kekewich, an injunction was moved for on behalf of the Strand District Board of Works, to restrain Mr. Frank Kirk, builder, from allowing an excavation in Little Newport-street to remain open. The defendant had, in 1891, entered into a building agreement with Lord Salisbury, and had made the excavation now complained of; but as, it was alleged, he had failed to carry out the agreement, Lord Salisbury had determined it, and claimed the site. For the defence it was contended that Lord Salisbury, having terminated the agreement, was in possession of the site, and that the defendant, if an injunction were granted and he attempted to comply with it, would be a trespasser. His Lordship declined to make any order, except that the defendant would have the costs of the motion in any event. The case came before Lords Justices Lindley, Lopes, and Rigby, sitting as the Court of Appeal, on Wednesday, when Mr. Justice Kekewich's judgment was reversed, and their lordships granted an injunction restraining the defendant Kirk from allowing the trench to remain open.

CHIPS.

Princess Christian opened on Saturday afternoon a Holiday Home for Boys, which has been erected under her personal supervision, and from designs by Mr. William Menzies, at Bishopsgate, on the confines of Windsor Great Park. The home provides accommodation for twelve boys, with a man and his wife in charge.

New county police-stations are about to be built at Asken and Tong from plans by Mr. J. Vickers Edwards, of Wakefield, county surveyor for the West Riding.

The two days' sale of old French furniture and decorative objects belonging to the late Mr. Arthur Seymour, of Piccadilly, came to an end on Friday at Messrs. Christie, Manson, and Woods's, the total amount realised by about 270 lots being close on £15,000. The pictures by old masters in the same collection realised £11,250.

Some new buildings which have lately been added to St. Peter's Training College, Peterborough, were dedicated by the Bishop of Peterborough on Saturday. The additions include a lecture-room, school-room, and laboratory. They were built at a cost of £1,300, from plans by Mr. H. M. Townseul, of Peterborough.

A nurses' home at Paisley, erected adjacent to the new infirmary now being built at Calside, was formally opened on Friday by the donor, Mr. Peter Coats. The building, which altogether cost about £5,000, including furnishing, is of red sandstone from Lochbriggs Quarry, Dumfries. It is three stories in height, and provides accommodation for 28 nurses.

At a meeting of the Knaresborough (Harrogate) Rural District Council, a scheme of main sewerage and sewage disposal was unanimously approved by the council, per plans by Mr. D. Balfour, M.I.C.E., F.G.S., Newcastle-on-Tyne, and application is to be made to the Local Government Board for sanction to a loan.

At the last meeting of the Hull Town Council, Mr. F. J. Bancroft, of New Barnet, near London, was elected waterworks engineer under the corporation at a salary of £450 per annum, with house, coals, and gas.

Our Office Table.

REFERRING to the "efficiency and cost of plumbers' work," the *Lancet*, in its special supplement on the subject, remarks on how young architects obtain their information upon details and prices, and observes, their knowledge of prices comes to them second-hand. To a certain extent this is true; but our contemporary is wrong when he assumes that it is from the "contractor's priced bill of quantities" the architect "collects schedules of all the lowest prices," or in case of arbitration he would refer. Again, it is stated "Thus it happens the contractor who makes the most mistakes is the one who chiefly influences the architect on the subject of prices." The writer evidently knows very little of the architect's work; probably he is not aware of such guides to prices as that of "Laxton," in which the prices of plumbing and other trades are based on data derived from the best materials and workmanship. Everyone knows that the tendency to cut down prices leads to bad work; but we are not aware that the architect is responsible for this condition of affairs, any more than a medical man can be held responsible for the inferior drugs of which his prescription is compounded.

AN architect writes, with some justifiable warmth, calling attention to an advertisement which appeared in the Cardiff newspapers last week, inviting members of the profession to apply for the post of architect for the erection of a county school under the Intermediate Education Act. As our correspondent points out, the advertisement clearly, though indirectly, charges architects with practices the commission of which would procure their immediate expulsion from any recognised body of architects, in the following words:—"The architect will not be allowed any trade discounts upon any part of the work ordered." He asks, How came the governors of this proposed school to think such so unprofessional a practice as the acceptance of secret and illicit commissions was possible; and, further, if the governors are afraid of the duplicity of architects, and therefore think proper to warn them, how can they have confidence in the man who eventually becomes their architect?

At Tuesday's meeting of the London County Council, the recommendation of the General Purposes Committee that Captain Simonds's appointment as chief officer of the Fire Brigade be terminated from Tuesday next, the 14th inst., and that he be paid six months' salary in lieu of notice, came up for consideration. After several amendments had been discussed and withdrawn, it was eventually resolved that Captain Simonds's appointment should terminate on July 31, and that it should be referred to the General Purposes Committee to prepare a regulation giving the Council discretion to grant a pension or gratuity to any member of the Fire Brigade who had served 15 years on his ceasing to be a member, and to report whether any, and, if any, what pension or gratuity should be paid to Captain Simonds. The proposal with reference to the erection of a new County-hall on a site in Spring-gardens was adjourned till next week. A recommendation of the Improvements Committee, that the Council should contribute one-half the net cost of the widening of Cheapside at the western end, such contribution not to exceed £77,975, was carried, after discussion, by 54 to 24 votes. It was agreed that hoardings surrounding the Council's surplus lands or other property, or put up by the Council's building tenants, or in connection with dangerous structures, might be let for advertising purposes. With regard to hoardings in connection with buildings erected or works carried out for the Council, it was agreed that it should be left to the committee upon whose initiative such buildings or works were carried out to decide whether or not the hoardings were to be let for advertising purposes. On the recommendation of the General Purposes Committee, it was agreed that Mr. Berry, one of the Council's officials, should be allowed on certain conditions to patent an invention for improved fire-ranges.

A SPECIAL meeting of the Cheshire County Council was held on Thursday in last week for the purpose of appointing a county architect and a county surveyor and bridge-master, in the room of the late Mr. Stanhope Bull. Colonel Dixon presided. There were 107 candidates for the position of county surveyor, and these had been

narrowed down by the council to the following five:—Thomas Aitken, Cupar, Fife; Harry F. Bull, Chester; E. Evans, Carnarvon; R. O. W. Roberts, Oswestry; and F. J. Wood, Lancaster. The council eventually appointed Mr. Bull, the son of and chief assistant to the late surveyor. The post is worth £500 a year, with travelling and other incidental expenses. For the position of county architect there were 65 applicants, and the committee submitted the following five names to the council:—H. Beswick, Chester; John Brooke, Manchester; C. R. Dalgleish, Wellington, Salop; G. H. Willoughby, Manchester; and P. Scott Worthington, Manchester. The council selected Mr. Beswick, who has for the last seven years assisted the late surveyor in his architectural work. The position is worth £200 per annum and travelling expenses, in addition to a commission of 4 per centum upon the contract price of all work carried on, the cost of which in each case amounts to over £500.

AN exhibition of works in wood will be held next October in the hall of the Carpenters' Company, London-wall, under the auspices of that company and of the Joiners' Company. Numerous medals and money prizes will be offered for models, drawings, wood carvings, and specimens of works in wood connected with the trades of carpenters, joiners, and wood-carvers. The trade examination for entrance scholarships at the Stratford school of the Carpenters' Company will be held on Saturday in next week, the 18th inst., at the school.

THE Department of Science and Art has received, through the Foreign Office, a translation of a Note from the Guatemalan Minister in Paris, inclosing a copy of the regulations issued for the Central American Exhibition, 1897. The exhibition will be opened on 15th March, 1897, and will last for six months. Although the character of the exhibition and the rules made for its arrangement prevent the Guatemalan Government from inviting foreign Governments to take an official part in it, they would view with great pleasure the co-operation of British exhibitors, who would be cordially welcomed, and whose goods would be accepted under the conditions laid down for the foreign section in the general regulations.

ACCORDING to the newspaper accounts, the great Bartholdi statue of Liberty, in New York harbour, is so far advanced in decay that its complete collapse is a question of a few years at most. The statue is, it appears, under the guardianship of the Lighthouse Board, who are unwilling, out of their scanty annual appropriation, to expend money on works of art of no practical utility. The consequence is that the corrosion of the metalwork, which might have been checked if attended to in time, has proceeded until many of the rivets have fallen out, and some of the seams are opened so far that the hand can be put through them, while many of the plates hang precariously from a small portion of the bolts or rivets which once fastened them. The use of the statue as a lighthouse was long ago abandoned. A small light is still kept in the torch, but it is of no particular efficiency. At least £30,000 would be needed to put the statue in repair, and considering the difficulty with which money enough was raised to pay for the pedestal, it seems unlikely that so large an additional sum can be secured in time to save the structure unless the United States Government, or that of the State of New York, will assume the burden.

A RECENT issue of the *American Architect* describes the work undertaken by the expedition sent to Italy last year by the Brooklyn Institute, under the care of Professor William Goodyear. Professor Goodyear took with him a professional photographer, Mr. McKechnie, of the Metropolitan Museum of Art, New York, and apparatus for making photographs with the plane of the sensitive plate precisely parallel to the front of the building to be represented, so as to allow of accurate comparative measurements from the pictures. By means of these photographs, he was able to detect some very curious irregularities in the construction of the Romanesque and Mediæval buildings which have hitherto escaped notice. It is well known that the Romanesque, or rather the Byzantine, buildings of Italy, present continual disturbances of symmetry. The arcades with which they are profusely adorned, although, at first glance, apparently regular, are really composed of arches of various sizes and varying heights, so that the string-courses and cornices above the arcades are

frequently broken by the intrusion of the arch-volt of some arch too large for its place. Moreover, where arcades are superposed, as they are in most of these buildings, the columns do not stand over each other, and wide arches and narrow arches are mixed at random in each tier, apparently in hopeless confusion. It used to be supposed, in the days when the Mediæval architects were looked upon as barbarians, that this irregularity was the result of the inability of the Romanesque architects to make correct measurements; but that idea has long been abandoned. In the front of the Fondaco dei Turchi, in Venice, the large and small arches, and the cushioned-shaped and bracket-shaped capitals are symmetrically arranged on each side of the centre, and it is now agreed that these strange irregularities, far from being the result of accident or ignorance, were purposely and carefully designed, to satisfy some æsthetic feeling which we cannot now understand.

MEETINGS FOR THE ENSUING WEEK.

SATURDAY (to-morrow). — Architectural Association. Visit to the Park Hospital, Hither-green, S.E. Train from Cannon-street Station, 2.20 p.m.
St. Paul's Ecclesiological Society. Visit to Ely. Train from Liverpool-street, 11 a.m.

Trade News.

WAGES MOVEMENTS.

STOCKTON-ON-TEES.—The Stockton joiners have agreed to accept the 1d. per hour, or 2s. 3d. per week, advance offered by the the Masters' Association. The original claim was 3d.

CHIPS.

Mr. George Cartledge has been elected head master of the Rochdale School of Art, at a commencing salary of £200 a year, with fees.

New board schools have just been completed at Stafford. Mr. Nicholas Joyce, of that town, was the architect, and Mr. Jervis the contractor.

The Lord Provost's Committee of the Edinburgh Town Council have instructed the City Superintendent of Works to proceed with the working plans and specifications and obtain estimates for the erection of a new west wing of the City Chambers.

An inspector of the Board of Trade was engaged on Tuesday in making a careful inspection of the new passenger railway which has been constructed from Amfield Plain to Consett, joining the Derwent Valley Line at the Consett junction. He was accompanied by Mr. Chas. A. Harrison, the chief engineer to the North Eastern Railway Company, York; and the representatives of Messrs. J. D. Nowell and Sons, London, the contractors for the new line.

The too-long-delayed memorial of Sir Walter Scott in Westminster Abbey will take the form of a reproduction of the Chantry bust at Abbotsford, and will be erected at the extreme southern end of Poets' Corner, at some distance from the ground.

The new pavilion and bowling-green erected by the recently-formed Severn Side Bowling Club, at Shrewsbury, were opened on the 2nd inst. The pavilion stands upon a terrace overlooking the green. It is a solid half-timber structure, designed after the style prevailing in this country during the early part of the 17th century. The building has been designed by, and carried out under, the superintendence of Mr. W. Scott Deakin, M.S.A., of the firm of A. B. and W. Scott Deakin, architects, Shrewsbury, by Mr. H. Farmer, builder, also of Shrewsbury.

The celebrated sculptor, Professor Erdmann Encke, died at Neu Babelsburg, near Potsdam, on Tuesday, aged 53. He was a pupil of Albert Wolff's. His masterpiece was the marble statue of Queen Louisa of Prussia, which is erected in the Berlin Thiergarten, as a companion to that of her consort, Frederick William III., by Drake. The sarcophagi of the late Emperor William and the Empress Augusta, with recumbent statues in the Charlottenburg Mausoleum, were also by Encke.

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TENDERS.

* * Correspondents would in all cases oblige by giving the addresses of the parties tendering—at any rate, of the accepted tender: it adds to the value of the information.

BELFAST.—For three dwelling-houses, for Dr. Croker. Mr. William Batt, M.R.I.A., Belfast, architect:—
Agnew, J., Belfast ... £720 0 0
Mulligan and Macartney, Belfast... 715 0 0
Rodgers and Black " 708 0 0
McLurg and Walker " 698 0 0

BURNHAM, SOMERSET.—For the erection of an additional water tank, at the Brent Knoll pumping-station, for the Burnham Urban District Council:—

Lowry, Burnham ... £584 18 0
Lloyd " ... 525 0 0
Ambrose " ... 515 0 0
Cook " ... 429 2 6
Saunders, Bournemouth (accepted) 425 0 0

BURY, LANC.—For the erection of a reading-room as an adjunct to the parish church:—
Shaw, J. W., Bolton-street, Bury (accepted).

CANTERBURY.—For erecting the infectious hospital, for the city council:—

Johnson and Co., London ... £5,430 0 0
Wilson, H. B., Canterbury ... 5,021 15 11
Norris, J., and Sons, Ascot ... 5,006 0 0
Adecock, W. J., Dover ... 4,613 6 2
Amos and Foad, Whitstable ... 4,485 18 0
Denne, G. H., and Son, Deal* ... 4,143 0 0
Wiltshier, G., Canterbury ... 4,449 17 7

* Accepted.

CHILCOMPTON.—For the restoration of the par's church (eastern portion). Mr. F. Bligh Bond, A.R.I.B.A., Liverpool Chambers, Bristol, architect. Quantities supplied:—

	A.	B.
Humphreys, G., Bristol	£1,891 10 0	£1,681 0 0
Hayward & Wooster, Bath	1,886 0 0	1,621 0 0
Long and Sons, Bath	1,800 0 0	1,515 0 0
Cowlin and Sons, Bristol	1,792 0 0	1,694 15 0
Church, W.	1,763 0 0	1,511 0 0
Perrot, J.	1,561 0 0	1,369 0 0
Howard and Sons, Bath	1,480 0 0	1,287 0 0
Lewis, T., Bristol	1,449 0 0	1,225 0 0
Hayes, C. A.	1,471 0 0	*1,221 10 0

A.—First estimate. B.—Alternative estimate.

* The committee having decided to carry out the alternative scheme, Mr. Hayes's tender, being the lowest, was accepted, subject to a deduction of £13 for hauling, supplied by a parishioner.

COLCHESTER.—For technical fittings at the science rooms and laboratories, at the new technical college, for the town council:—

Illingworth, Ingram, and Co. ... £297 10 0

For the supply of electric-light fittings throughout the college:—

Christy Bros., Chelmsford ... £145 17 0

Accepted.

ENFIELD.—For caretaker's house, Bush Hill Park School, for the Enfield School Board:—

Fairhead, A., and Son, Enfield, N. ... £290 0 0

FINSBURY.—For exterior painting at the Highbury Truant School, for the London School Board:—

Chase, G. ... £450 0 0
Lawrence, W. ... 238 7 0
Martin, W. ... 229 0 0
Marchant and Hirst ... 229 0 0
McCormick and Sons... 215 0 0
Dearing, C., and Sons (accepted) 185 0 0

HACKNEY.—For exterior and interior painting at the Glyn-road School, for the London School Board:—

McCormick and Sons... £498 0 0
Shurmer, W. ... 493 0 0
Nicholson, T. ... 358 0 0
Derby, A. W. (accepted) ... 348 0 0
Wilmott, C. ... 315 0 0

HACKNEY.—For interior painting at the Nichol-street School, for the London School Board:—

Shurmer, W. ... £342 0 0
Hornett, W. ... 284 0 0
Stevens Bros. ... 261 0 0
Barker, G. ... 248 0 0
Corfield, S. H. (accepted) ... 205 0 0

HORNCastle.—For the reconstruction of Redmill bridge, for the rural district council of Horncastle. Mr. Thropp, county surveyor:—

Jeffrey and Co. (accepted) ... £310 10 0

THE BUILDING NEWS

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THE PUBLIC ESTIMATE OF ARCHITECTS' WORK.

ONE of the misfortunes of a profession which has so many sides as that of building and its kindred arts, is that the public mind is inclined only to estimate that one of them in which it is mostly concerned. A well-known essayist has said that "Each man has his own vocation. There is one direction in which all space is open to him." Others are closed against him. Every man "inclines to do something which is easy to him," and if he confines himself to this, he does it well. If he tries to do other work, he fails somewhere. True to this principle, we see professional men fail in many particulars, and in a similar manner the public generally estimate the architect's work in those directions which they are most capable of appreciating. One thinks the architect should be an expert in plumbing and sanitary matters, another that he should be able to give a correct estimate, a third that he should be capable of settling a dispute about "ancient lights." The public look upon architects and their work from one side only—that side, in fact, which appeals to their popular notions. This partial view of architecture may be mainly summed up in what affects their pocket, their understanding, and their taste. It is not the qualities of good planning or good design which concern them so much as what the building will cost: whether it is cheaper per person to be accommodated, than some other building?—whether a lower tender can be obtained for it?—whether it is larger and handsomer than some other work? The architect is estimated by his knowledge of prices, by his skill as a builder or plumber, seldom for those qualities upon which he plumes himself. It is certainly not for his qualities as an artist, as a scholar, or as a sympathetic gentleman that he is regarded—a fact which may be wisely remembered by the young man who has just passed his "final," and has entered upon his professional career with all the pride and self-satisfaction of being a proficient in the many branches of his calling. Young Mr. "Trilby," with all his enthusiasm for art, may be saved many a rude shock to his feelings if he understands this plain fact. His friends may have set it about that he has won prizes and medals, that he "draws beautifully," and has a full complement of letters after his name. But to what purpose, if at the first commission he gets snubbed for his estimate, or his failure to obtain a low tender, by the cheese-paring Mr. Brown on a committee, or is found fault with by the wife of his client for putting the kitchen in the wrong place, or by her cook because the kitcheners smoke? He may feel inclined to resent such indignities as blaming him for commonplaces or builders' mistakes; they, nevertheless, are painfully hard to bear, and inflict injury upon him which no amount of success in passing examinations can atone for.

The public are keen on what touches their pocket, and this explains why it is that the ordinary client attaches so much importance to cost, to his architect's knowledge of prices of buildings. Ability to estimate has always been one of the qualities which the ordinary client esteems the most. Even so well-informed an authority as the leading medical journal, in speaking of the efficiency and cost of plumbers' work, obviously attributes the inferior plumbing work of the day to the architect's acceptance of prices which

are too low for good work. The writer says the young architect's knowledge of prices is second-hand, and he actually asserts that his knowledge of them is derived from the contractor's priced bills of quantities which are left with him. As these contain schedules of all the lowest prices at which work is undertaken, it is inferred that the architect's prices are below the proper value, and that he makes use of the average values of these schedules when he is called upon "to check or arbitrate upon an account." Only a very partial and one-sided view of the architect's practice and qualifications could lead to so mistaken an idea. It is equally wrong to say that the "contractor who makes the most mistakes is the man who chiefly influences the architect on the subject of prices." Yet this is the kind of misconception the ordinary public have of an architect's work. It is assumed that his skill is based on tendering, that he stakes his reputation on plumbing work, that he has no safer criterion of value than the prices put down by the underbidding contractor. To know how a piece of work ought to be executed cannot be acquired without a knowledge of the proper qualities of material and labour, and this knowledge is or ought to be learned by the architect, who has recourse to proper price-books. We see in this instance a glaring confusion of the architect's with the surveyor's work, and this confusion is everywhere noticeable in the prevalent popular ideas. Do we not constantly meet with persons who, or read newspaper articles which, blame architects for bad drains, insufficient ventilation, and smoky chimneys, who are constantly confounding the builder's with the architect's duties, who cannot understand why the latter should have anything to say or do in matters of decoration or furniture? And this question leads us to dwell on the misconceived view of the public as to what architecture really is. With one class of people it is building only; with another, a sort of external mode of representing buildings. The former or utilitarian class is always confounding the duties of the architect with those of the builder, the sanitarian, or the plumber. No defect appears in the building, but is attributed to the architect, and, as we have pointed out, every smoky chimney and leaking drain is directly owing to his negligence. A person of this kind cannot look beyond the bare possibilities of utility; he cannot see anything beyond the size of a room, whether it is provided with a fireplace, door, and window, and it never troubles him to inquire how these are designed, or of what shape and form they are or ought to be. He does not care a straw about the pattern of the iron grate or chimney-piece; it concerns him more how it "draws," and whether it is an economical consumer; he will try the door to see whether it fits close, and look at the window fastening to see whether it is burglar-proof. Such is the way he assesses the work of the architect—he looks upon it simply as builders' work, in which technical qualities only are concerned. How can we be surprised if the public share this view? They altogether overlook the architect's function—all that deals with good design, logical treatment of materials, decoration and colour.

Or if we take those who look upon the architect as a kind of draughtsman, who prepares pictures, elevations, and does the ornamental part, they are equally wide of the mark. We hear of such people saying that they have employed Mr. So-and-So to draw them an elevation, to make a sketch. They have not the slightest idea that there is any connection between such work and the real structure; that plan has anything to do with the elevation, or that it is inconsistent to get Mr. Brown to build a house to one's fancy and Mr. Setsquare to draw out an elevation. The divorce between construction and art cannot go farther than it does in the

mind of either of those representative factions of the British public. One only regards the architect as a sort of superior builder, the other as a draughtsman. Viewing, therefore, in a very one-sided and imperfect way those who design, we cannot wonder that the profession gets very little honour from the public, and that the architect's name in connection with a new building is considered of less importance than the builder's. His art is less understood than the arts of the painter or musician, which appeal directly to the eyes and sympathies of the public. They think of buildings in the narrower senses of usefulness, sanitation, not as having anything to do with expression or beauty. The very conception the average man has of these latter, is a very different one from that held by the artist. Expression with him is merely a matter of "taste" or a kind of unrelated and freakish "fancy" for a particular sort of building. It may vary in each individual: one may like Gothic, another Renaissance, a third Dutch or Japanese—it does not matter which, this is what is considered "taste"; whereas the architect's conception of that quality means a great deal more—something that is the consequence of the building itself, which cannot be altered or changed by whim; which is as much part and parcel of the plan and the materials themselves as the character of a piece of music depends on the succession or agreement of the sounds which compose the melody. We often find people intelligent in many other things totally unable to realise this fact of dependence, or that a piece of architecture ought to be as much a reasoned-out composition as a mathematical demonstration. They think that an architect is one who can fit an elevation in any style to a given building, or that he can draw out of his stock a design suitable for any building at a moment's notice.

The profession are to blame for permitting many of these wrong impressions to prevail. Every time they submit a design pledging themselves not to exceed a certain amount of cost, or to find a builder to carry it out for a sum which is ridiculously low, they acknowledge their responsibility as to cost; they commit themselves to another common error when they take out the quantities of their own works and guarantee the reception of tenders. Again, in preparing designs, they are often willing to submit drawings in two different styles, or to alter the elevation to the taste of their client, which practices are opposed to a professional or true sense of the architect's work, and lead the public to the supposition that design is an easy matter, and can be altered to suit anybody's taste. It is probably the indifference of some architects to questions of sanitation and other like matters of elementary importance—their want of skill in drainage, ventilation, heating, and other things—that have caused the public mind to inquire how it is that a work designed and superintended by an architect should be defective in these points. If his art consists in arranging and constructing buildings perfect in all respects, it is naturally assumed that these matters ought to receive the first attention. An undesirable prominence has, therefore, been given to the commonplace requirements of building. People naturally say: Before we have art, let us have buildings that are well-constructed, and well drained, ventilated, and warmed. Hence, by the carelessness of those intrusted in the design, a very partial and by no means flattering estimate of professional assistance is formed.

UNFORESEEN DANGERS.

ALTHOUGH legislation of a remedial kind has provided measures for the protection of the public against accidents to dangerous structures, the law has not done

anything to prevent many dangerous conditions arising. One of the first difficulties encountered in the case of a great many of the latter class of questions, is as to the meaning of "structure." Section 102 says: "The expression 'structure' includes any building, 'wall,' or other structure, and anything affixed to or projecting from any building 'wall' or other structure." Thus sign-boards, lamps, and other fixtures to the front of a building would be included in this definition, but as to whether certain temporary expedients can be called "structures," it is not so easy to say. From what we can infer, a hoarding is a structure according to section 84, but whether other arrangements of material of a loose kind can be so named there is nothing to show. The above section appears to point out that wooden structures are not to be erected without having obtained a license from the Council, except hoardings inclosing vacant land not exceeding 12 ft. in height, and except wooden structures of a movable kind erected by a builder for his own use during the construction or alteration of buildings. A new clause, section 85, provides that this part of the Act shall "not apply in the case of a pile, stack, or store of timber not being a structure affixed or fastened to the ground." From what we can gather of the meaning of all this, it appears that the law exempts certain hoardings and stacks or loose piles of timber, and that any storage or accumulations of materials can be made without any control. Hoardings for advertisements have been held not to be buildings, and, as far as we can discover, many hoardings are erected which do not appear to be under any supervision, though there are clauses of the Metropolis Management Act, 1855, which apply, as we shall see presently. That such structures ought to be regulated in London cannot be doubted, if we consider to what use they are sometimes put. That a hoarding is a structure cannot be denied; but a loose accumulation of materials or *débris* behind it is apparently a different matter entirely, though such a pile of loose material may be held up or supported by a hoarding which is certainly not strong enough to resist the pressure of a loose stack of material on one side. In this case the hoarding becomes a retaining wall with a loose mass of shifting material behind it, ready to move or slide down, and creating a pressure of a dangerous kind that may at any moment, after a fall of rain has increased it, threaten those who are on the other side. We have here, in fact, by the use of a hoarding as a support to a mass of building materials, a structure of a dangerous character, which, nevertheless, is not under the direct control of the sections relating to "Dangerous and Neglected Structures." Such a condition of insecurity and danger arises when a few buildings are demolished at the side of a street or passageway, and a hoarding is erected of a temporary nature to protect the public during the operations of pulling down. The falling brickwork, timber, and plaster accumulates next the hoarding, or is piled up against it by the workmen for the sake of clearing the site. The hoarding has to do a double duty, that of protecting the public footway and of supporting the *débris*. In many places in London we may see the hoarding used for this purpose—a purpose for which it is not intended, and which adds a serious danger to our thoroughfares, as at any moment the hoarding may suddenly give way and lives be imperilled. But as the loose stacking of *débris* is not a structure, the law does not interfere. It may regulate the construction of the hoarding, but it does not guarantee its strength to resist internal pressure, and so we have a dangerous structure created, which evades the terms of the section to which we have referred.

We may just refer to the provision made for

the erection of hoardings for the protection of the public during building operations by section 121, 122 of the Metropolis Management Act, 1855. Here we find it is required that during taking down, building, or repairing of any house, building, or wall, every person is to put up a "proper and sufficient board or fence with a convenient platform and hand-rail" to serve as a footway for passengers, and shall continue such hoard or fence with such platform and handrail standing and in good condition to the satisfaction of the vestry or district board during such time as may be necessary for the public safety. Such hoards are to be well lighted during the night, and under penalty.

Section 122 is more to the point. It declares that it shall not be lawful for any person to erect a hoard or fence or scaffold for any purpose, or "any posts, bars, rails, boards or other things by way of inclosure for the purpose of making mortar or of depositing bricks, lime, rubbish, or other material, without a license in writing from the clerk or surveyor of the vestry or district board of the parish or district." The next section also provides that if the hoard be set up without a license from the vestry, or in any other manner than permitted by such license, the hoard is to be removed, &c. These sections clearly give a certain discretionary power to the vestry or district board. They can impose a penalty for continuance of such erection without a license, and remove it and deposit the materials in another place; but there is no direct prohibition of the deposit of materials and *débris* in the way we have described. Do, however, the authorities in every case require a license or insist on a proper storage of materials behind the hoarding? The question applies also to the erection of covered passages or scaffoldings over the footway, which is often used for the storage of building materials. These scaffolds are often loaded with bricks and stone, or timber. In every sense of the term they are structures, and as such require to be constructed with skill and care. Another kind of danger arises when a building has been gutted by fire, and the beams of floors and partitions and the timbers of roof half-burnt, hang about for weeks. A case of this kind occurred only lately in the Westminster Bridge-road. A building of a considerable frontage, and four stories in height, was burnt out, only the brick inclosing walls remaining. The half-burnt and dislocated timbers of floors and roof form a dangerous element, and render the walls insecure, as the ties and connections are broken. Only the other day the back walls of a building in a dilapidated state in Hampshire suddenly gave way, carrying the roof with them, the disturbing cause being a traction-engine in the roadway. But the law only concerns itself with shoring the walls and hoarding the site, perhaps after the lapse of considerable time, instead of making it compulsory to remove all loose timber and girders that threaten the safety of the public.

CAST IRON IN BUILDER'S AND CONTRACTOR'S WORK.—XXX.

By JOSEPH HORNER.

IT will have been noticed that in the list of moments of inertia and moduli of section given in the last article, that no values for moduli are given for the T-section, and the girder section with unequal flanges. This brings us to the consideration of a matter we have mentioned already, Art. IV.—i.e., the position of the neutral axis in a beam which is made of cast iron. In a flanged girder which is proportioned correctly the neutral axis should coincide with the centre of gravity of the cross-section, and the stress on each flange would then be directly proportional to the distance of the flange from the neutral axis. The section of each flange should be so adjusted that the stress shall correspond with the resistance of the metal to tension or compression. If the tensile strength

of the metal does not correspond with the compressive strength, both edges of the section cannot be fully stressed when the neutral axis lies through the centre of the section, and, as a consequence, the metal is not used in the most economical way. In that case it is best to adopt a section unsymmetrical with respect to the neutral axis—a section corresponding with the ratio of tensile to compressive stress. In this case we shall have to obtain two different values or moduli, one for each section.

Let ft = the tensile strength, and fc = the compressive strength of the metal; Zt = the modulus of section for the tension edge, and Zc = the modulus of section for the compression

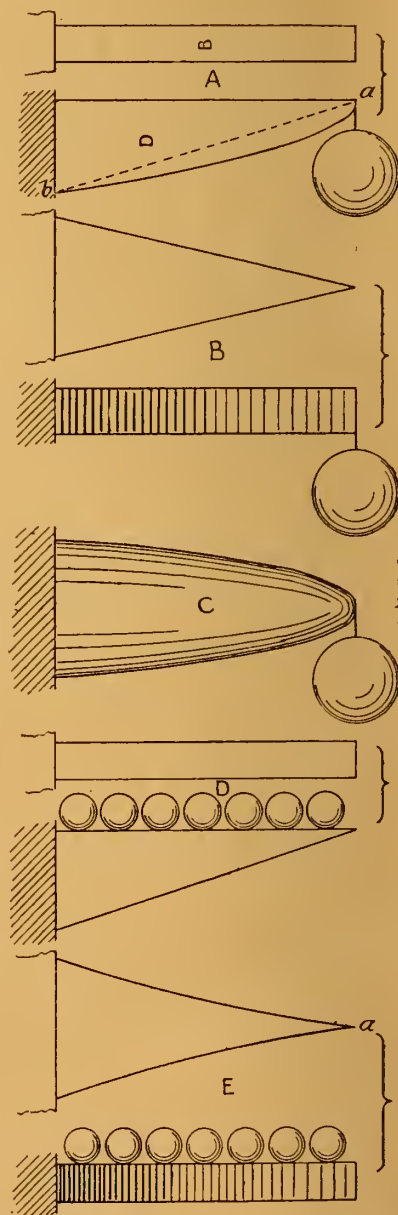


FIG. 123.

edge. Then, if $ft = fc$, $Zt = Zc$, and $ft Zt = fc Zc$ = bending moment. If ft is not the same as fc (as in the case of cast iron), then Zt should not be the same as Zc . In cast iron, fc is about five times ft ; therefore Zt may be five times Zc . For all practical purposes, the proportioning of the flanges of a girder to fulfil these conditions may be done as follows:—Let at = the area of the tension flange, ac = the area of the compression flange, and H = the vertical height between the centres of the flanges; then—

$$ft at = fc ac,$$

$$\text{and—} \quad at = \frac{M}{ft H}$$

$$\text{and—} \quad ac = \frac{M}{fc H}$$

where M = bending moment on beam.

This, of course, does not take into account the

shearing stress on the section; but if the vertical web be cast of a reasonable thickness compared with the flanges, we shall find that it has sufficient area to take the shear. The above method of proportioning a girder section is certainly the easiest one, and for the majority of cases is quite near enough; but for particular cases it is well to calculate the moment of inertia, and deduce from this the Z and Z_c , and thus discover the exact resistance of the section.

With a simple rectangular section the position of the neutral axis must be placed so as to properly adjust the stresses on the outside fibres of the section. Taking cast iron to be five times stronger in compression than in tension, the depth of material above the neutral axis will be to that beneath it as $\sqrt{1}$ is to $\sqrt{5}$, or as 1 is to 2.236, or, roughly, say as 2 is to 5.

This arrangement of metal to take advantage of the differences in tension and compression is often done, but not invariably. In the true Hodgkinson girder, which is the general type upon which most cast-iron girders are made, the principle of equality of moments is embodied. But in some cases it is objectionable to have one flange wider than another, or, at any rate, much wider than another. Then the bottom flange is made thicker than the top, leaving an immense excess of strength in the top. Even in the modified form of the Hodgkinson girder there is usually an excess of strength left in the top flange. The rule given by Mr. Hodgkinson for calculating the strength of the beams to which his name has been given takes no account at all of the strength of the compression flange. This is due to the fact that the top flange has rather over $\frac{1}{4}$ th of the area of the bottom one, while $\frac{1}{2}$ to $\frac{3}{4}$ represents about the difference between the tensile and compressive strengths of cast iron. So that if the beam breaks it will be wholly due to the failure of the bottom or tension flange. The rule is—

$$W = \frac{A \times D \times C}{L}. \text{ Where—}$$

W = breaking weight in tons imposed at centre.

A = area of bottom flange in square inches.

D = depth over all in inches.

C = a constant, 2.166.

L = length, or span in feet.

To find the dimensions of such a beam loaded at the centre with a given weight:—

$$\frac{W \times L}{2.166 \times D} = A.$$

The relation of thickness of flange to width is about 1 to 6 or 8, that of the top flange from 1 to 4 or 6. The thickness of the vertical web from $\frac{1}{8}$ to $\frac{1}{10}$ that of the total depth. In practice the top flange is made heavier than $\frac{1}{6}$ or $\frac{1}{8}$ of the bottom one, as $\frac{1}{3}$ or $\frac{1}{2}$, giving more metal than is necessary for absolute strength, but insuring a casting less liable to stresses due to inequalities in shrinkage. When the bottom flange is excessively thick, from 2 in. upwards, some reduction of strength must be allowed for, because thick castings are weaker than thin ones.

The Hodgkinson beam, though proportioned correctly according to theory and exact experiment, has fallen into disuse. Such beams are about one and three-quarter times as strong as beams of equal weight in which the top and bottom flanges are equal. But experience has proved that they have an exaggerated strength, due partly to the weakness produced by unequal shrinkage stresses, and partly to unequal loading. The disparity in the masses of adjacent metal is too great to be safe. Beams on which the loads are thrown upon one side of the vertical web, instead of directly over it, are little more than half as strong as they would appear from Hodgkinson's formula. Mr. Barlow recommended that in a beam liable to be loaded on one side the top flange should have an area equal to one-third of the total cross-section of the beam. In all such beams the strength is greater per unit section in thin castings than in thick ones.

Mr. Barlow modified Hodgkinson's formula thus:—

$$W = \frac{A \times a \times D \times 2,333}{L}$$

in which—

W = the breaking weight in tons,

A = area of bottom flange in square inches,

a = half the area of the vertical web,

D = depth from centre to centre of top and bottom flanges, in inches,

L = clear span in feet.

In considering the strength of beams our remarks have mainly had reference to their

sectional forms. But a moment's consideration will show that by the principle of the lever their longitudinal outlines must needs vary with the methods of support and of loading, and that taking, therefore, a beam of rectangular section,

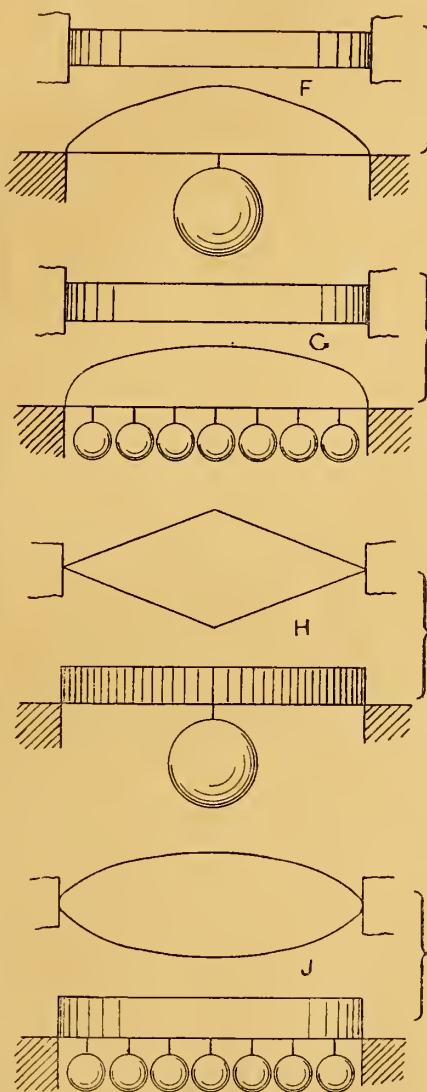


FIG. 124.

the dimensions of its cross-section need not be of the same area at all portions of its length in order to secure uniformity of strength. If the dimensions of its various sections are to be proportioned simply to the stresses imposed upon it at its various sections, then those sections and longitudinal outlines need never be uniform throughout. These theoretical forms for beams

width of a beam is uniform, and the depth is variable; the other in which the width is variable, and the depth uniform. Taking the cantilever beam first. In Fig. 123, A is a beam of uniform breadth B , and variable depth D , loaded at the free end. The curve of the beam for uniform strength is that of a parabola with vertex at end a . The curve may be uppermost, or lowermost, as shown, or both top and bottom edges may be curved, giving the complete parabolic section. The depth of the beam at any section must vary as the square root of the distance of that section from the end a . If the beam is flanged top and bottom, and the strength afforded by the web is neglected, the bottom edge is a straight line, ab . If the web is taken into account, the form is a compromise between the triangle and the parabolic curve. If a beam is of constant depth and loaded at the free end, as in the case of B, the sides are straight and the form is triangular in plan. If the section of the beam is circular and loaded at the end, as in C, its form is that of a solid parabola. If a beam is of uniform width and uniformly loaded, D, the form is triangular. If of uniform depth, and uniformly loaded, the sides form parabolic curves, the axes being perpendicular to the centre of the beam, and their vertices meeting at a . The forms of beams supported at both ends are the duplicates of cantilevers, Fig. 124. A beam of uniform width and loaded at the centre has the outlines of two parabolic curves, the vertices being at the points of support. As in the case of A, the curves can be uppermost, lowermost, or symmetrical about the axis. If the width is uniform and the load distributed, G, the outline is elliptical, the curve coming above or below, or both edges being curved, so forming a complete ellipse. If the depth is uniform, and the load in the centre H, the outline is that of two triangles placed base to base with their apices at the points of support. If the depth is uniform, and the load distributed, J, the outline in plan is that of two parabolas with their vertices at the middle, and their bases meeting on the centre line. Cases occur in which the load is neither concentrated at the centre nor distributed. When the load is concentrated elsewhere than at the centre, then the beam can be proportioned for greater strength at the location of the load. If there are two or more points of loading, the moments of resistance of the beam can be concentrated correspondingly. The relative strength, therefore, of every portion of a beam can be proportioned to the relative share which it takes of the load, and the outlines thus obtained, though not always practical or pleasing, would indicate to the eye of the engineer the outlines to which he might approximate with regard alike to economy of material, beauty of outline, and maximum strength.

Just as the strength of beams differently supported and loaded can be calculated in reference to the strength of a cantilever supported at one end and loaded at the other, so the strength of various sections can be conveniently referred to, and deduced from that of the rectangle. In the sectional diagrams, Fig. 125, examples are given of the commonest sectional forms in cast-iron beams and stanchions, the strength of each of which is referable to, and can be calcu-

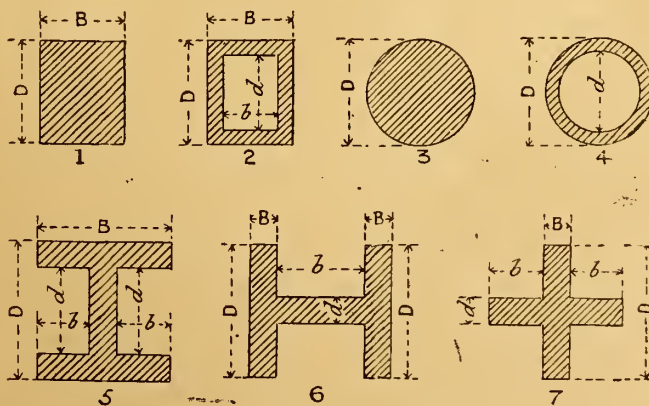


FIG. 125.

of uniform strength, though not followed strictly in practice, are, nevertheless, useful as a guide to the approximate forms. Some of the commonest are shown in Fig. 123 adjacent.

Two general cases occur. One in which the

lated directly from, the square or rectangle without the use of the moment I or modulus Z . Thus, No. 1 is a rectangle, and the strength of the cross section is directly as BD^2 . 2 is a hollow rectangle. The strength is obtained for the

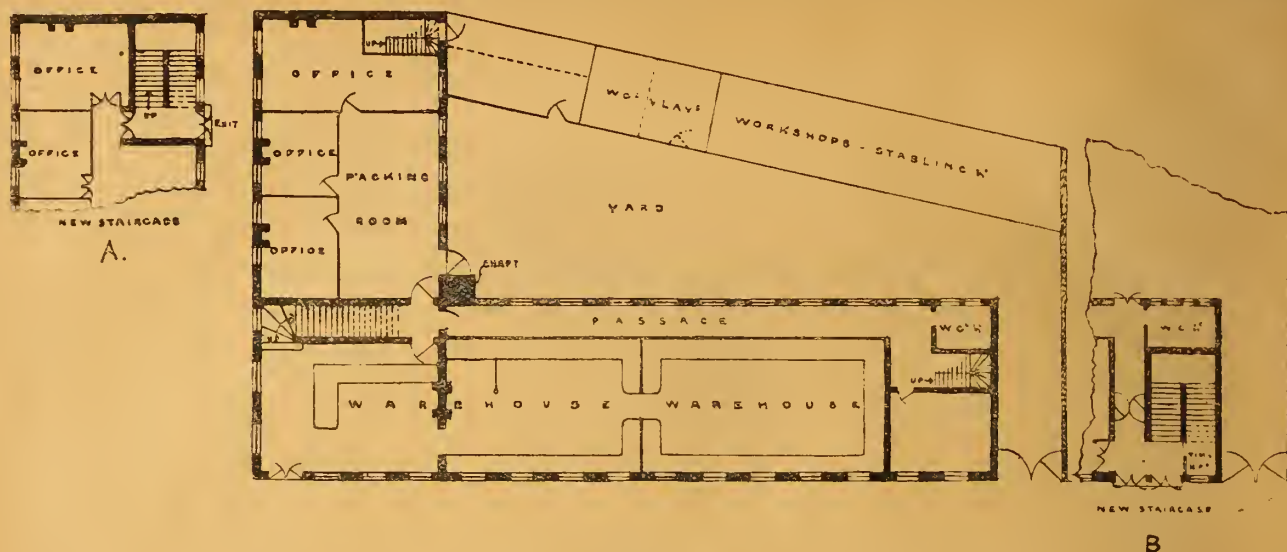


FIG. 9.

cross-section thus:—Find the strength of a solid beam, BD^2 , and subtract from it that of a solid beam of the size of the hollow portion—viz., $b d^2$. 3 is a solid cylinder. In this, find the strength of a square beam, the length of each side of which is equal to the diameter D , and multiply this by .589, a square beam being 1.7 stronger than a cylindrical one of the same dimensions. 4 is a hollow cylinder. Subtract the strength of a solid beam of diameter d from that of a solid beam of diameter D , to obtain the strength of the hollow cylinder. 5 is an I-section beam with equal flanges. Find the strength of a solid beam of breadth B and depth D , and subtract from it the strengths of two beams of breadth b and depth d . 6 is a beam with equal flanges set vertically. For this find the strengths of three separate beams of breadth B and depth D respectively, and add the results together. 7 is a beam of cruciform section; find the strength of the three beams of breadth B and depth D respectively, and add the results together.

FACTORY CONSTRUCTION AND FACTORY ACTS.—V.

By GEORGE H. BIBBY, F.R.I.B.A.

PLANNING.

UNDER the provisions of the Factory and Workshop Acts of 1891 and 1895, it is certain that many buildings throughout the country will be condemned by the various authorities as being inadequately provided with means of escape for the workpeople, and in Figs. 9 and 10 I give the ground and first-floor plans of a factory, with many serious defects in the arrangement of the doors and staircases.

The staircases are, all of them, too far from the exit doors, or discharge into rooms having the doors arranged to open inwards. In fact, all the internal doors are hung in such a manner, that a crowd of workpeople pressing outwards against them, would probably, during a panic, block the passages entirely. The staircases have, all of them, many winders—a form of construction always to be avoided where large numbers of persons are assembled. Again, the packing-room on the ground-floor (Fig. 9) being a place where straw, paper, and light woodwork is dealt with, would be a source of danger to the staircases, particularly as the room divisions at this point are of wood construction.

The staircases at A and B on Fig. 9, show the modes by which the exits might be improved; also an arrangement by which the doors for exit towards the street might be hung to open outwards, and yet not in any way encroach upon the staircases or passages leading thereto. The new staircases and landings would all be of fire-resisting materials.

In many factories the arrangements are very much worse even than as shown upon the first floor plan on Fig. 10; but on Fig. 11 is shown a suggested means for improving this floor in which all the doors of the workrooms, &c., are set back from the passages with the view of keeping the same unencumbered while the doors are opened outwards.

Here it will be well to note that, according to the Factory and Workshops Act (1895), section 53, the expression, "Factory Acts," means the Factory and Workshop Acts, 1878 to 1891 and the Act of 1895.

The expression, "the Principal Act," means the Factory and Workshop Act (1878); therefore it is chiefly to these three Acts of 1878, 1891, and 1895 that reference is made in these articles.

Amongst the regulations affecting proposed alterations or reconstruction of factory buildings in order to bring them into conformity with the Factory Acts, reference must be particularly made to the Factory and Workshop Act (1878), section 93, sub-section 2, which states that "A part of a workshop or factory may, for the purposes of this Act, be taken to a separate factory or workshop; and a place solely used as a dwelling shall not be deemed to form part of the factory or workshop for the purposes of this Act. Where a place situate within the close, curtilage, or precincts forming a factory or workshop is solely used for some purpose other than the manufacturing process or handicraft carried on in the factory or workshop, such place shall not be deemed to form part of that factory or workshop for the purposes of this Act, but shall, if otherwise it would be a factory or workshop, be deemed to be a separate factory or workshop, and be regulated accordingly."

The "places," therefore, in a factory building, or attached thereto, and used for warehouse, storage, or residential purposes, are excluded from survey and inspection under the Factory and Workshops Act of 1891 and 1895, so far as such survey, indirectly, might be concerned with the reconstruction of staircases and other means of exit belonging to the factory; and in the event of any doubt as to the purposes for which any room may be used, power for entry could be obtained by an inspector under the provisions of section 69 of the Factory and Workshop Act, 1878.

There are throughout the country many factories and workshops which not only contain residences for caretakers, watchmen, and foremen, but also for large numbers of clerks, apprentices and others, whose remuneration is wholly or in part given in lodging and in board, and in some instances the residence of the proprietor forms a portion of the factory building.

For various reasons, the apartments for apprentices and other workers in factories are placed frequently upon upper floors, and with very insufficient means of escape in the event of fire or panic, and it appears to be a great defect or omission that the existing Acts of Parliament do not directly afford the means of enforcing in these respects a better state of matters. In the large towns, and in the Metropolis, are considerable numbers of warehouses and factories, which include within their "close, curtilage, or precincts" extensive ranges of apartments for the apprentices and others employed, and whose position in the dormitories and bedrooms at night would be far more liable to danger from fire than in the factories or workshops wherein they are employed during the day. It is, therefore, much to be regretted that Section 93 of the Factory

and Workshop Act, 1878, in its present form remains un repealed.

The only factory and workshop enactment with regard to sleeping-rooms with which I am acquainted is contained in Section 35 of the Factory and Workshop Act, 1878, which recites: "Where a bakehouse is situate in any city, town, or place containing, according to the last published census for the time being, a population of more than 5,000 persons, a place on the same level with the bakehouse, and forming part of the same building, shall not be used as a sleeping place, unless it is constructed as follows—that is to say, unless it is effectually separated from the bakehouse by a partition extending from the floor to the ceiling; and unless there be an external glazed window of at least 9 superficial feet in area, of which, at the least, $4\frac{1}{2}$ superficial feet are made to open for ventilation."

The regulations as to the fabric of bakehouses are somewhat stricter than those respecting other buildings subject to the Factory and Workshop Act; for instance, all the inside walls of the rooms of such bakehouses, as are above named, and all the ceilings or tops of such rooms (whether such walls, ceilings, or tops be plastered or not), and all the passages and staircases of such bakehouses, must either be painted with oil or varnished, or be limewashed, or be partly painted or varnished and partly limewashed; where painted with oil or varnished, there must be three coats of paint or varnish, and the paint or varnish must be renewed once, at least, in every seven years, and shall be washed with hot water and soap once at least in every six months. Where limewashed, the limewashing must be renewed once at least in every six months. In all other factories and workshops the washing of paint and limewashing need only be done once within every fourteen months.

Factories are divided into classes, as "textile" or "non-textile." The expression "textile factory" means any premises whereon or within the close or curtilage of which steam, water, or other mechanical power is used to move or work any machinery employed in preparing, manufacturing, or finishing, or in any process incident to the manufacture of, cotton, wool, hair, silk, flax, hemp, jute, tow, or other similar material; but exclusive of print works, bleaching and dyeing works, lace warehouses, paper-mills, flax scutch mills, rope-works, and hat-works.

Non-textile factories include the following:—Any premises in which any persons are employed to print figures, patterns, or designs upon cotton, linen, woollen, worsted, or silken yarn, or upon any woven or felted fabric (not being paper).

All buildings in which the processes of bleaching, beetling, dyeing, calendering, finishing, hooking, lapping, and making-up and packing any yarn or cloth of any material, or the dressing or finishing of lace, or any process incidental thereto, may be carried on.

All places or buildings in which persons work for hire in making, or assisting in making or finishing, earthenware of any description except bricks and tiles, not being ornamental tiles.

Any shed or other erection, &c., in which persons are employed in making lucifer matches, or

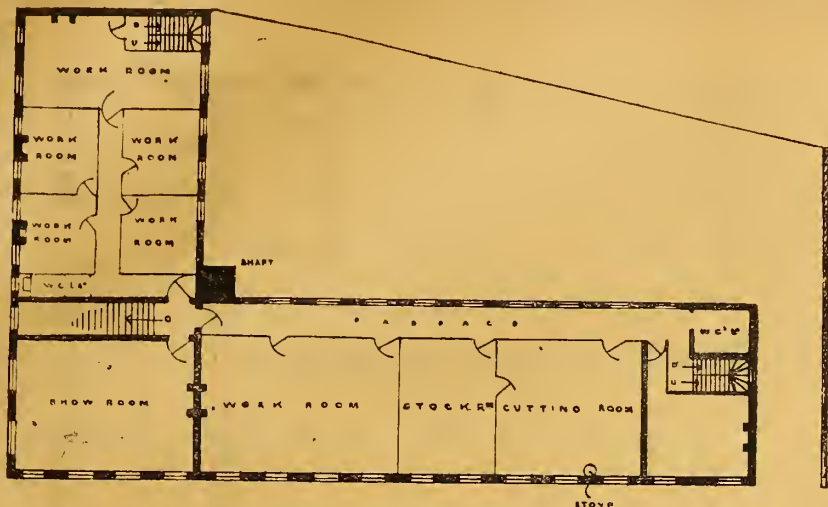


FIG. 10.

in any process incidental thereto, except the cutting of the wood.

Any place where percussion-caps are made, or where persons are engaged in storing the chemical materials for making them.

Any factory in which persons are employed in making cartridges (excepting the makers of the cartridge cases).

Any place in which persons are employed in printing patterns in colours upon paper for wall coverings, either by blocks applied by hand or by rollers worked by mechanical power.

Also fustian-cutting works, blast-furnaces, copper-mills, iron-mills, foundries (with certain exceptions), metal and indiarubber works, paper-mills, glass works, tobacco factories, letterpress printing works, and flax scutch mills.

The term "workshop," according to the Act

various circumstances, be placed during panic or fire in positions of greater danger than those above. Amongst other inconsistencies is the arrangement bringing shipbuilding under strict statutory regulations, while the occupation of builders' workmen (engaged upon house-building) is not subject to the restriction of Factory and Workshop Acts. It is difficult to understand why this should be, or why a carpenter's apprentice, working in his master's shop, should be under the protection of the Factory Acts, but while working away from it, upon buildings in course of erection, he is not so.

Much of the misery and poverty of the people of this country arises, not only from the causes of insufficient work, want of food, intemperance, want of skill, and idleness, but also, to a great extent, by reason of the bad condition of the

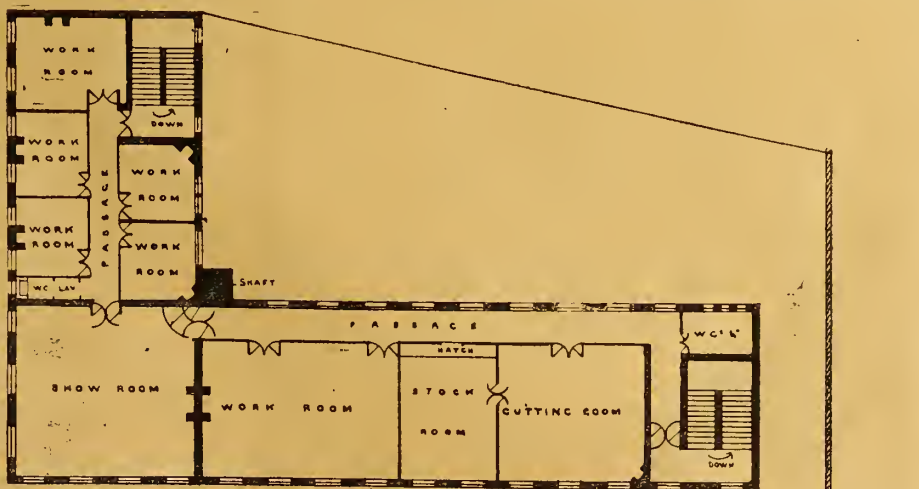


FIG. 11.

of 1878, includes hat works, rope works, bake-houses, lace warehouses, shipbuilding, yards, quarries, and pit banks (providing they are not so specially circumstanced as to be factories within the meaning of the Factory and Workshop Act of 1878); also any premises, room, or place not being a factory within the meaning of this Act, in which any manual labour is exercised by workpeople for hire, and to which premises the employer of the persons working therein has the right of access or control.

With all the advantages obtainable under the provisions of the new Factory and Workshop Acts, there is yet much that has been overlooked; for instance, with regard to the item of cubic feet to be allowed to each person working in a factory. Under the Act of 1895 250c.ft. for each inmate must be provided; but it is obvious that with a very lofty room, say, 20ft. in height, the area might be improperly limited to 4ft. by 3ft. 3in. per person, a manifest overcrowding of the floor space.

Again, the Factory and Workshop Act of 1891 provides only for the escape of the persons employed on the upper floors of a factory; whereas the persons engaged below may, from

structures used for factories and workshops which are so frequently wanting in light, cheerfulness, and are so often overcrowded with workers during long periods, the buildings being often badly arranged and defective as regards nearly everything that should tend to mitigate excessive labour, little cause for surprise exists that workpeople should suffer both physically and morally or that they should, upon leaving such factories, often seek solaces which can only end with utter ruin.

The new Act of 1895 appears to have given satisfaction in many quarters, and especially with regard to the question of cubic feet to be allowed to each person. In Birmingham I understand that the local officials never count in the additional height of any workroom above 10ft., thereby securing not only sufficient cubic space, but also ample area of floor space. It is considered that the new Act, with calculations on this basis, will operate most materially and beneficially upon workshops in certain districts where tailors, milliners, and dressmakers especially have been fearfully overcrowded, and I am able to confirm from personal observation the statement of one inspector who describes his experience in stalking

along a labyrinth of stairways and passages in utter darkness "to find, somewhere on the third story, or deep down in a cellar, a room full of human creatures, gas-jets, and rubbish-heaps, with all means of ventilation plugged up." Again, the same inspector found a workroom with one door, closed windows, and nine persons in a space barely enough for three. The ceiling was giving way, and the limewasher could not have visited the place except at a very remote date—a clear intimation that the inspector himself might have been earlier upon the scene with advantage.

The Report of the Chief Inspector of Factories and Workshops for the year 1895, addressed to the Home Secretary, has recently been issued, and the great advantages of the new Act of 1895 are therein fully recognised. The power for an inspector to obtain an order from a Court of summary jurisdiction to stop work in a factory or workshop which is in a dangerous condition, structurally or otherwise, cannot fail to act advantageously, and to result in architects and builders being called in to contrive and carry into effect much needed improvements. It has been stated that there was an instance in Sheffield of a particularly dangerous structure, which neither the local authorities nor the factory inspector had power to deal with. But all dangerous factories and workshops are now brought within the scope of the law, and it is known that there are many such. One inspector tells of flour-mills in his district in which the joists and beams, supporting heavily-weighted floors, are half eaten through by dry-rot or wet-rot, so that very little would be required to bring the whole to the ground.

(To be continued.)

NATIONAL TRUST FOR PLACES OF HISTORIC INTEREST.

THE Duke of Westminster presided on Tuesday afternoon at the second annual meeting of the National Trust for Places of Historic Interest, held at Grosvenor House, Park-lane. The annual report stated that, not only in the United Kingdom, but in America, there was a strong and growing feeling for the preservation of those features of this country which, whether from association or inherent beauty, go to make it interesting and inspiring. The work of the society claimed to be a work of true patriotism, and was done for posterity. It was, perhaps, not too much to hope that eventually work of that kind might be recognised by the Government of the country as constituting a claim upon the national purse. The Trust had secured the ownership of the interesting pre-Reformation Clergy House at Alfriston, Sussex, and appealed for £350 to carry out the needful repairs in conjunction with the Society for the Protection of Ancient Buildings. They also asked for subscriptions towards the preservation of Barras Head, North Cornwall, overlooking Tintagel Castle ruins, on which headland it had been proposed to build a large hotel, but which had been secured by Lord Wharmliffe for £505, and was offered to the society at the same price. The chairman, in moving the adoption of the report, said they must continue to excite public interest to the advantages and the desirability of acquiring some of the beautiful pieces of scenery in the country, and by raising sympathy they would be able to add to the property of the nation and the Trust. Sir Robert Hunter, in seconding the motion, said that he hoped they would eventually carry out the society's title, and that it would be in every sense a national trust. The adoption of the report was supported by Mr. Alfred Waterhouse, R.A., and was agreed to. Other speakers included the Right Hon. G. Shaw Lefevre, Professor Herkomer, R.A., Canons Wilberforce and Rawnley, Mr. Walter Crane, Mr. C. R. Ashbee, and Mr. Briscoe Eyre.

THE NEW LONDON COUNTY COUNCIL OFFICES.

THE resolve of the London County Council to apply to Parliament for powers to acquire the Spring-gardens site for new county offices at a cost of £313,000 is being variously commented on.

There is no doubt that a new building is wanted. There is no doubt either, in our opinion, that money thus spent is by no means "wasted," as some rigid economists fancy. It employs labour—and the best class of labour—

that belonging to the Building Trades, and the great industries which feed them. There is too little public work going on in London just now, and our only regret is that so much money in this case will have to go to the landowner, and so little to the craftsman and artisan. Half a million—that is the sum talked of for the structure—is little enough for a municipal building worthy of London.

When the question of site comes to be considered, we are by no means so sure that the County Council is doing the right thing. We are in favour of Mr. Waterhouse's suggested site on the proposed thoroughfare between Holborn and the Strand. The centre of London is the place for London's central municipal hall. The site would cost less, and in every way is, in our opinion, the best site. The question is, Can the Council wait? If the Spring-gardens site is not secured, it may be bought over the Council's head, and the Council may have to turn out of its present offices. We had rather see Mr. Waterhouse's site selected than any other; but we had rather see the new building erected in Spring-gardens than postponed indefinitely. We hope, at any rate, the question may be debated in Parliament solely on public grounds, and not with the wretched party rancour that is exhibited so often in connection with municipal matters in London.

GROUTING IRON-LINED TUNNELS.

THE grouting apparatus used in the City and South London tunnels is a feature of some interest in connection with the construction of the City and South London Railway. As we have before given particulars of the tunnel construction, cement grouting was employed to fill the cavity left by the advance of the shield. This grouting apparatus was invented by the engineer, Mr. James Henry Greathead, M.Inst.C.E., and is described as follows:—"A cylindrical vessel, capable of resisting a pressure of 70lb. or 80lb. per square inch, has through its axis a shaft or spindle working in a stuffing-box at each end of the vessel, and provided at one or each end with a handle outside, and carrying inside a number of paddles. The lime and water are introduced through an opening at the top having a lid capable of being closed air-tight, and the mixture is discharged by compressed air through a length of flexible hose-pipe ending in a branch and nozzle, the latter being inserted in holes in the tunnel lining provided for the purpose. The smaller grouting pans are usually worked by two men; one continually keeps the paddles revolving and opens and closes the air and discharge valves, while the other has charge of the branch at the end of the hose. As the space is gradually filled, the holes through which the grouting is discharged are necessarily closed. Beginning at the lowest hole, grout is forced in until it reaches the hole above it; the lower hole is then plugged, and the nozzle applied to the higher one, and so on until the highest hole in the key-piece is reached, and the full pressure is brought upon the grout." At the stations about 2,000ft. in length of the iron-lined tunnels gave place to the larger brick-lined station tunnels. It was found that the tunnels were well encased, and every cavity was filled by the grouting. The smallest cracks on the nodules of septaria made by the shield were filled by the lime. The compressed-air grouting was found not only to prevent movements overhead and deformation of the tunnels, but it prevented the escape of the air, and was found of value in making air-tight locks and the sinking of iron-lined shafts, and to make the vaults of property disturbed water- and air-tight. The compressed air used for grouting enabled the tunnels to be ventilated by the occasional escape of the air when it was not used for grouting.

CONCERT-HALLS AND ASSEMBLY-ROOMS.—XXIII.

By ERNEST A. E. WOODROW, A.R.I.B.A.

THE concert-hall and assembly-room, which is commonly called the music-hall, is to be found all over the world; but it will be found that each country has its own peculiar class of music-hall. The music-halls of the Continent are, as we understand them, distinct from theatres, but follow in most instances the form of the auditorium. In some cases theatres have been converted into music-halls, notably Ronacher's Variety Theatre, Vienna, which was formed from the old City Theatre after it was partly burnt down. The

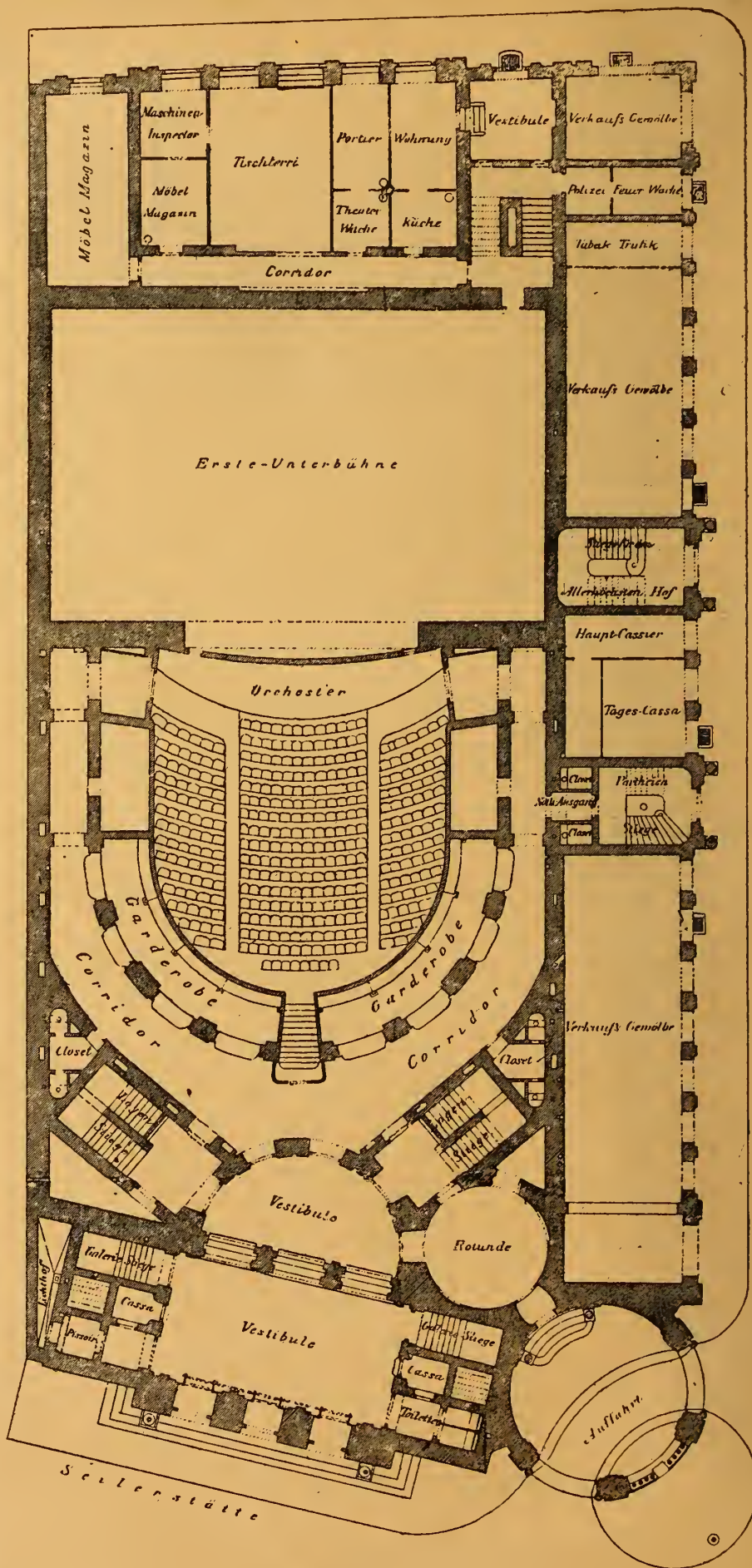


FIG. 1.

famous Continental theatre architects are Messrs. Fellner and Helmer, and it was from their designs that the old theatre was converted into Ronacher's Palace of Varieties. Figs. 1 and 2

represent the City Theatre before it was altered. The stage was cut off from the theatre, only a small portion being left for the music-hall, and the remainder was converted into an assembly-

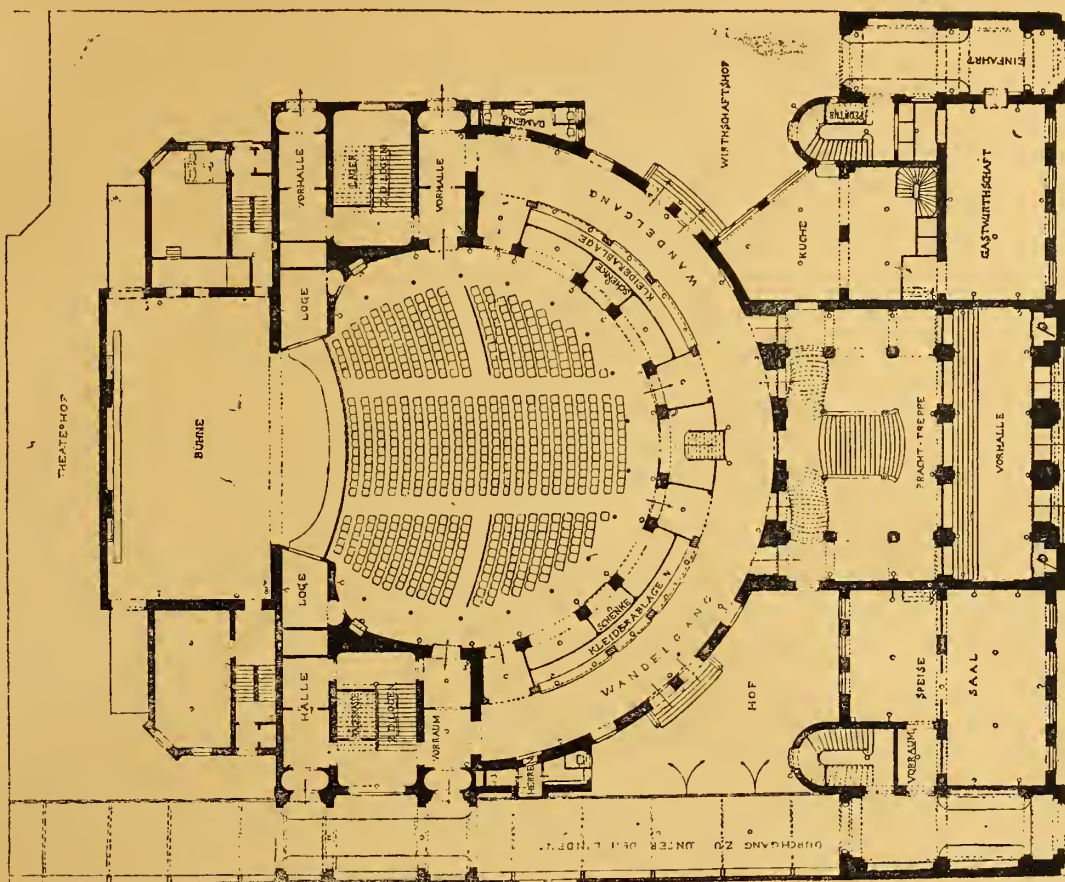


FIG. 3.

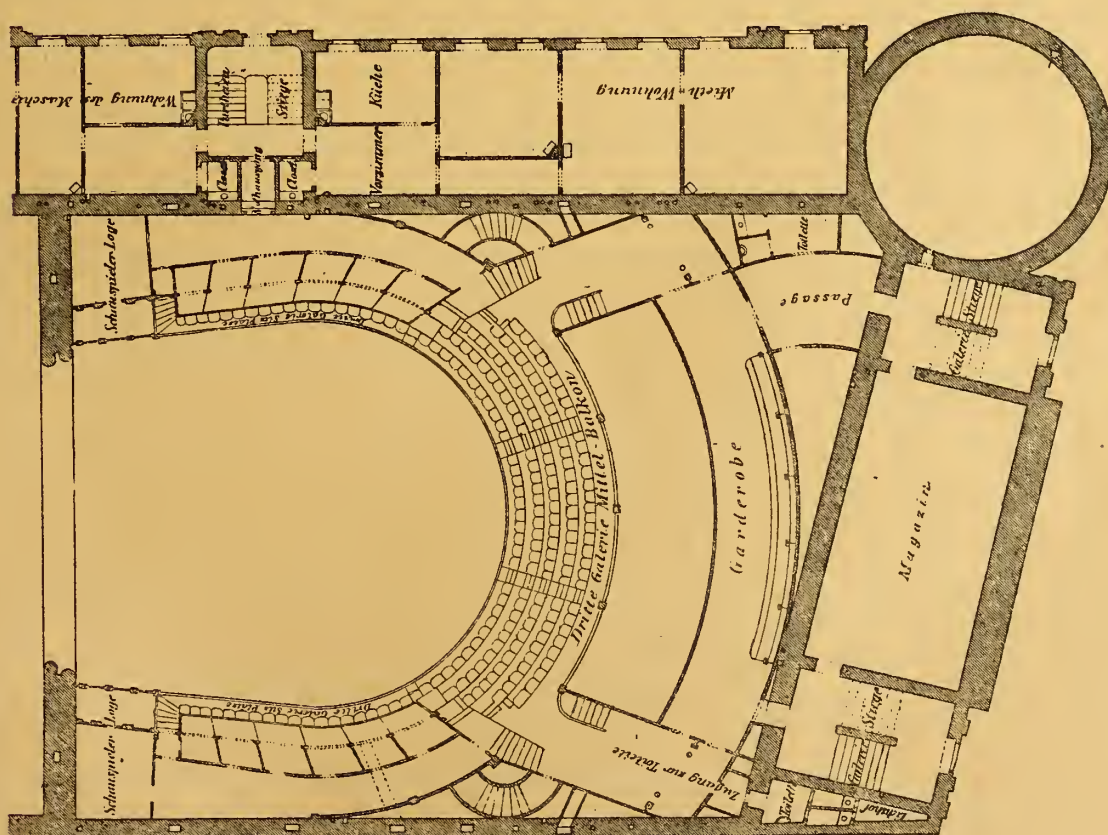


FIG. 2.

room, with entrances from the side. To make up the required depth for performances, the stage was advanced beyond the proscenium opening to a considerable extent, so that plenty of room is allowed for the purposes of a variety concert. The proscenium opening is surmounted by a canopy or sounding-board, in the same manner as our Alhambra Theatre.

The same famous Vienna firm of architects have carried out the Unter den Linden Theatre of Varieties in Berlin for the same proprietor, Mr.

Ronacher. Figs. 3 and 4 are plans of the building, and Fig. 5 a view of the staircase. Fig. 6 is part of the elevation of the same building. (The last two illustrations have been taken from Sachs and Woodrow's work on "Modern Opera Houses and Theatres.")

The principal feature in the plan is the auditorium with its spacious promenade, which is on the highest tier, and affords an admirable view of the stage. This convenient feature is unusual to Berlin variety theatres, and has been borrowed

from London and Vienna. The first tier is composed of half-open boxes, behind which are supper-rooms, while the area is taken up by seats and a minor promenade, from which latter, however, no view of the stage is obtainable. A grand staircase, of good proportions, leads to the tiers and promenade; but, besides these, there are staircases of ample dimensions for the use of the occupants of the tiers, in connection with which I would remark that it is not likely that they would be ever used in case of panic, since the

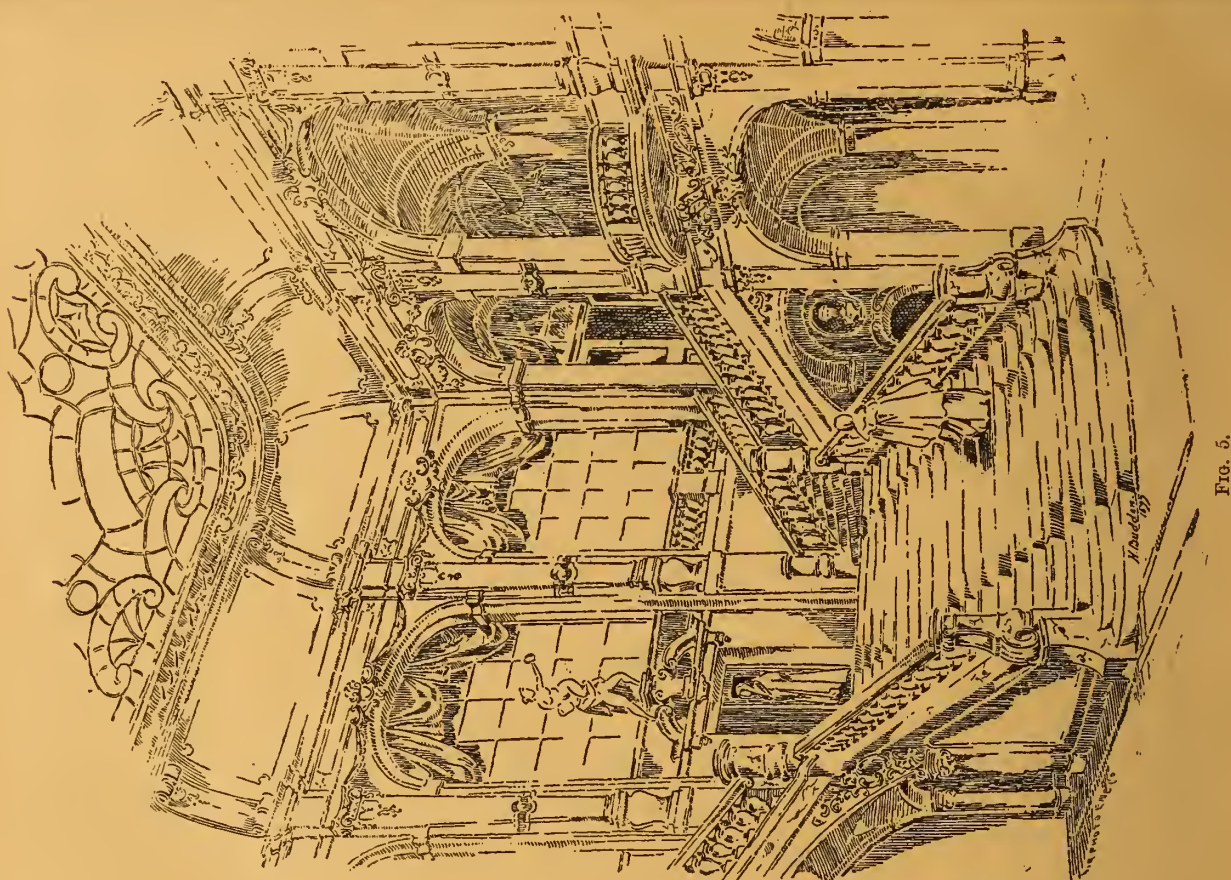


FIG. 5.

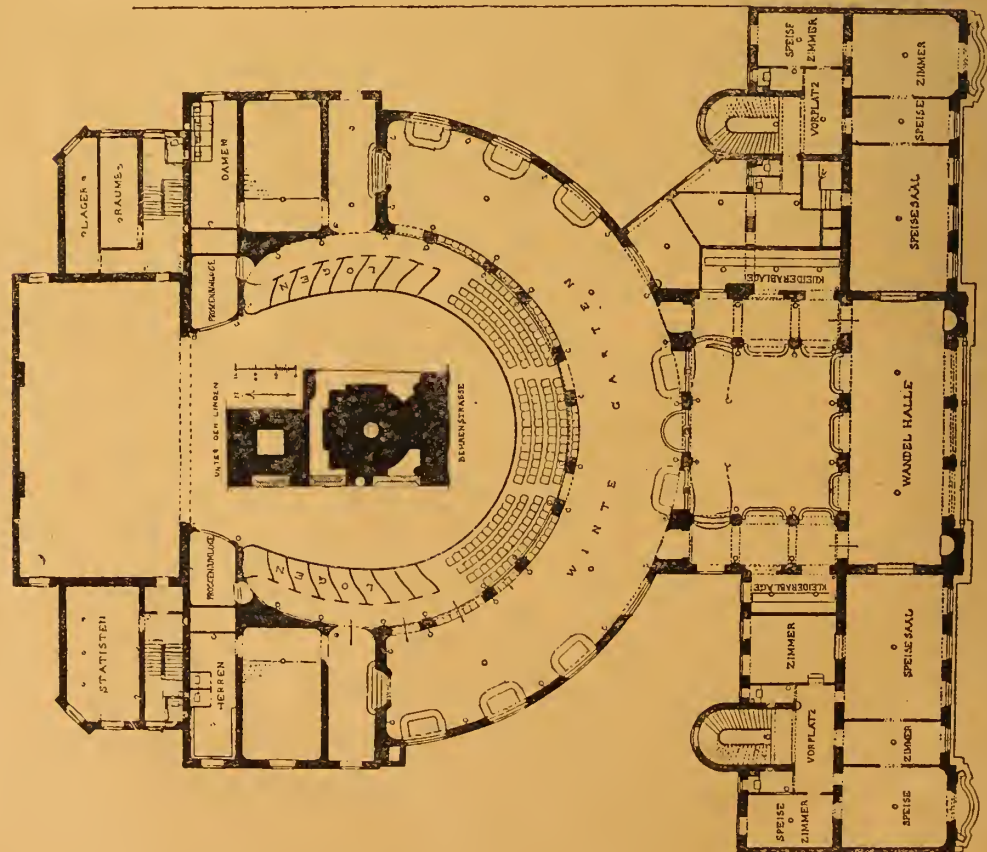


FIG. 4.

spectators are certain to hasten to the grand staircase by which they came up. In plan it will be noticed how distinctly separate the auditorium is kept from the front of the block; but in the upper part of this front the Grand Foyer is situated, and can be approached from the main staircase, while the lower part is devoted to the restaurant.

The site of the Unter den Linden Theatre was

only one part of a large piece of ground which was developed by a company. This plot has its main front, which is taken up by an hotel and restaurant towards the thoroughfare "Unter den Linden," and its rear front to the Behrenstrasse, which runs parallel to the main street, with the view of having an approach to the theatre from the main thoroughfare, as well as of complying with the regulation that requires the theatre

proper to be free on all sides, and to have a way for carriages into the courtyards. A large passage was formed on one side of the site from "Unter den Linden" to Behrenstrasse, which was finally elaborated into a kind of arcade. It is, further, of interest to note that the theatre was erected at a time when Prussia had just come under very stringent regulations with regard to theatres, and the owners and the architects had



FIG. 6.

many difficulties to overcome in complying with them, especially in approaching the authorities with a class of institution combining the dramatic entertainment and variety concert in a manner that had previously been unknown. The establishment holds, in fact, the unique position in a city of the size of Berlin: it is the only variety theatre, in the proper sense of the word, the others being music-halls of a very different class, and from the architect's point of view, merely halls with a stage in them. Special credit is due to both architects and owners that they have made this building not only an elaborate one, and a gorgeously-decorated structure, but also one in which the decoration is of high architectural merit. There is nothing in the construction to call for special mention. In the decoration, however, we again meet the clever treatment of flat surfaces with light plastic work, which is so successful a feature in the Fellner and Helmer theatres. These architects have certain types in theatre building, this being their usual pattern of variety theatre, which they have repeated, for instance, at Buda-Pesth. The cost of this building, which will seat 2,500 persons, was £75,000.

Ventilation is a great feature in music-halls, as the dense cloud of tobacco-smoke must be carried off, and a hall must not be permitted to smell of stale smoke when an audience first enters. The most practical way of keeping a hall sweet is undoubtedly the sliding roof, which leaves the auditorium open to the sky on warm and fine nights, and is the means of ventilating and purifying the air in the hall during the day, when the roof can be removed. The only time when a sliding roof may be considered a disadvantage is when a sudden shower of rain comes on, and the occupants of the stalls have to put up their umbrellas until such time as the roof can be wound back.

The usual way of forming the sliding roof is

most simple. The dome or central portion of the roof is mounted like a big dish-cover upon wheels running upon metal rails. A steel rope is attached to one end of this huge dish-cover, and is passed over pulleys down to a crab on the stage level. When the roof has to be taken off, the attendant on the stage simply winds up the steel rope on the crab, and the roof travels along the rails. To replace it, a second rope is attached at the farthest end. This rope passes, like the other, down to the crab on the stage level, and when the crab is reversed it works the roof back over the opening. This is the most effectual way of ventilating a music-hall—in fact, no hall is perfect without a sliding roof, and many theatres would be vastly improved if they were provided with a similar means of purifying the air. The first sliding roof in London was erected at the Canterbury Music-Hall, "over the water."

NOTES FROM PARIS.

THE committee appointed for the purpose of studying the question of forming schools in the provinces for the teaching of architecture has voted a series of resolutions in reference to the scheme of primary, intermediary, and higher schools, noted in the report of the Congress of French Architects, given in a recent number of the BUILDING NEWS. The resolutions are as follows:—There shall be established in a certain number of the provincial schools of fine arts sections specially devoted to the teaching of architecture; that there shall be examinations on entering and leaving the schools, the latter examination, if successfully passed, entitling the student to a certificate of merit in the study of architecture; that the examination awarding the certificate, on leaving, shall be at least equal in degree to the test examination required to be

passed by the students at the Ecole des Beaux-Arts at Paris, who desire to pass from the second class into the first class; that the students who succeed in passing the final examination shall be granted an exoneration of two years of the compulsory military service; that these schools shall be subjected to a uniform set of regulations as regards the studies, the professors, however, enjoying a certain liberty and independence as regards their systems of teaching and their ideas on architecture; that the final examination shall entitle the successful student to his entrance into the first class of the Ecole des Beaux-Arts at Paris without the necessity of passing a fresh examination, the certificate from the provincial school being sufficient proof of studies equalling those of the second class at the Ecole des Beaux-Arts. These resolutions, which it is hoped will be accepted and confirmed by Parliament, show that the question of the teaching of architecture in the provinces is one of great interest at the present moment in France. Primary schools will be formed in a very large number of the provincial towns, where students of architecture may prepare themselves for the examinations to be passed when entering the intermediary schools to be formed in a few of the more important towns, the degree of studies in these intermediary schools being equal to the degree of studies made in the second class of the Paris Ecole des Beaux-Arts, the artificial examination to be passed on leaving the intermediary schools entitling the student to his entrance into the first class of the higher school at Paris.

Another question of considerable interest at this moment is that of the combination of the studies of engineer and architect and the giving of additional facilities to those who, having completed their studies at the school of engineering, desire to add to their knowledge by the study of architecture. The professional title of Ingenieur-Architecte is one which is becoming rather frequent at Paris, and denotes that its possessor has successively passed through the Ecole Centrale des Arts et Manufactures and the Ecole des Beaux-Arts, and that he is not only an architect possessing more or less artistic talent, but also an engineer able to construct on scientific principles the buildings he designs. The Minister of Commerce is, therefore, with the Minister of Fine Arts, entering into the question of facilitating the admission into the Ecole des Beaux-Arts of those students who have attained their diploma at the Ecole Centrale, estimating that the studies already made by these students at the latter school are sufficient to obtain exoneration from the science examinations required on admission to the Ecole des Beaux-Arts.

The work sent in by the students of this latter school at present studying in Italy are being exhibited at the Ecole. M. Pontremoli, who is doing his fourth year of studies at Rome, sends a very interesting set of drawings of the actual state and his proposed restoration of the Acropolis of Pergamus at Troy. The drawings of the actual state consist of an elevation, a plan, a perspective view of the ruins, and a carefully-measured plan of the ground occupied by the buildings. The drawings of the restoration are as yet in an unfinished state. M. Eustache, also a student of the fourth year, sends a plan of the Via Sacra and a drawing of a portion of the Roman Forum. M. Bertone has a view of the ruins of Palmyra, a rather uninteresting exhibit; but two carefully measured details of the soffit and one of the capitals of the Temple of the Sun are more worthy of remark. The drawings of MM. Chaussemiche, Recoura, and Satouillard, students of the first and second years, consist of well drawn and coloured details of various portions of the Roman temples and other Classical work required from the students during the first and second years of their stay at Rome.

The Académie des Beaux-Arts has elected M. G. Cuypers to the honour of Foreign Associate in the place of the late M. da Silva. M. Cuypers, architect at Amsterdam, is well known as an ardent follower of the Renaissance of the old national architecture of the Netherlands, and as a restorer of a large number of ancient historical buildings. His best known works are the new central railway station at Amsterdam and the Rijks National Museum in the same town—a fine building designed in the style of the Dutch Renaissance, the total cost of which was £230,000. The work of this architect was much studied at Paris a few years ago, when the Dutch Renais-

sance was a style much in favour at the Ecole des Beaux-Arts for domestic architecture.

Two new examples of the modern style of decorative architecture employed more especially for the new brasseries or larger cafés, in the construction and decoration of which modern materials play a very important part, are to be seen in the Café Riche and the Brasserie Mollard. The former, which has already been described, is very interesting, as showing the employment and adaptation of the various new materials and products invented by modern industry: the architect, M. Ballu, has, however, been perhaps too bold in the use of coloured materials, and the effect may be considered by many to be somewhat *tapageur* or gaudy. Several portions of the work, however, give evidence of great artistic skill in the arrangement of the decoration. The Brasserie Mollard, close to the Gare St. Lazare, may be considered as a more sober example of the modern style. M. Edouard Niermans, the architect of the work, is of Dutch origin, and has made a speciality of this style of decorative architecture. His first successes were won at the Exposition of 1889, where a large number of the pleasure buildings were due to his talent; his later work of theatres, concert-halls, and brasseries at Paris are unique in their style. The façade of the Brasserie Mollard is treated in a style full of freshness and brightness well suited to the requirements of such an establishment; the general lines of the architecture are graceful, and the tones of the various decorative materials employed very harmonious in their ensemble. A striking feature in the façade is the large transparent panels of enamelled glass—a speciality of one of the best-known Parisian glass manufacturers, MM. Hubert and Martineau. These artists have succeeded in decorating plain or cathedral glass with enamels of a special composition, with which a very fine ornamentation can be obtained on sheets of large dimensions, the enamel forming body with the glass produces a very brilliant effect. A judicious use of Scotch marble, artistically-wrought iron, and bronze-work for decoration and electric-light purposes, together with enamel mosaic panels and some very cleverly imitated marble of stucco, the secret of working which appears to belong to Frenchmen only, has produced an attractive and not at all gaudy façade. The decoration of the interior is rich and in good taste; the ceiling is covered with enamel mosaic work and ornamentations of fruit, game, &c., hop and absinthe leaves—in fact, a decoration symbolical of the various dishes and beverages which are partaken of in such a brasserie. The walls are decorated with mosaic work and a number of interesting panels produced by the faience manufactory of Sarreguemines, representing episodes in the lives of the modern pleasure-seekers, a suitable decoration for a brasserie interior. The large hall or winter garden leading from the café is decorated in a somewhat similar manner; the ceiling is constructed of decorative iron and bronze work, filled in with decorative enamelled glass, producing a very pleasing effect. This, and other similar work now coming into vogue at Paris for cafés, brasseries, and concert-halls, gives a great impulsion to the various sections of art industry, and tends to encourage the production and working of modern materials which, if employed in a logical and artistic manner, should go far to help the new school of modern and rational design.

The interesting building destined to house the Society of Civil Engineers of France is rapidly approaching completion as far as the work of construction is concerned. Some of the new methods of construction being employed in this building are of great interest, and will form the subject of an early article.

The old prisons of Mazas, Sainte-Pelagie, La Roquette, and St. Lazare in the interior of Paris are now being demolished, and the large space which they occupy will soon be covered by dwell-houses and new streets. New prisons containing all the most modern improvements as regards sanitation and arrangement of plan are being built outside Paris, the most important at this moment nearing completion is that of Fresnes-Rungis. The architect, M. Poussin, is combining in this work all the improvements existing in the model prisons of Europe, and it is the opinion of specialists that the cell arrangement of this prison is perfect as regards the requirements of lighting, heating, ventilation, and sanitation.

The French Archaeological Institute at Cairo is entering into the period of execution; the foundations are being completed under the direction of

MM. Guetin and Charvaut, engineers. The plans were prepared by M. A. Baudry, and M. Dourgnon, architect of the new museum of Egyptian antiquities, is intrusted with the carrying out of the work. The building will cost £14,000, and it is hoped that towards the middle of next year the director of the French Archaeological Mission, M. Bouriant, will take possession of the new institute.

The Rev. Père Delattre informs the Académie des Inscriptions that his work of exploring the Punic necropolis at Carthage is producing interesting results. A large number of tombs have been opened, discovering, besides the usual funeral objects, a quantity of vases of black earthenware, figures of animals, and other objects of Grecian work, of alabaster, and ivory, several mirrors and objects of gold and bronze. One of the most interesting objects of the finds is a lamp of a very primitive type. The Punic inscription composed of five letters scratched on the lamp gives a certain proof of its authenticity.

Saturday, the 4th inst., was the last day for sending in plans and designs for the two new palaces to be erected in the Champs Elysées, in place of the present Palais de l'Industrie to be demolished. Although the number of demands for taking part in the competition was very large, the total of designs sent in does not exceed fifty, the high quality of the work presented, however, compensates for quantity. The difficulties met with and the expenses incurred in the preparation of schemes for such an important competition, are certainly sufficient to frighten all but the boldest and richest amongst Parisian architects, who are willing to pass three months of continual hard work, and pay the expensive necessity of half-a-dozen or more highly-paid draughtsmen of the Ecole des Beaux-Arts during the preparation of the designs. Such a competition at Paris means at the very lowest the expenditure of £300 to £400 by the competing architect, and many do not hesitate in disposing of larger sums, for economy in draughtsmanship is misplaced in such cases. The designs will be exhibited at the Palais de l'Industrie from the 12th to the 15th inst.: the jury will meet on the following days, and probably make its final decision on the 18th. The jury is composed of the Ministers of Commerce and Fine Arts, the various directors and presidents of public services and art societies, nine members appointed by the Minister of Commerce, eight members from the Paris Municipal Council, and eleven architects appointed by the competitors sending in designs. The result of this competition as regards the work sent in is certainly a splendid success for French Art: some of the designs are masterpieces of architecture, of a style essentially French; all of them contain interesting points of originality, and evince a certain tendency to the development of a modern style to be brought about by the employment of modern materials. The immense artistically coloured drawings are as yet hardly in their places on the walls, so it is impossible to give this week more than a short list of the architects whose designs are most striking, and these are chiefly those who were the most successful in the recent competition for the whole scheme of the Exposition of 1900. The designs of MM. Girault, Esquié, Cassien-Bernard and Cousin, Thomas, Mewés, Guadet, Hermant, and Blavette are very interesting, and will certainly obtain success both as regards their façades and arrangement of plans. It is hoped that the work of construction will be commenced towards the autumn. At the present moment the preparatory work for the coming Exposition is being pushed forward; soundings and excavations are being made in view of the monumental bridge to cross the Seine before the Esplanade des Invalides, and the tunnel to pass under the river in front of the Champs Elysées. In a few months therefore the various work will commence and form the subject for very interesting news.

ARTHUR VYE PARMINTER.

A receiving order has been made in the case of Edward Tom Hatherly and Henry Carr, trading as Hatherly and Carr, of Bristol, builders and contractors.

On Saturday afternoon, at Cawood, the first sod of the Cawood, Wistow, and Selby Light Railway was formally turned. The railway will connect an extensive agricultural district with the North-Eastern main line at Selby. The total length of the proposed line is about $4\frac{1}{4}$ miles, and of the cost, estimated at about £25,000, £8,000 will be spent in permanent way, £2,000 on stations at Wistow and Cawood, and £1,000 on the junction at Selby.

OBITUARY.

PROFESSOR ERNEST CURTIUS, of Berlin University, the well-known Greek historian and archaeologist, died in harness, while still at work at his classes, on Sunday last in his 82nd year. Born at Lübeck on September 2, 1814, Curtius prosecuted his studies at Bonn, Göttingen, and finally at Berlin. In 1837 he was selected by his former instructor at Bonn, Professor Brandis, to accompany him to Greece for the purpose of lecturing before King Otto and of furthering classical research on Hellenic soil. Joined afterwards by another of his old masters, Otfried Müller, Curtius spent in all four years in Athens and the Peloponnese. On his return to Germany, his first topographical dissertation, on the Harbours of Athens, procured him the degree of Doctor at the University of Halle. In 1844 his first great work, "The Acropolis of Athens," appeared and established his reputation as one of the leading archaeologists of the day. From 1844 to 1849 he held the post of extraordinary professor at the University of Berlin. In 1856 he was elected professor at Göttingen, but returned once more to Berlin in 1868 to receive the professorial chair of the history of the fine arts. The excavations at Olympia under the direction of Professor Curtius were begun in 1864; but it was not till 1875, after the foundation of the German Archaeological Institute in Athens, that the undertaking was seriously developed, and two years afterwards followed the discovery of the Hermes and Dionysus of Praxiteles. Professor Curtius has left an account of these labours in his work "The Discovery of Olympia," published in 1882.

CHIPS.

The tower of St. Michael's Church, Sittingbourne, has been tested by an expert as to its stability, and it has been pronounced to be unsafe. A long crack in the masonry is visible when ringing is in progress, and the beams and fittings of the belfry require renewing.

At a meeting of the Gateshead School Board held last week, it was unanimously agreed that Mr. George Bell, quantity surveyor, of 13, Westgate-road, Newcastle, be appointed quantity surveyor to their new offices. Mr. Edwin Bowman, of Newcastle, is the architect, and the work is estimated at £3,500.

The Educational Department have approved of plans prepared by Mr. H. J. Jeffery, M.S.A., architect, of Ashford, for new board schools at Marden, Kent, for 430 children (boys, girls, and infants). Messrs. Mancktelow Bros., of Horsmonden, are the contractors, and the work is to be proceeded with.

The new Roman Catholic Church of the English Martyrs, which has been erected near the Alexandra Park, Manchester, was opened last week. The new church, which is Gothic in style, has been built and furnished at a cost of about £5,500, but the sanctuary is still to be added.

At the town hall, Dawlish, on Wednesday week, Colonel Luard held a Local Government Board inquiry into an application from the Dawlish District Council to borrow £1,200 for the purposes of carrying out water improvements. Information respecting the proposed new mains to increase the supply of water for domestic purposes and to water the roads was given by Mr. J. M. Martin, C.E., of Exeter, and Mr. J. S. Delbridge, surveyor to the council.

At Hawarden, on Friday, Mr. Gladstone was presented with an address by Mr. Larkin (secretary) and other members of the annual conference of the Manchester and District Builders' Labourers' Union. Mr. Gladstone expressed his thanks, and said he was pleased to meet so intelligent a body of working men.

The Convent School of Jesus and Mary, at Willesden, was *en fête* on Thursday in last week, when Cardinal Vaughan opened a new wing which has recently been built. There is now accommodation for 90 boarders and the same number of day scholars.

The new Trades Hall, Aberdeen, presently being erected to the designs of Messrs. Ellis and Wilson, architects, is being ventilated by means of the "Climax" patent direct-acting invisible roof ventilators, which have been supplied by Messrs. Cousland and Mackay, ventilating engineers, Glasgow.

The newly-erected Roman Catholic schools in connection with St. Robert's Church, and situated near the church in Robert-street, Harrogate, have just been opened. The buildings have been erected from the designs of Mr. E. Goldie, architect, of Kensington-square, W., at a cost of over £3,000, and will afford accommodation for 318 children.

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Our Illustrations.

THE PORCH OF ST. ANASTASIA, VERONA.

MR. A. WALLACE RIMINGTON, R.P.E., has placed his exquisite water-colour of this noble portal from the Royal Academy of last year at our disposal, and we print to-day a photo-tint copy of his delightful study. The church of St. Anastasia ranks among the most perfectly beautiful Gothic buildings in Italy. Its façade, which terminates the fascinating little piazza at the end of the narrow Corso, is still incomplete, but the proportions of the front are correctly described as being noble, though so unfinished. Street speaks of the building in unqualified praise standing in "dark shade in contrast with the bright sunshine which plays upon its lofty arched marble doorway and frescoed tympanum, and lights up by some kind of magic the rough brickwork with which the unfinished church has been left so brightly that, as you gaze, thoughts pass across your mind of portions of some lovely painting or some sweet dream: you feel as though Fra Angelico might have painted such a door in Paradise, and as though it were too fair to be real. There, however, it is, rich and delicate in colour, shining with all the delicate tints of the marbles of Verona, pure and simple in its softly-shadowed mouldings, beautiful in its proportions, and on a nearer approach revealing through the dark shade of its opening, and over and beyond the people who early and late throng in and out, the vague and misty forms of the solemn interior." Over a gateway on the left of the church is the exquisite tomb of Count Guglielmo di Castelbarco, who died in 1320. The church was erected by the Dominicans in the 13th century, the time of the Scaligers. "If I were asked," says Ruskin, "to lay my finger, in the map of the world, on the spot of the world's surface which contained at this moment the most singular concentration of art-teaching and art-treasure, I should lay it on the name of Verona." Verona is a place to linger at, and there are few places in Italy where so many different periods of history are still illustrated, or where more various branches of study may be pursued.

Verona è una terra bella e buona,
E cieco e sordo è chi nol vede e sente.—BERNI.

CITY GUILDS: NO. XXII.—THE HALL OF THE GIRDLE'S COMPANY.—THE STAIRWAY.

THIS City Guild of Girdlers or Girdle-Makers was incorporated as early as 1449 by Henry VI., and Elizabeth reaffirmed their charter in 1658, at which time the pinners and wire-drawers were united in the deed. The arms of the Company is generally accepted to be intended as a rebus on their name = a gridiron or girdle-iron. Among the treasures possessed by the Company

is a document dated 1464, by which Edward IV. confirmed the privileges granted to them by Richard II. and Edward III., among which was the following:—In the girdles then worn, silver and copper were used in their fabrication and embroidery, and power was given to the Company to seize all girdles found within the City walls containing spurious metals. The Hall belonging to this Company is situate in Basinghall-street, and it occupies the site of the ancient wall destroyed by the Great Fire, after which the present buildings were erected. The chief feature of interest to the architect consists in the richly-treated oak-screen inclosure to the stairway at the end of the hall. This we illustrate to-day, and before long we propose to give a view of the court-room. The hand-rail and gas-standard posts are, of course, not contemporary with the other work to which they are attached. In connection with the Girdlers' Company, a picturesque ancient ceremony is gone through at the annual election, according to the authorities, when the Clerk to the Guild crowns the Master with a crown embroidered in silk and gold, with the Girdlers' devices; and the other officials with three antique caps; whereupon they pledge their subjects in a loving cup of Rhenish wine.

CITY GUILDS: NO. XXIII.—THE VINTNERS' HALL.—THE HISTORIC PALL.

WE shall hope to give other illustrations before long from this famous company's hall in Upper Thames-street, which was rebuilt by Wren. The present hall has been refronted and relined sumptuously in oak. The historic pall, which we now illustrate, ranks among its most valued treasures.

HIGHER GRADE SCHOOLS, STOCKTON-ON-TEES.

THESE schools occupy a central position in the town of Stockton-on-Tees, and are four stories in height. The lower ground floor contains gymnasium, workshops, laundry and washhouse, and cookery classrooms. The upper ground floor contains central hall, and classrooms for 490 children. The first floor contains a central hall, and classrooms for 480 children, with a room for a teachers' reference library, chemical laboratory, preparation, and balance-rooms, and lecture-room. The fourth floor contains large rooms for drawing and modelling, and classrooms for pupil teachers. The cloak-rooms and lavatories, and rooms for the teachers are mainly placed on the mezzanine floors. There are ample playgrounds, with latrines and covered playsheds. The buildings are of brick, with red stone moulded strings, cornices, and the like, and are covered with red Staffordshire tiles. The floors are fireproof, with wood blocks constructed by Messrs. Homan and Rodgers, of Manchester. Coloured glazed bricks have been largely used as lining for the inside walls. The cost has been about £13,500, exclusive of the wings, which are reserved for future extension. The contractor for the whole of the work was Mr. Wm. Atkinson, and the clerk of the works Mr. Jas. Sanderson, both of Stockton-on-Tees. The buildings throughout are warmed by the low-pressure system of hot-water by Messrs. Emley and Sons, of Newcastle, with auxiliary open fireplaces. The architect was Mr. J. Mitchell Bottomley, of Middlesbrough and Leeds, whose design was selected in a limited competition, the adjudicator being Mr. E. R. Robson, the architect to the Education Department, who also drew the conditions of competition, and advised the Stockton School Board generally upon the scheme. The drawing now illustrated is well hung in the present Royal Academy Exhibition.

DESIGN FOR TOWN HALL.

THE design here shown is one submitted in competition for a town-hall in South Wales. The general arrangement is expressed in the design, and consists of a large public entrance-hall having an open-timber roof and lofty, mullioned windows, with offices on either side. The court, other offices, and waiting-rooms, &c., are in the rear. The walling is of local range-work with Bath stone dressings, and the roofs are covered with green slating. The architects are Messrs. Silcock and Reay, of Bath.

THE PASSMORE EDWARDS CONVALESCENT HOME, LIMPSFIELD.

(SEE description on p. 95.)

New board schools, for the Frizinghall district, were opened at Bradford on Monday. They have cost £9,000, exclusive of site.

ARCHITECTURAL & ARCHÆOLOGICAL SOCIETIES.

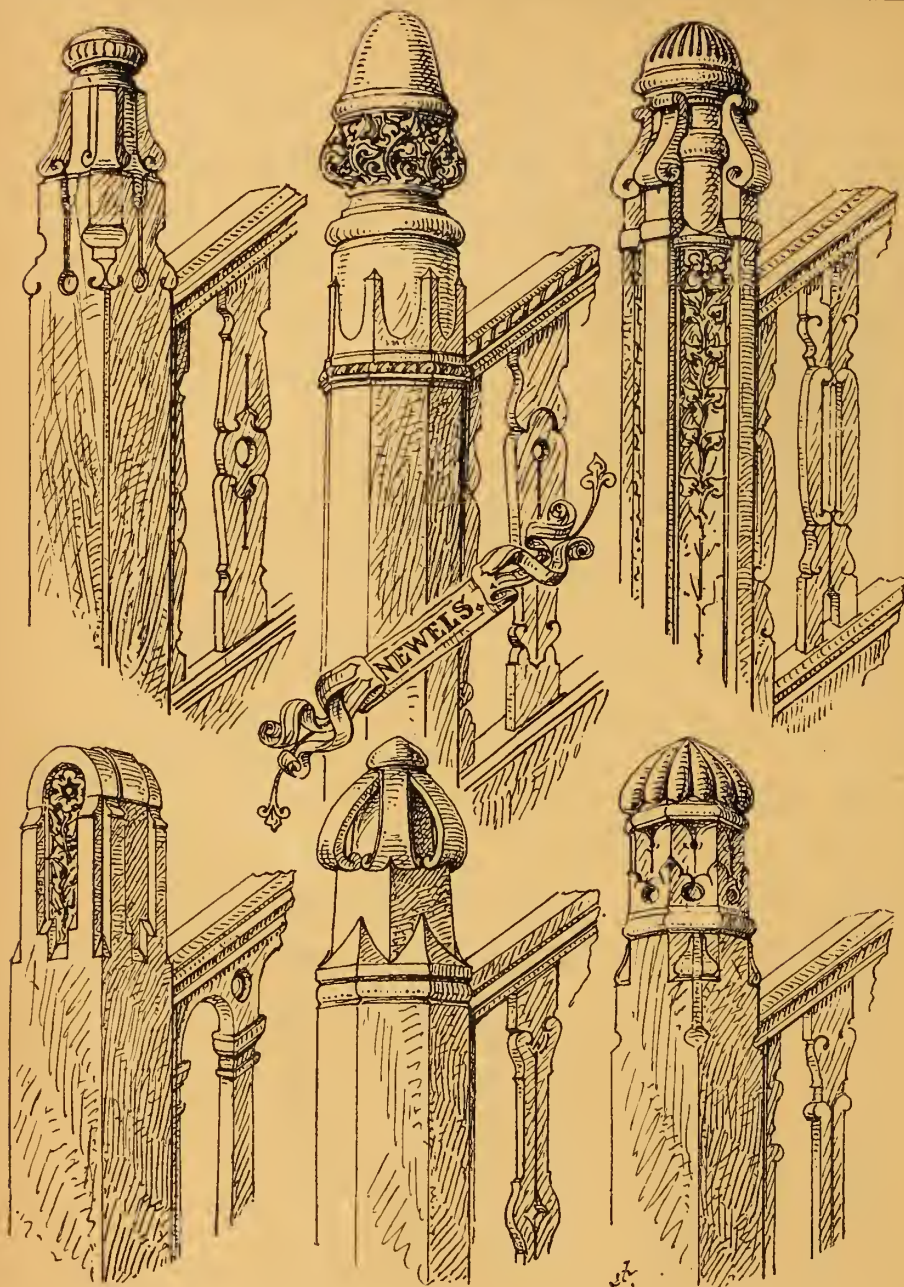
KENT ARCHÆOLOGICAL SOCIETY.—The annual meeting of this society was held on Tuesday and Wednesday week, July 28th and 29th, at Sittingbourne. After the preliminary meeting at the town hall, at which the Lord Lieutenant (Earl Stanhope) will preside, the parish church will be visited, a description of the building being promised by Dr. Francis Grayling. In the afternoon the members will drive to Tunstall Church, and will also visit Tunstall House. Afterwards Bredgar Church and Stockbury Church will be inspected. Canon Scott Robinson will describe each of the three churches mentioned, while Mr. G. Payne, F.S.A., the secretary, will discourse upon the ancient earthwork next the Stockbury edifice. The annual dinner will take place at the Bull Hotel, Sittingbourne, in the evening. The Lord Lieutenant will preside. At the subsequent meeting Mr. G. Payne will deliver a lecture on the "Antiquities of the Sittingbourne District." On Wednesday the members will visit Quenborough, to which ancient borough the mayor will welcome them at the Guildhall, where the municipal insignia will be exhibited. The Rev. C. E. Woodruff, rector of Otterden, will be the guide of the party to Quenborough Church, and Minster Church will be described by the Rev. J. Cave-Browne, vicar of Detling. The remains of the gatehouse of the nunnery of St. Sexburgh will be inspected, and Eastchurch Church will afterwards be visited. The Rev. J. Cave-Browne will act as cicerone at Shurland Castle, and a drive to Warden will end the society's outing of 1896.

SUSSEX ARCHÆOLOGICAL SOCIETY.—The jubilee of the Sussex Archaeological Society was celebrated on Thursday, Friday, and Saturday in last week. On Thursday evening the members and friends dined together at the Royal Pavilion at Brighton. On Friday, Lewes was visited, when the Priory and the parish churches of the town were described by Messrs. W. H. St. John Hope, J. L. André, Phillips, and Somers Clarke. In the afternoon the castle was visited and described, and in the evening the members met at a conversazione, when a collection of antiquities and pictures, illustrating the history of Lewes, was exhibited. On Saturday the members and their friends went into West Sussex, when the Duke of Norfolk entertained the party to luncheon in the new Baron's Hall at Arundel Castle. The visitors, who numbered some 400, afterwards drove to Parham House, where they were entertained by Lord Zouche.

THE SOCIETY OF ARCHITECTS.—The tenth ordinary meeting of the Society of Architects will be held at Shoreham on Saturday in next week, the 25th inst., when the churches of Old and New Shoreham will be visited. Members and their friends (either ladies or gentlemen) will leave Victoria Station (L.B.S.C.R.) by the 10.40 a.m. train, and the reduced fare will be 3s. return by special carriage. It is proposed to lunch at Brighton on arrival, and then to drive to Shoreham by waggone. Returning to Brighton about 4.30 p.m., the party will have an opportunity of visiting the parish church, and after tea will start on the return journey at 7.30 p.m.

WILTSHIRE ARCHÆOLOGICAL SOCIETY.—The annual meeting of this society is being held this week at Salisbury. The inaugural general meeting was held at the County Hotel on Tuesday afternoon, after which the cathedral, St. Thomas's Church, and other objects of interest in Salisbury were inspected, and the members visited Longford Castle. On Wednesday an excursion took place to Dean, Mottistfont, and Romsey Abbey, Mr. E. Dokan Webb, F.S.A., acting as cicerone, and yesterday (Thursday), the closing day, Mere and Sturton were visited. On Tuesday and Wednesday evening conferences were held at Salisbury, at which papers on "Romsey Abbey," "The Mediaeval Guilds at Salisbury," &c., were read. A unique feature of the arrangements is the announcement that the surplus proceeds of the meeting, after paying expenses, will be given to the fund for the repair of the cathedral tower and spire.

The Colne Corporation have decided to construct a new compensation reservoir in the Wycollar valley at a cost of over £50,000. This departure has been rendered absolutely necessary owing to the rapidly increasing population, the present springs being now taxed to their utmost limit. Mr. Hill, C.E., of Manchester, has been appointed the engineer.



5 SUGGESTIONS IN ARCHITECTURAL DESIGN.*

MR. JOHN COTTON has prefaced his book issued under the above title, by Mr. B. T. Batsford, with an essay on "Architectural Progress," which serves to explain the author's ideas on the need of originality, which, he says, has too often been accounted a presumptuous innovation, for:

Custom hangs upon us with a weight
Heavy as frost, and deep almost as life.

To this the writer adds:—"That fine creative thought, however, and constructive, if not artistic, inventiveness still dwell with us as much as, if not more than, with any former age, our romantic and poetic literature and the wonderful achievements of the civil and mechanical engineer abundantly testify." Mr. Cotton urges that public bodies and building acts check and suppress originality of design, while in the matter of places of worship, so-called, he admits that Nonconformists, though less restricted by associations than their Episcopal brethren, are only too anxious oftentimes to follow in the orthodox wake. The Victorian age, marked by the concentrating influences of progress, wealth, and power of the past, gives greater opportunities than ever known before for development. Instead of this architects are often merely archaeologists, and their work can be reducible by analysis into two great systems—the "beam system" and the "arch system"; whereas "if ever architecture is to become again

a creative art, imbued with the spirit of the time, it must in the first place be delivered from the antiquarian and archaeological shackles that so largely control it." And, again, "without the venturesome presentation of new ideas and propositions, and their tolerant consideration, progress would be impossible; for prejudice would always prevent any new departure." The author, in reference to his designs which form the body of his book, says that the scope of his work has been confined to detailed parts of buildings, and not with buildings as a whole. He consequently has limited his efforts to the production of doorways, windows, tracery, gables, towers, turrets, pediments, chimneys, joinery, and other features and accessories. We have thus far enabled the author to speak for himself, and in order that our readers may judge for themselves to what extent Mr. Cotton has been enabled to realise his ambitions, we reproduce two or three specimens from his folio. In making our choice we have endeavoured to take him at his best, and each design is self-explanatory; indeed, there are no special descriptions in the volume before us. These designs, he says, are deferentially contributed to the great architectural treasury with a view to further the cause of progress, and are not intended to compose a "copy-book," but should the author's ideas be approved, he hopes that the suggestive influence of his productions may be eventually forthcoming, and thus tend to exalt our art, and make it more interesting and attractive to people generally.

New occasions teach new duties;
Time makes ancient good uncouth;
They must upward still and onward,
Who would keep abreast of Truth.

In conclusion, if we add a remark of our own, it would be to seriously urge that in order to achieve any real advance in architectural design, the primary consideration of the designer should be given to the production of a structure as a whole, leaving for subsequent thought the working out of its details. Mr. Cotton rather seems to have reversed this natural order of things. The book is well printed and nicely bound. The author was a Pugin Travelling Student and Medallist at the R.I.B.A., of which body he is a Fellow.

CHIPS.

The managers of the Royal Infirmary of Edinburgh have approved of plans for new laundry offices, to be built at the rear of the existing buildings in Lauriston-lane, and a warrant has been granted in the Dean of Guild Court of that city for their erection. Messrs. Sydney Mitchell and Wilson, of Young-street, Edinburgh, are the architects.

Thomas Condich, plasterer, was summoned to the South-Western Police-court, on Saturday, to answer the charge of having intimidated a workman named Death, who had refused to come out on strike. The prosecutors were the Artisans' and Labourers' Dwellings Company, and the evidence was to the effect that complainant had been waylaid and assaulted. The magistrate looked upon the offence as serious, but allowed defendant to enter into his own recognisances to keep the peace on payment of twenty shillings costs.

The Sheffield Corporation on Wednesday week sanctioned the purchase for £60,000 of 42 acres of land, known as Whiteley Woods. These woods are a continuation of Endcliffe Wood, already in the possession of the corporation. For generations Endcliffe was a scene of busy industry, there being at frequent intervals, all up the valley, grinding-wheels, with dams of water to turn the machinery. One of the dams has been turned into a bathing pool, another is used for boating purposes, and a third is stocked with swans, ducks, &c. Together the Endcliffe and Whiteley Woods stretch along the Porter Valley about two and a-half miles.

The jubilee of the erection of St. John's Church, Wednesbury, was celebrated on Saturday by re-opening services, after external and internal renovation, the provision of choir-stalls, and the erection of a new organ-chamber.

Mr. G. E. Cockburn, thirty years with Messrs. Strode and Co., and latterly a partner in that firm, has commenced business on his own account at 35, Great Pulteney-street, W., with works at 1 and 2, Bleeding Heart-yard, Hatton-garden, E.C., as electrical, gas, and heating engineer, and manufacturer of wrought-iron work, bells, &c. Mr. Cockburn's experience has been a long and successful one, and many architects to whom he is known will doubtless be glad to employ him. His motto is "Good work at a fair price."

At the last meeting of the district council for Eastleigh, Hants, a report was received from a committee of the whole council, stating that they had unanimously agreed that, having considered the claim of Messrs. Elliott Bros. for £4,847 18s. 4d., in respect of sewage works on balance of account, they declined to entertain the same, and had instructed their clerk to act for them as solicitor, and to do all things necessary in resisting the claim, and further that a counter-claim for damages under Clause 18 of the contract, for £1,812 be made.

The new Blackpool, St. Anne's, and Lytham tramway has been constructed from Blackpool to St. Anne's, and on Wednesday week the Board of Trade inspector, Major Marindin, surveyed the completed portion and declared it fit for use. The inspector expressed his satisfaction at the cars, which are propelled by a gas-engine underneath. The line to Lytham will soon be completed, and as parliamentary powers have been granted for the construction of a tramway from Blackpool to Fleetwood, visitors will soon be enabled to travel along the coast from Lytham through Blackpool to Fleetwood.

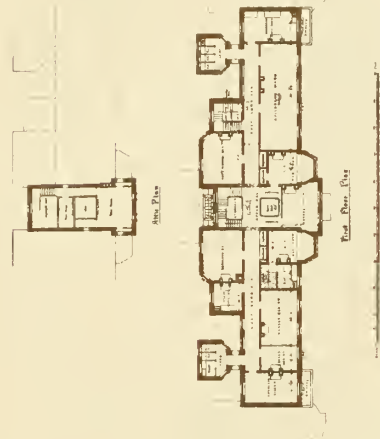
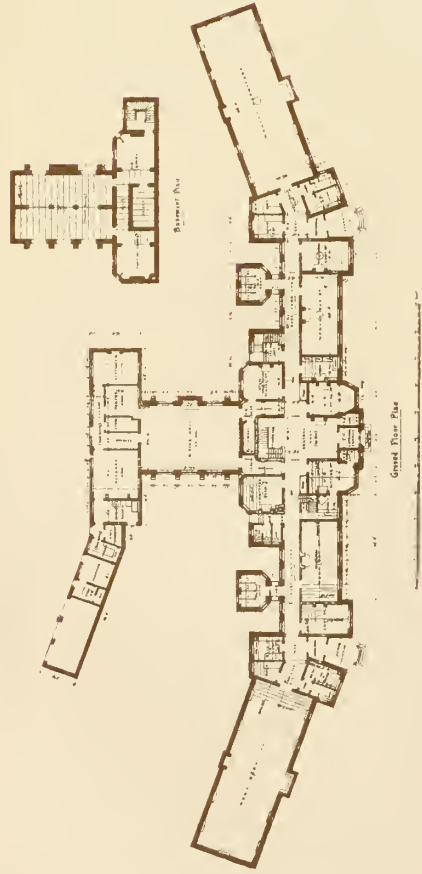
New premises which have been erected in Union-terrace, Aberdeen, for the Savings Bank were formally opened on Friday. The building is three stories in height, and was designed by Mr. William Kelly in the Renaissance style. The cost of the building has been about £11,000.

The Limbert Tower, part of the old walls of Avignon, has been demolished by the corporation, in spite of the law protecting historical monuments, and the old church of St. Pierre at Montmartre, overlooking Paris, is about to share the same fate; but in the latter case the building is so dilapidated that there is no alternative.

Works of restoration and repairs are being carried out at the parish church of St. John the Baptist at Wakerley, near Seaton. The architect is Mr. J. B. Corby, of Stamford, and the builder Mr. A. S. Roberts, of Wakerley.

* Suggestions in Architectural Design: prefaced with Thoughts on Architectural Progress. By JOHN COTTON. London: B. T. Batsford, 94, High Holborn. 1896.

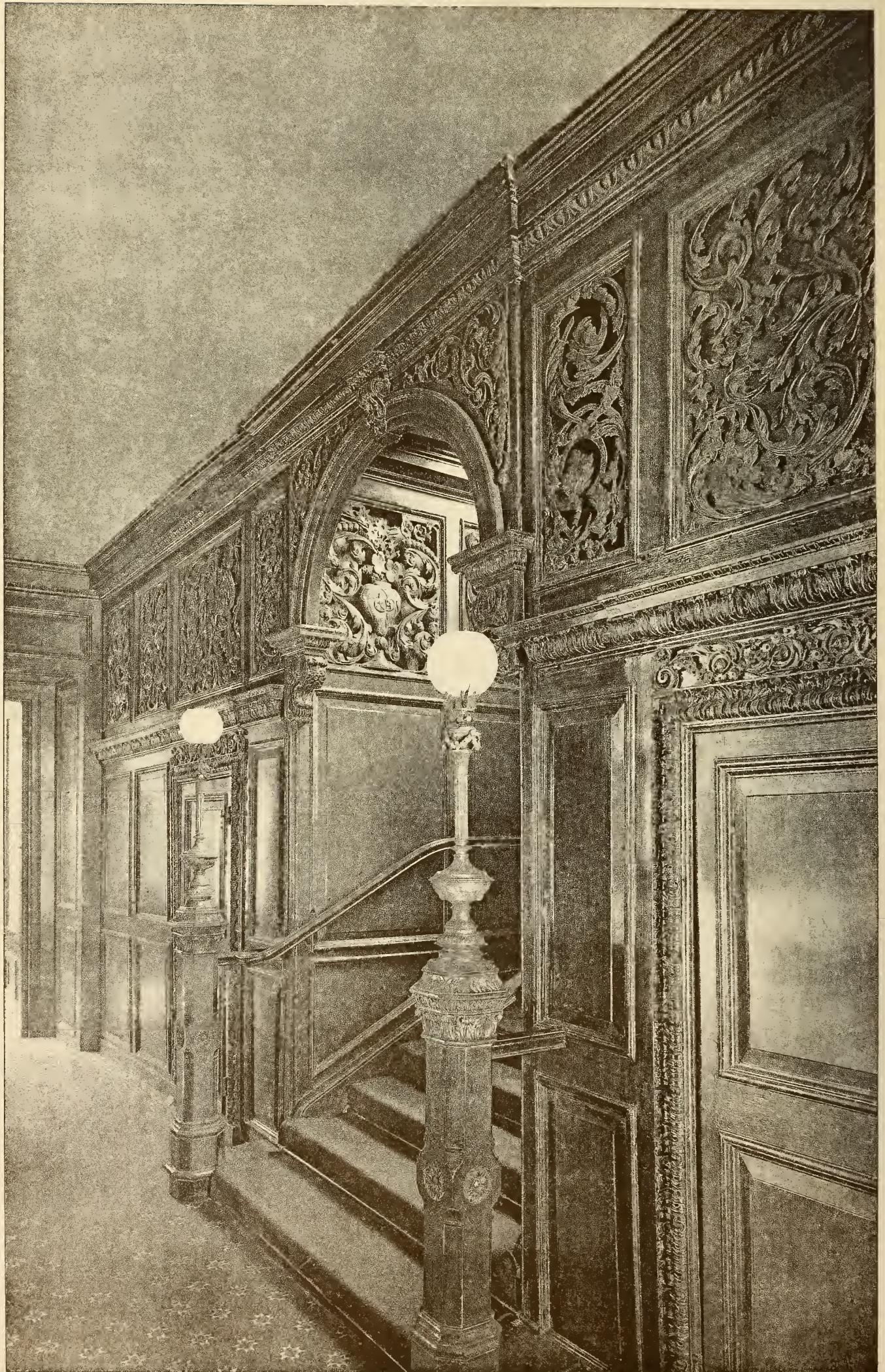
THE BUILDING NEWS, JULY 17, 1896.



THE PASSMORE EDWARDS CONVALESCENT HOME, LIMPSPFIELD, FOR CHARING CROSS HOSPITAL.

OPENED BY THE PRINCE OF WALES, JULY 11TH, 1896, JOHN J. THOMSON, ARCHITECT

"PHOTO-TINT" BY JAMES KEEMAN & QUEEN SQUARE LONDON W.C.



PHOTOGRAPHED WITH A SANDELL PLATE.

"PHOTO-TINT" by James Akerman 8 Queen Square London W.

THE BUILDING DEWS, JULY 17, 1896.





"Photo-Tint" by James Akerman, Queen Square, London, W.

THE PORCH OF ST ANASTASIA. VERONA. BY A. WALLACE RIMINGTON R.P.E.

HIGHER GRADE SCHOOLS STOCKTON-ON-TEES J. MITCHELL BOTTOMLEY ARCHT



HIGHER GRADE SCHOOLS
STOCKTON ON TEES
J. MITCHELL BOTTOMLEY, ARCHT
MIDDLESBROUGH & LEEDS

JULY 17, 1896.



JOHN CASH DEL.

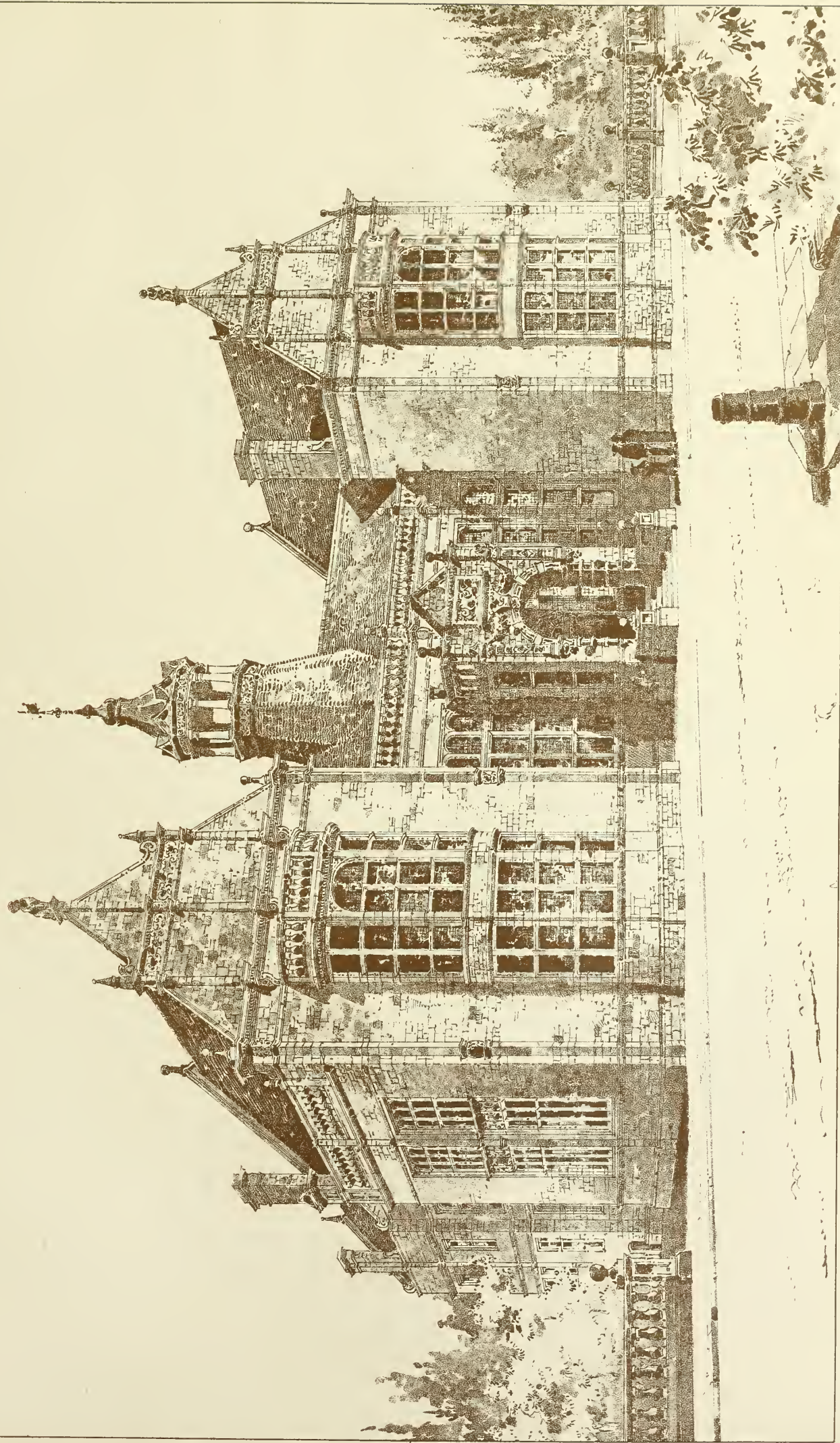
"PHOTO-TINT" by James Akerman, 6, Queen Square, London, W.C.



PHOTOGRAPHED WITH A SANDELL PLATE.

THE CITY GUILDS No 23.
THE HALL OF THE VINTNERS' COMPANY
HISTORIC HALL

PHOTO-TYPE BY JAMES AKERMAN & CO. LONDON



DESIGN FOR TOWN HALL. MESSRS SILCOCK & REAY ARCHTS

PHOTO-TINT by James Akerman & Co. Queen's Square, London W.

Suggestions in Architectural Design.

J. M. Cotton
Architect.

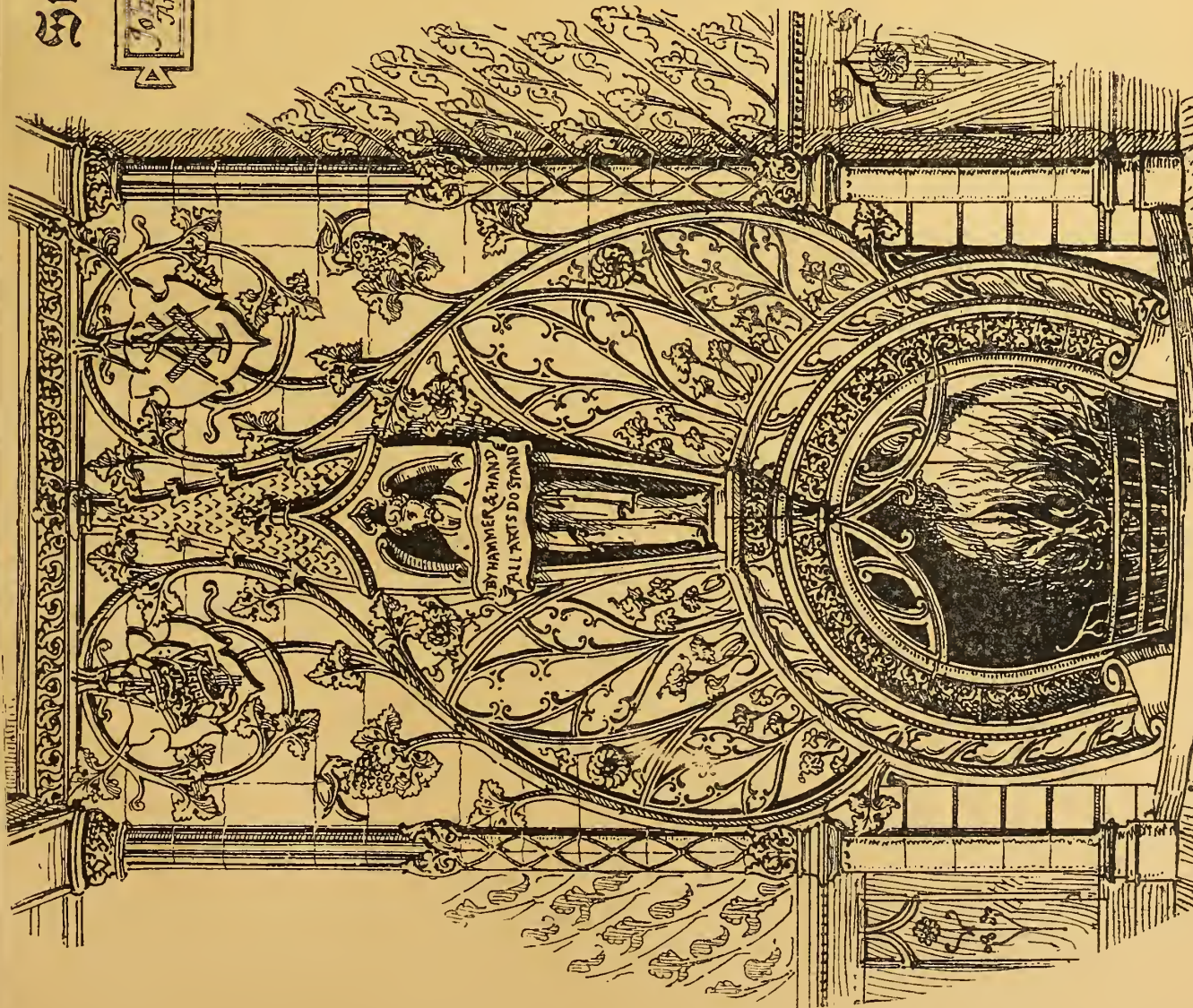


FIG. 1. PLACE FOR A MINISTERS' SCHOOL.

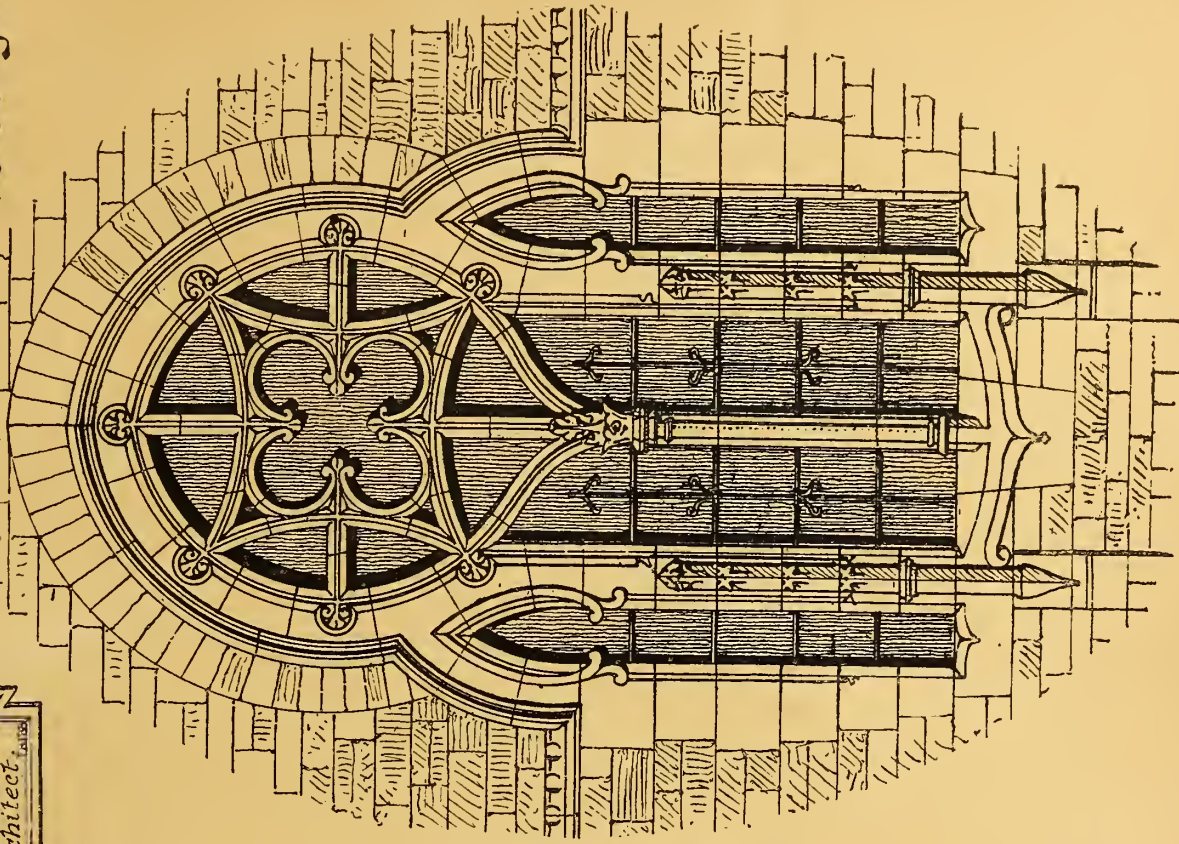


FIG. 2. CHURCH WINDOW.

Building Intelligence.

BORDESLEY.—Holy Trinity Church, Bordesley, after being closed for several weeks for renovation and redecoration of the interior of the fabric, was reopened on Friday by the Bishop of Worcester. A picture of "Christ at the Pool of Bethesda," by Foggi, which formerly was placed on the reredos, intercepting the decoration, has been raised, and the redecoration includes the replastering of this part of the ornamentation of the chancel, the treatment being a conventional arrangement of the lily and rose on a ground of red, blue, and dove tints. The gallery front and organ have also been treated as special features. The architect for the present work is Mr. Frank B. Osborn, of Bennett's Hill, Birmingham.

GREENHEYS, MOSS-SIDE.—The foundation-stone of Christ Church, Lloyd-street, Greenheys, was laid on July 2nd by the Bishop of Manchester. The new church is being erected on the site of an old one. It will consist of nave, north and south aisles, and a chancel, on the south side of which is a morning chapel for 56 worshippers, and on the north side are the organ-chamber and priests' and choir vestries. The portion of the building now being proceeded with includes the chancel, chapel, and vestries. The former, like the nave, will be 28ft. in width, 40ft. in length, and 60ft. high to the ridge. The church is Late Decorated in style, the materials used being Bolton bricks, for both external and internal wall facings, and Rainhill stone for dressings. The altar is raised on nine steps above the nave floor, and, with a height of some 20ft. between the altar-face and the sill of the seven-light east window, ample space is provided for a reredos. The chancel will be divided from the nave by a low stone screen and wrought-iron gates, and the arches inclosing the morning chapel will be filled in with oak screens with elaborate traceried heads. The total cost is estimated at £12,000. When completed the church will accommodate 770 worshippers. It is being built from plans prepared by Mr. W. Cecil Hardisty, architect, of Manchester, the general contractors for the work being Messrs. Statham and Whitby, of Pendleton.

LANGSIDE, GLASGOW.—The foundation-stone of a U.P. church in Langside-road, Glasgow, was laid a few days since. The new church is being erected on the site of the old church at the corner of Stevenson-drive and Langside-road. The church is being built of yellow stone, with red freestone dressings and corners, and is in Late Decorated style. The spire, which it is not proposed to complete at present, will rise to a height of 130ft., and the tower will meantime be finished with a gabled roof. The church internally will be divided into nave and side aisles, with galleries at sides and end. The sittings arranged for are 780 in church, and the hall is designed to seat about 300, with two class-rooms of 40 each opening into the hall when required. The buildings are designed by Mr. John B. Wilson, A.R.I.B.A., architect, Glasgow.

LEITH.—The members of the Edinburgh Association of Science and Art recently visited Leith Public Health Hospital, Ferry-road; and also Royston House, Caroline Park, and Granton Castle Gardens. The party were conducted over the hospital, which is in course of completion, by Mr. George Simpson, the architect. The hospital is laid out and constructed upon the pavilion or cottage system to accommodate 100 adult patients, and the various buildings consist of:—Gate lodge, administrative block, four ward blocks, double isolation ward block, disinfectant and laundry block, discharging and blanket block, and also mortuary and stable block. Each building has a separate system of drainage, and all the water, gas, and soil pipes are exposed. Each ward block has a separate hot-water heating apparatus, and the fresh air to the wards is led in over coils of hot-water pipes before it enters the rooms. Each block has a small boiler for heating the water for baths, &c. The members subsequently proceeded to Granton Castle and Royston House, these places being interesting examples of the architecture of Scotland from 1544 to 1696.

ROCHDALE.—The new premises of the Lancashire and Yorkshire Bank were opened last week. They have been built from the designs of Mr. W. E. Vernon Crompton, A.R.I.B.A., of Wigan, and occupy the corner of the Orchard and Yorkshire-street. The banking room is 44ft. long,

31ft. wide, and 26ft. high, and is lit entirely from the roof. The columns in the room and the dado in the porch are of Norwegian rose and black Labrador granite, while the vestibule is lined with faience. The floors of the banking-room are of marble mosaic on one side of the counter and wood blocks on the other. There is a dado of mahogany round the bank harmonising with the counter, desks and fittings. Above this the walls are plastered and hung with a painted Tyne-castle tapestry, and enriched under the main cornice by a deep decorative band of modelled plaster work. On three sides the building is faced with Yorkshire stone, and white glazed bricks are used for the remainder. The style adopted is a modern adaptation of the Later English Renaissance. Messrs. W. A. Peters and Sons, of Rochdale, were the general contractors, the sub-contractors including Messrs. Patteson, of Manchester, for marble and mosaic work.

COMPETITIONS.

ABERDEEN.—A curious development has arisen with regard to the Corporation Lodging House which it is proposed to erect at Aberdeen, and for which competitive designs had been solicited. The design of Messrs. Marshall and Dick, of Newcastle-on-Tyne, was placed first among those sent in, but the assessor considered that it could not be executed for the stipulated sum—£9,000. So the first place was given by the committee to the design of Mr. Bruce, Aberdeen. Messrs. Marshall and Dick, however, have written, stating that their design can be carried out for the stipulated amount, and hence the difficulty. Various suggestions have been made with a view to a solution of the question. One is that Messrs. Marshall and Dick's design should be accepted on their agreeing to indemnify the council for any outlay on the building exceeding £9,000; and another is that this design be awarded a first premium of fifty guineas, and that Mr. Bruce, Aberdeen, be appointed architect for the work. In order to give time for consideration, the report of the committee has been held over till the next meeting of the Aberdeen Town Council.

HALIFAX.—In the competition for new police offices, court-house, and public hall, to be erected on the site of the old infirmary, sixteen sets of designs were received by the town council. These have been submitted to Professor T. Roger Smith, F.R.I.B.A., Temple Chambers, E.C., who recommends that the first premium of £100 be awarded to the design under the motto "Justice," the second of £60 to that entitled "Persimmon," and the third of £40 to "Hali-1662-fax." The design, according to Professor Roger Smith's recommendation, standing first in merit provides a public hall which would give sitting accommodation for 3,400 persons, distributed in this order—area 1,136, balcony 784, gallery 1,080, orchestra 350, and band 50. There are also provided an open parade-ground, court-house, and public gallery, in addition to the offices and cells. Although the names of the architects whose plans are recommended for the premier award are not officially made known, it is generally reported, says the *Leeds Mercury*, that another success has thus far been achieved by a well-known firm.

LIVERPOOL.—We published the result of the competition for the Liverpool Museum extensions last week, when we named some of the unsuccessful competitors. The following is a complete list of those invited; but the last six firms did not submit designs:—Mr. E. W. Mountford (1st premiated design), 17, Buckingham-street, W.C.; Mr. J. M. Brydon (2nd ditto), 77, Newman-street, W.; Messrs. John Belcher, 20, Hanover-square, W.; W. D. Caröe, 8A, Whitehall-place, S.W.; W. Emerson, 8, The Sanctuary, S.W.; H. T. Hare, 1, York-buildings, W.C.; Burnett, Son, and Campbell, 167, Vincent-street, Glasgow; Goddard, Paget, and Goddard, 6, Market-street, Leicester; T. E. Colcutt, 36, Bloomsbury-square, W.C.; Grayson and Ould, 31, James-street, Liverpool; J. Francis Doyle, 4, Harrington-street, Liverpool; C. E. Deacon, 41, North John-street, Liverpool; James Rhind, 10, Cook-street, Liverpool; T. M. Reade and Son, 2, South John-street, Liverpool; Douglas and Fordham, 6, Abbey-square, Chester; Sir T. N. Deane and Son, 3, Upper Merriam-street, Dublin; R. Rowand Anderson, 16, Rutland-square, Edinburgh; E. Kirby, Union Buildings, 5, Cook-street, Liverpool; Francis Holme, 1, Crosshall-street, Liverpool; and C. O. Ellison and Son,

22, Sir Thomas-street, Liverpool. Mr. Aston Webb was the assessor. We hope at an early date to illustrate the premiated designs.

MANCHESTER.—The limited competition, in which ten specialists were invited to send in designs for the rebuilding of Manchester Royal Infirmary, has been settled. Mr. Alfred Waterhouse, R.A., acted as professional assessor, and the design submitted conjointly by Messrs. John W. Simpson and E. J. Milner Allen, of New Inn, Strand, has been selected. The site of the buildings is that occupied by the present hospital, which stands on an isolated plot facing Piccadilly, and flanked by Portland-street and George-street, with Parker-street to the rear. The problem presented to the architects was a by no means easy one, seeing that the materially enhanced accommodation, both for patients, and consequently for an increased staff, had to be as nearly as possible restricted by the extent covered by the old buildings, so as not to encroach upon the open spaces on all sides, and at the same time not to needlessly increase the height of the infirmary as a whole. The in-patients on the medical side number 90 males and 80 females, on the surgical side 160 males and 90 females, giving a total of 420. Two operating theatres, adjacent to one another, and a lecture theatre for 200 students, form part of the scheme. The following architects were selected to compete (besides Messrs. J. W. Simpson and E. J. Milner Allen, the elected architects):—Messrs. George Corson, Leeds; Giles, Gough, and Trollope; Alex. Graham; Chas. Heathcote, Manchester; Wm. Henman, Birmingham; Matthews and Mackenzie, Aberdeen; Tuke and Hewitt, Manchester; Wm. Waddington and Son, and Thos. Worthington and Son, of Manchester. The chosen plan is a remarkably good one, and the reduction of the open space is only a fraction over 5 per cent. of the present area. The open space now is 13,440 yards superficial, and the plans for the new building show the open space at 12,744 yards superficial, a reduction only of 696 yards superficial. Although so little ground is covered, the wards are only three or four stories high, and the administrative block is of five stories. Thorough and easy inter-communication is combined with distinct isolation. The walls of the wards and rooms of main building will be lined with smooth cement painted and varnished; the floors laid with oak parquet, paraffin polished. The interior of the out-patients' hall, chapel, and central entrance-hall will be of washable terracotta. Oak or American walnut will be used throughout for the joinery. The work of rebuilding is divided into five contracts in a very convenient and well thought out manner, so as to permit the work of the hospital to go on in the meantime, and the site will by these means be spared from encumbrance by the erection of temporary buildings. The total estimated cost is stated at £126,923 15s. 10d., an equivalent of less than £300 per bed. Each of the unsuccessful architects' firms will receive £100 for their designs. We hope to illustrate the selected design at an early date.

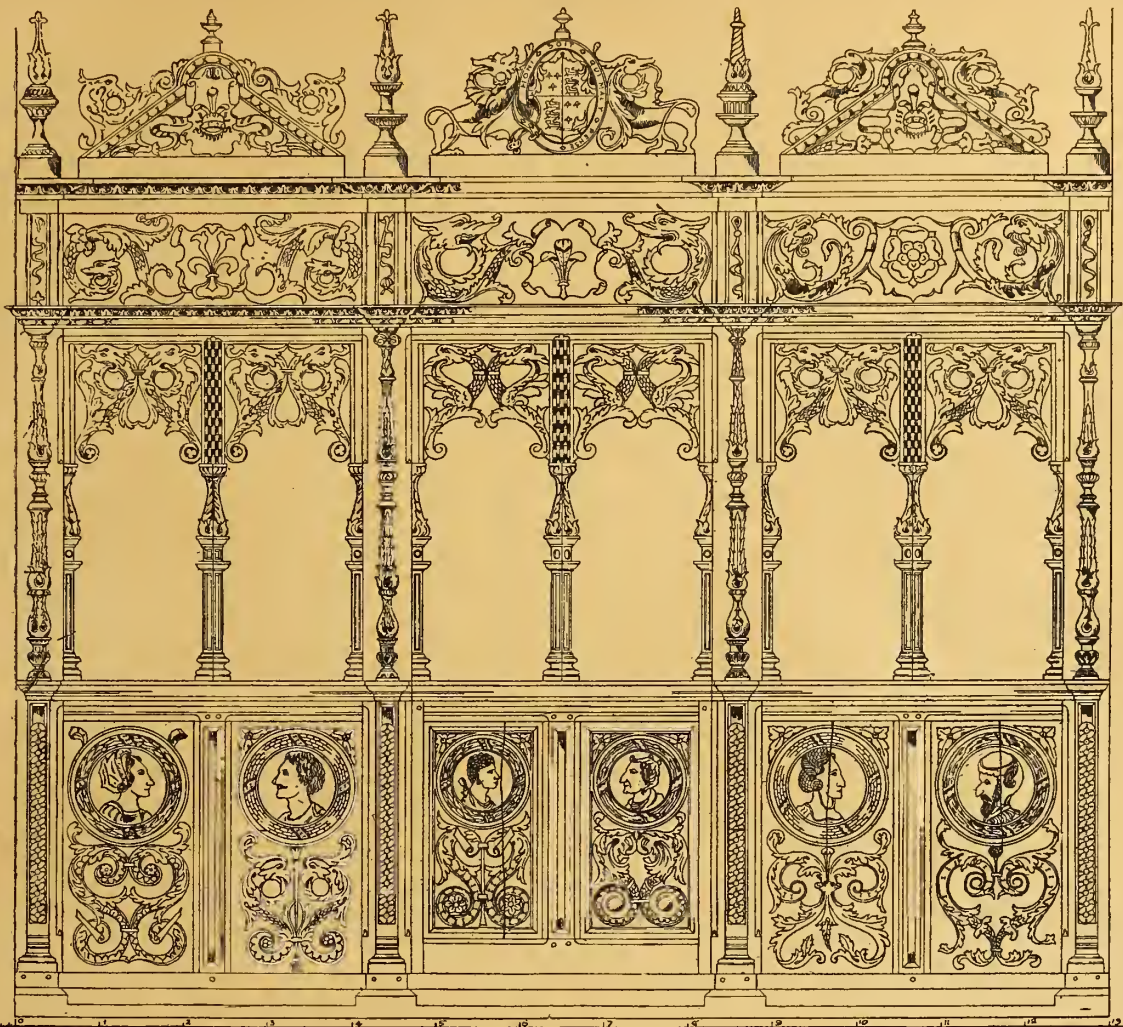
CHIPS.

The tower of the parish church of Bury, Lancs, a building re-erected twenty years ago, is about to be completed by the addition of the eight pinnacles. Messrs. Austin and Paley, of Lancaster, are the architects.

Under the terms of the Chantry Bequest the president and council of the Academy purchased "Alleluia," by T. C. Gotch, for £900 (catalogue price); "The Man with the Seythe," by H. H. La Thangue, £500; and "The Morning Bath," by Mildred A. Butter, for £50.

The Wesleyans of Paignton have just erected a new chapel in Palace-avenue, the centre of the town. Constructed in Early Geometrical style, the chapel consists of a nave 67ft. by 26ft., with side aisles, each of which is over 12ft. wide, there being a large transept and a gallery over the south end of the nave. The builder is Mr. S. Blatchford, of Upton, Torquay, and the joint architects are Messrs. W. G. Coudrey and G. S. Bridgman, Paignton. Messrs. Boyle and Son, London, have done the ventilating of the building.

Subscriptions are being raised for completing the restoration of Thirsk parish church, at an estimated cost of about £1,300. In 1876-77 the interior was restored and entirely repewed with oak, the interior restoration being completed during the vicariate of the Rev. Canon Camidge, now Bishop of Bathurst, Australia. The works now contemplated will deal with the extensive fabric, one aim being to add pinnacles to the fine square tower at the west end.



SCREEN
BETWEEN
CHOIR AND N. AISLE
CARLISLE
CATHEDRAL
ELEVATION TO
NORTH AISLE.
AD. 1532.

MEASURED AND
DRAWN BY
W. MOSS SETTLE
1896.
1/4 INCH.

SCREEN, CARLISLE CATHEDRAL.

THIS beautiful woodwork screen is of Renaissance work, the date being 1532. It is situated on the north side of the choir, behind the pulpit, under one of the pier arches, and divides one bay of the choir from the north aisle. In the centre bay of the screen is a door, which, at the present time, is not used. Upon the screen are the initials of Lancelot Salkeld, the last prior and first dean, together with the letters D.K. (Decanus Karlioliensis), the initials of his new title. The lower panels and the frieze are closed with the carving in relief, the remainder being openwork carving. The length of the screen is 13ft. between the piers, and the total height 12ft. W. MOSS SETTLE.

PASSMORE EDWARDS CONVALESCENT HOME, LIMPSPFIELD.

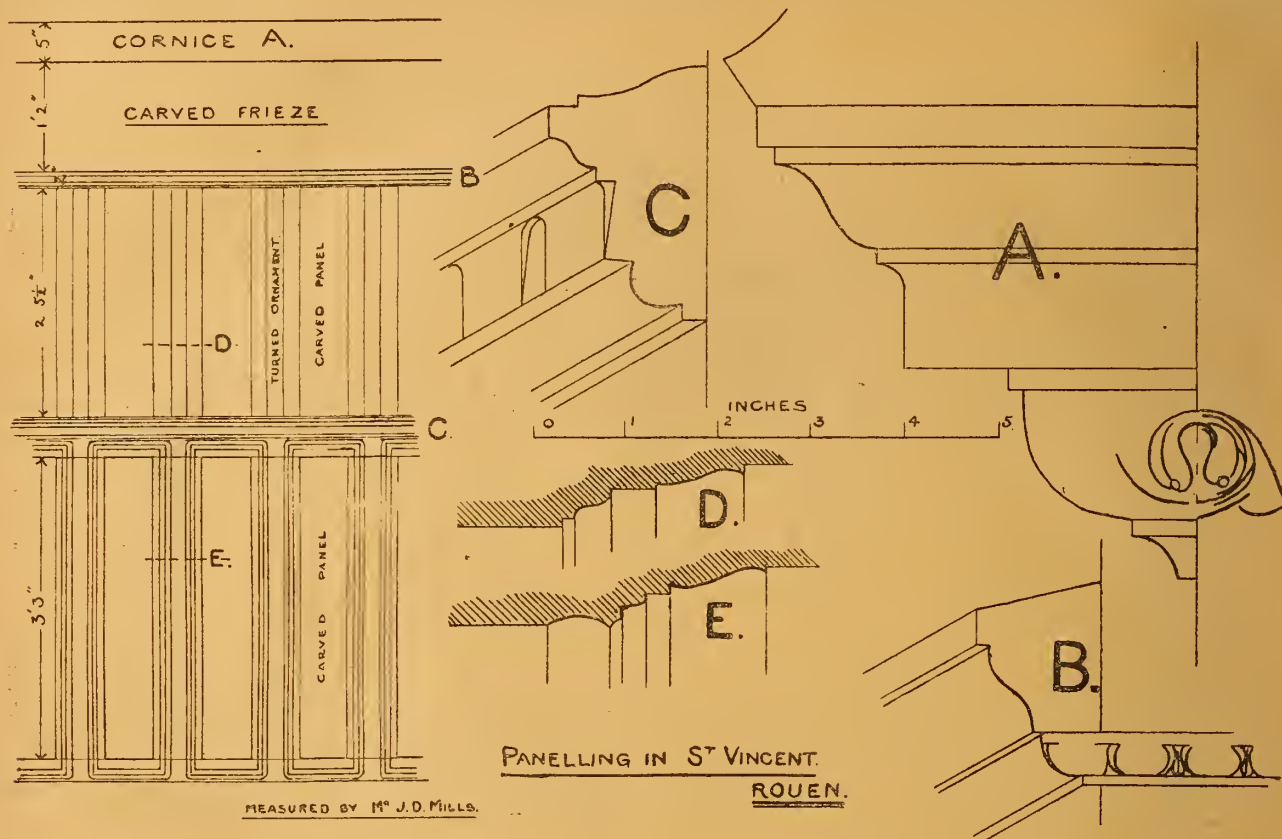
[WITH PHOTO-LITHOGRAPHIC ILLUSTRATIONS.]

THE quiet little village of Limpfield, Surrey, was lavishly decorated on Saturday with flags and flowers in honour of a visit from the Prince of Wales who went down to open the new Convalescent Home which has been built by Mr. J. Passmore Edwards for Charing Cross Hospital. The Prince of Wales, who was accompanied by the Princess of Wales and Princess Victoria, was driven up to the scene of the ceremony in his own carriage. The Royal party met with a hearty welcome from the hundreds of interested spectators. It was in 1888 that the council of the hospital first had under consideration the subject of providing a Convalescent Home for their patients. After prolonged search, during which no fewer than sixty-eight places were examined and considered, the present site was fixed upon and obtained through the intervention of Mr. J. Passmore Edwards, and the council have every reason to be satisfied with the result. The grounds are 19 acres in extent, the site of the home is 532ft. above sea-level, and abuts on Limpfield common, an adjacent part of which is a wood of about 300 acres. On a former occasion* we gave an

illustration of the result of a competition for the erection of a suitable building. Since then a fresh site has been chosen, and some modification of the plan was necessary to meet the altered conditions, the principal change being an alteration in the relative position of the dormitory wings; these no longer project, but are thrown back at an obtuse angle of 160°. The Home contains accommodation for twenty male patients, twenty female patients, ten children, and seven or eight paying patients. The administrative block is in the centre of the premises, and each wing has a day-room and a guest-room. There are also rooms for nurses and servants, and 1,000c.ft. is allotted for each patient. The Home stands on the lower greensand, and is built almost entirely of stone quarried from a portion of the estate, Bath stone supplied by the Bath Stone Firms, Limited, being used for the dressings. A good supply of water, which analysis has shown to be of excellent quality, is derived from springs on the property. It is estimated that the maintenance of the Home will entail a cost of some £2,000 per annum, which is not provided for by any endowment. The architect is Mr. J. J. Thomson, A.R.I.B.A., of 1, Durham-place, Chelsea, S.W., and the builders are Messrs. Colls and Sons; the contract for the retaining-wall and formation of terrace being let to Mr. A. Durnell, of Brasted. The water is pumped up from a spring at the foot of the hill by two of Blake's hydraulic rams. The clerk of works is Mr. W. J. Vinnell. The entire cost of the building has been defrayed by Mr. Passmore Edwards. The ceremony, which took place in a large marquee, was very brief. After the reception of their Royal Highnesses by the treasurers and council of the hospital and the presentation of beautiful bouquets to the Princess of Wales and Princess Victoria, by Miss Nellie Petley, daughter of the matron of the Caxton Convalescent Home, a neatly-illuminated address of welcome was presented to the Prince by Mr. Biddulph Martin on behalf of the council. The address expressed regret at the unavoidable absence of the Duke of Saxe-Coburg, president of the hospital, mentioned certain facts in connection with the scheme, pointed

out that the entire cost of the building had been defrayed by Mr. J. Passmore Edwards, who had provided similar institutions in the neighbourhood, and after giving further details of the work of the hospital, and the prospective usefulness of the new Home, concluded by an expression of thanks to their Royal Highnesses for their presence and support. Responding to this address, the Prince of Wales spoke in the following terms:—"In declaring this Convalescent Home open, I am desirous of expressing the great pleasure which it has given the Princess of Wales, the Princess Victoria, and myself to be permitted to take part in the proceedings of to-day. I regret that my brother, the Duke of Coburg, for many years president of the hospital, and who has always been deeply interested in its welfare, is unavoidably absent. The governors of the hospital have every reason to be grateful to those whose beneficence has provided this almost indispensable adjunct to a hospital, a convalescent home, as a resort to patients sufficiently recovered to be no longer invalids, and still too incapacitated to be able to do work with advantage. I desire specially to express our warm thanks to Mr. Passmore Edwards, who, at his own cost, has supplied a want which the Charing Cross Hospital has hitherto long felt. He is, I am sure, well known to all of you as the munificent founder of the Caxton Convalescent Home, situated in this neighbourhood, and other institutions similarly designed to benefit the working classes. The fresh and invigorating air, and the charming Surrey scenery will, I trust, an inestimable boon to the inmates of this new institution; and I can readily believe that a temporary sojourn here will materially improve their health. We cannot, I think, call to our aid a more valuable auxiliary, as a means of increasing the utility of a hospital, which, owing to its situation in one of the crowded localities in London, has no recreation grounds or gardens. I have to thank you again, ladies and gentlemen, for your very kind reception, and to assure you of my sincere sympathy with the objects of this building, and my gratification in being present on this interesting occasion." Their Royal Highnesses and other visitors then proceeded to inspect the new

* BUILDING NEWS, April 28, 1893.



building, which stands only a few hundred yards from the Caxton Convalescent Home opened by Mr. Passmore Edwards last year. The following gentlemen were formally presented to the Prince of Wales during the afternoon:—Mr. J. Passmore Edwards (donor), Mr. John Biddulph Martin, (hon. treasurer of the hospital), Dr. Watts Black (Chairman of the Convalescent Home Committee), Mr. Thomas Percy Borrett (Chairman of the Weekly Board of Governors), Dr. John Ashley Bloxam (senior surgeon of the hospital), Dr. Arthur Maude (medical officer of the Convalescent Home), Mr. J. J. Thomson (the architect), and Mr. J. Howard Colls (the builder).

SOME MINOR EXAMPLES OF THE FRENCH RENAISSANCE.*—IV.

By G. A. T. MIDDLETON.

THE PANELLING OF ST. VINCENT, ROUEN.

THE drawing accompanying this is illustrative of some internal decorative panelling upon the walls of the Church of St. Vincent, Rouen—a Late “Flamboyant” church, with fine western portico—and is given to show how eminently adaptable to modern requirements are some of the simple mouldings and enrichments of the French Renaissance. The mouldings, the two varieties of the egg and dart, and the simple yet effective method adopted of giving the appearance of dentils without great projection, are all eminently well suited to the material, oak, and applicable to modern work, suggestive of other possible variations, and to emphasise these points the more, the carving, of which there is no dearth, has been omitted. It is subservient to the general outline, in low relief, suitable to its position and to execution in hard wood, and very rich and varied in design, but is not of the practical value of these few details.

LONDON BOARD SCHOOL BUILDINGS.

THE annual report of the Works Committee of the London School Board just issued states that during the year ended March 25 last compulsory powers were obtained over 26 sites for new schools and additional land for 42 existing schools. The scheduling of 57 other sites either for new schools or for enlarging existing ones, is being proceeded with. The Board agreed to purchase during the past 12 months various

interests in sites at a cost of £104,243, the surveyors' fees amounting to £1,177. All the sites purchased or agreed to be purchased previous to March 25, 1895, were valued at £2,985,307, and the costs in connection with them amounted to £418,453. The total cost, therefore, of the sites purchased up to the end of the year under review was £3,089,550, with costs amounting to £419,630. The total number of permanent schools which had been erected and opened to Lady Day last was 406, and these included three additional schools opened during the year, besides which 20 enlargements had also been completed. The three new schools—including sites, buildings, and furniture, had cost £87,848, and the accommodation given was for 3,918 children, showing an average cost of £22 8s. 5d. per head; while the enlargements, which will give additional accommodation for 5,971 children, had cost £128,618, or £21 10s. 9d. per head. The average cost per head of the 307 school buildings, and of the furniture, was £12 14s. 2d. for buildings, and 10s. 6d. for furniture. Tenders had been accepted during the past year for 11 new schools, providing accommodation for 9,884 children, at a cost of £195,626, an average of £19 15s. 10d. per head; and for 17 enlargements, giving accommodation for 5,167 children, at a cost of £119,219, an average of £24 5s. 11d. Eight of the 11 new schools would have a hall for each department, the three remaining schools being provided with only one or two halls, and provision is made for cookery, laundry, or manual training centres, or rooms for the teaching of the upper standards. The variations in cost between new schools and enlargements arose mainly from the fact that in enlarging the buildings the opportunity was taken to improve the existing schools so as to make them thoroughly efficient; and in some cases, also, the tenders for the enlargements include the provision of cookery, laundry, or manual training centres, a drawing-room, a class-room, a technical room, a chemical laboratory, a new house for the school-keeper, or other buildings. Tenders had also been accepted for carrying out the following among various other works:—Erecting 11 cookery centres, 13 laundry centres, 18 manual training centres, five manual training rooms, 11 schools of special instruction, three housewifery centres, and rooms for the teaching of the upper standards at five existing schools; providing covered playgrounds; carrying out drainage and sanitary works to 27 schools (the total amount of accepted tenders for this work at 19 schools is £30,697, the work at the remaining eight being done in connection with

enlargements of school buildings); providing hot-water apparatus at many schools, and carrying out various structural alterations. All the new schools which were being erected were provided with apparatus other than open fireplaces for warming purposes. This was also the case with schools where enlargements were made. Duplicate boilers would be provided in future new schools.

During the year the Board had instructed the committee to take the necessary steps for the erection of an institution for deaf children at Anerley, and finished plans of a residential institution, comprising five blocks, to accommodate a total of 90 boys and 60 girls on the cottage system, had been approved. It had also been decided to purchase Gordon House, Isleworth, for the purpose of a girls' industrial school. Progress had been made with new drainage works at the schools; and 163 schools were painted or cleaned inside or out or both during the year. The system of carrying out repairs to school buildings by workmen employed directly by the Board was being continued in nine of the 18 districts of the clerks of works for repairs, and 56 workmen were thus engaged. The whole of the repairs to furniture were also being carried out by the Board's own workmen, the number of men employed in this department being 51. With reference to wages paid by contractors, the Board had inserted in each building contract a schedule of wages and hours; and it was now provided that where the London scale of wages applied the contractor should pay the workmen employed by him the rates of wages mutually agreed upon by the Central Association of Master Builders of London and the representatives of the unions of the various branches of the building trade, and that where the London scale did not apply the contractor must pay not less than the minimum standard rates of wages which might for the time being be usual. The Board's own workmen were paid the same wages as were required to be paid by contractors. The work in hand at Lady Day last consisted of 18 new schools for 16,742 children; and 18 enlargements, providing accommodation for 5,957 children; 40 additional sites for new schools had been, or were being, purchased (25 of these sites would provide for 22,783 children); 16 sites for new schools had been scheduled (eight would give accommodation for 7,100 children); 31 enlargements had been sanctioned, giving accommodation for 10,160 children; and the Education Department have sanctioned the provision of sites in eight districts which will be scheduled next session.

TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. All communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondents.]

It is particularly requested that all drawings and all communications respecting illustrations or literary matter should be addressed to the EDITOR of the BUILDING NEWS, 332, Strand, W.C., and not to members of the staff by name. Delay is not unfrequently otherwise caused. All drawings and other communications are sent at contributors' risks, and the Editor will not undertake to pay for, or be liable for, unsought contributions.

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ADVERTISEMENT CHARGES.

The charge for Competition and Contract Advertisements, Public Companies, and all official advertisements is 1s. per line of eight words, the first line counting as two, the minimum charge being 5s. for four lines.

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Front-page Advertisements 2s. per line, and Paragraph Advertisements 1s. per line. No Front-page or Paragraph Advertisement inserted for less than 5s.

Advertisements for the current week must reach the office not later than 3 p.m. on Thursday. Front-page Advertisements and alterations in serial advertisements must reach the office by Tuesday morning to secure insertion.

SITUATIONS.

The charge for advertisements for "Situations Vacant" or "Situations Wanted" is ONE SHILLING FOR TWENTY-FOUR WORDS, and Sixpence for every eight words after. All Situation Advertisements must be prepaid.

NOTICE.

Bound copies of Vol. LXIX. are now ready, and should be ordered early (price Twelve Shillings each), as only a limited number are done up. A few bound volumes of Vols. XXXIX., XL., XLI., XLVI., XLIX., LI., LIII., LIV., LVIII., LIX., LX., LXI., LXII., LXIII., LXIV., LXV., LXVI., LXVII., LXVIII. may still be had, price Twelve Shillings; all the other bound volumes are out of print. Most of the back numbers of former volumes are, however, to be had singly. Subscribers requiring any back numbers to complete volume just ended should order at once, as many of them soon run out of print.

CONCRETE.—We know very little about the "Institute of Architects and Surveyors," the prospectus of which you include, and which states that "nearly 300 architects had joined on May 18." We do not know a single name among those which appear as the officers, council, or directors, and we do not think a third professional society is wanted, or that it is wise to combine architects and surveyors in such. The Institute and the Society of Architects amply represent architects, and the Surveyors' Institution is so thoroughly well established, and does its work so well, that there is not a shadow of need for another institution of the sort.

RECEIVED.—D. E. Farlow.—Welshman.—F. H. and Co.—J. E. W.—B. L. (Warwick).—G. S. N. Co.

"BUILDING NEWS" DESIGNING CLUB.

K. K. IN A SHIELD. (Our criticisms on your design are absolutely correct. Your front elevation faces S.W., and your main entrance, being at the rear, is necessarily placed towards the N.E.; and, moreover, being located within the angle formed by the lavatory block and the ladies' room, the porch would receive the full force of the cold winds from that quarter. Had the entry been in the position now occupied by the drying-room, the plan would have been improved.)

Correspondence.

DISTRICT COUNCIL OFFICES, ILFORD.

To the Editor of the BUILDING NEWS.

SIR,—It may be of interest to your readers who took part in above-named open competition to know that although our scheme was awarded the first premium by the assessor, Mr. G. T. Hine, out of the 52 designs submitted, and we were informed that our plans would be carried out, we have recently received an intimation, after a lapse of nearly four years, to the effect that "the council having decided to make great alterations in the size, &c., of the public offices, they do not consider our designs meet their views."

We understand that the firm whose design was awarded the second premium, one member of which is a resident at Ilford, have been commissioned to carry out the work.—We are, &c.,

CLARK AND HUTCHINSON.

28, John-street, Bedford-row, W.C., July 14.

RE FAWCETT v. HOMAN AND RODGERS.

SIR,—We having taken exception to Messrs. Homan and Rodgers' advertisement in your journal of last week, and in consequence of many architects being in doubt as to how matters really stand between us, it has been agreed between Messrs. Homan and Rodgers and ourselves that we shall write you to the effect that we have arranged to grant them a free license (on terms) to construct floors with the brick of triangular section as used by them for some years, the later side-flanged hollow brick or lintel advertised in 1895, on which we commenced action, to be permanently withdrawn.

The license has become necessary, in consequence of the judges holding that the main idea of the patentee was a light, strong, self-supporting concrete floor, constructed without the usual wood centring, the concrete bearing directly on the bottom flanges of the joists, and that the functions of the tubular lintel (or hollow brick) are to protect the joist flange, reduce the dead weight, and act as centring until the concrete sets, and that the form of the brick or lintel is immaterial if it attains this end, the idea being entirely novel. This being so, all lintels or bricks having the same functions come under the patent.—We are, &c.,

MARK FAWCETT AND CO.

50, Queen Anne's-gate, Westminster, S.W.

July 13.

THE WOULDHAM CEMENT COMPANY.

SIR,—The attention of our clients, the Wouldham Cement Company, has been called to an advertisement issued on p. 18 of your journal of Friday last, in which it is stated that the Wouldham Cement Company "have now retired," and which announcement naturally conveys the impression to the public that our clients have retired from business. We beg to state that this is not the case, as they still continue to carry on business as cement manufacturers, as the "Wouldham Cement Company," at West Thurrock, Grays, Essex, as they have so done for many years past, and they have no intention to discontinue either the title or the business.—We are, &c.,

MILLER, SMITH, AND BELL.

3, Salters' Hall-court, London, July 16.

[Advertisers should be more careful in their statements.—Ed. "B.N."]

Intercommunication.

QUESTIONS.

[11525].—Stopping for Shakes.—What is a reliable and unnoticeable stopping for shakes in wrought roof timbers which are to be sized and varnished?—TIMBER.

[11526].—Frescoes.—Can any of your readers inform me how frescoes should be freed from whitewash or plaster?—A.R.I.B.A.

[11527].—Rome.—I shall be obliged to any of your readers who have been to Rome, Corinth, and Athens, if they could give me the best and cheapest way to go about it, what it will cost, and the best time of the year to go?—STUDENT R.I.B.A.

[11528].—Triforium.—I should like to know whether it has been absolutely determined what the triforium space in our old churches was used for? What was the reason for its existence?—W. E. V. C.

[11529].—Saw-tooth Roof.—I am wanting to arrange a saw-tooth roof for a textile manufacturing shed, and shall be pleased to hear through any of your correspondents, how they have overcome the difficulty of carrying the shafting, when reducing the number of pillars, by introducing rolled steel girders. A sketch of roof principal (17ft. 6in. span) with scantlings figured would also be interesting.—WARD NILL.

CHIPS.

Alterations are being made to Oxford House Club, Bethnal Green, embracing the ventilation, which is now being carried out on the Boyle system.

A memorial window, placed in the Chapter-house of Lichfield Cathedral, by his widow, in memory of the Rev. J. Finch Smith, M.A., F.S.A., has been unveiled. The glass is by Mr. C. E. Kempe, and, like the other windows in the Chapter-house, it commemorates historical facts in connection with the cathedral. On one side is a figure of Archbishop Higbert, or Hygeberht, ninth in succession to St. Chad, who who had metropolitan authority over all the sees of the original diocese of Mercia—viz., Worcester, Leicester, Lincoln, and Hereford, together with Elmham and Dunwich in East Anglia. His successor, Adulph, voluntarily resigned the metropolitan dignity of the see at the council of Cloveshoo, October 12, A.D. 803. The scene is represented in the lower part of the window.

Legal.

COUNTRY BUILDING OWNERS.

IF the local authority refuse to approve plans without legal grounds, the only thing to be done is to apply to the High Court for a writ of *mandamus* to compel them to give such approval. The motion, of course, raises the whole question as to whether or not the approval was rightly or wrongly refused, and so it decides the rights of the parties. The latest instance of this arose in an application of that kind made against the Tynemouth District Council (*Times*, 20th June). There the building owner had sent in his plans of the proposed houses and streets he intended erecting, with lines of intended drainage, depth and inclination of drains, &c. But these were naturally drawn up on the presumption that the district council would provide the necessary sewer and outfall and other works to meet and receive his drains. The district council refused to approve his plans unless he would agree with them for the construction at his expense of the needful sewers and works to complete the drainage. In other words, they declined to pass his plans unless he built the sewers as well as the separate drains of his houses.

Upon the application for a *mandamus* the Lord Chief Justice and Mr. Justice Wills went very fully into the points raised, and ended by granting the writ. They held that the council had no right to refuse to approve plans to which they otherwise had no objection simply because the building owner had not provided for the making of sewers and outfalls at his own expense. They decided that this duty was upon the council itself, and they could not shift it, as they had tried to do, on to the building owner. It was said with some weight, that the council ought not to be compelled to make sewers for a few houses built in a country place, which might never grow any larger. But, on the other hand, the local authority could obtain an order constituting the area proposed to be built upon a special drainage area, in which case the whole costs of its drainage would fall upon that area. They could also compel the building owner to pay the expenses of sewerage, paving, &c., the new streets when they came to be taken over. Meanwhile, until sewers were built, cesspools could be used, and at all events the absence of sewers was no ground for refusing the approval of proper plans to a building owner.

FRED. WETHERFIELD, Solicitor.

1, Gresham Buildings, Guildhall, E.C.

NOTE.—All questions for reply in this column must be headed "BUILDING NEWS," and must reach my offices, as above, by Tuesday morning to insure answer same week.

A. L. J.—WATER.—RATES.—(1) It depends upon the clauses in the private Act of the water company or authority. Baths are often charged for extra. (2) Yes; a contractor's yard could be assessed to the rates, as there would, of course, be some beneficial occupation by the tenant or owner.

The Wesleyan Methodists of Consett have opened the final instalment of their building scheme, which has involved an outlay of between £10,000 and £11,000. The date of the inception of the undertaking to build a new church, school, lecture hall, and caretaker's house was October, 1889. A central site adjoining the new town hall was acquired, and the church was opened in 1893. The memorial stones of the new school, lecture-hall, &c., were laid last September. The architects were Messrs. Armstrong and Knowles, of Newcastle, the contractors being Messrs. E. and J. R. Taylor, Benfieldside. The school and hall are Gothic in style, to harmonise with the church itself.

The long-delayed rebuilding of Kew Bridge is about to be carried out. The cost has to be defrayed jointly by the Middlesex and the Surrey County Councils. For a long time Surrey held out against the proposal to rebuild the structure, as involving unnecessary expenditure. When the absolute necessity of something being done was admitted by Surrey, a question arose as to whether the new bridge should be of stone or iron, Surrey favouring the latter, as being less expensive. Middlesex was strongly in favour of a stone bridge, and a special report on the relative merits of the two has been prepared by Mr. Wolfe Barry. It is strongly in favour of a stone structure, and the Highways Committee of the Surrey County Council has therefore recommended that body to consent to the erection of a bridge in stone, with three principal and two minor arches. The estimated cost is £100,000.

LEGAL INTELLIGENCE.

T. DREW BEAR AND OTHERS V. THE ST. PANCRAS GUARDIANS AND A. AND C. HARSTON.—At the Old Bankruptcy Court, on Tuesday, Mr. E. Ridley, Q.C., sitting as the Official Referee, commenced the hearing of this important case, which is a claim for £24,226 (or alternatively, for £24,265), by a firm of builders' merchants, suing as trustees of creditors of William Brooks, builder, against the Guardians of the Poor for St. Pancras, and their architects, Messrs. A. and C. Harston, for balance due on a building contract for the completion of St. Pancras Workhouse. Mr. Reginald Bray appeared for the plaintiffs; Mr. English Harrison and Mr. Moyses for the defendant guardians, Mr. McIntyre and Mr. R. W. Turner for the defendant architects. The case for the plaintiffs is that some years ago the St. Pancras Guardians resolved to reconstruct their workhouse premises in King's-road, Pancras-road, and appointed Messrs. Arthur and Christopher Harston, of Leadenhall-street, E.C., as their architects. Quantities were duly taken out on Messrs. Harston's plans by a firm of surveyors, and the original contract for certain sections of the work was undertaken by Messrs. Kirk and Randall, of Woolwich. Disputes arose, and in 1892 Messrs. Kirk and Randall desired to be relieved of further duties under the contract; fresh tenders were invited for the completion of sections 1 and 2, and that of a Mr. William Brooks, of Folkestone, was accepted. His work was to have been completed in 15 months from May, 1892; but delays arose, and in November, 1894, the work was stopped. Messrs. Tom Drew Bear, Perks and Co., 71A, Queen Victoria-street, E.C., who supplied the ironwork, Mr. Henry Tolputt, of Folkestone, who supplied the timber, and Mr. James Brown, of Cannon-street, E.C., and Baintree, who supplied the bricks, now sued as trustees of the creditors of William Brooks for £24,226, or alternatively £24,265 balance alleged to be due to Brooks. The first claim was made up as follows: net cost of executed work £65,479 plus ten per cent. profit £6,547, making £72,026. On this account it was agreed that £47,800 had been received under the architect's certificates, leaving a balance claimed by plaintiffs of £24,226. The alternative claim estimated the net cost of the work executed at £65,479 as before, but reckoned the 10 per cent. profit to be added on a basis of the contract price of £50,861, so that £5,086 (in lieu of £6,547) was claimed to be added to the net outlay, making, with £1,500 claimed for damages, the total of £72,065, and the amount claimable, after allowing for the £47,800 already received under the architects' certificates, £24,265. In addition, plaintiffs claimed 5 per cent. interest from the stoppage of the works at the end of 1894 to the date of hearing. Counsel for plaintiffs continued that their case would be that Brooks was hindered from continuing and completing the contract by the action of the clerk of works to whom the architect intrusted the absolute control of the job, George Poole, who rejected girders and other materials sent on to the works without sufficient cause, and owing to the treatment received from him Brooks had continually changed the foreman, as no one would stay for any length of time. It was alleged that this clerk of works swore at and abused the foreman in charge, but wrote in very mild terms to the builders and architects, while the architects were seldom on the works. Brooks alleged that the rejection of material without sufficient cause occasioned a net loss of £2,526, in addition to £193 18s., the estimated value of materials left by Messrs. Kirk and Randall, and not permitted to be used. The defence was a general denial of the charges against the clerk of works, and it was alleged by defendants that Brooks had not carried out his undertaking to complete the work left unfinished by, and accept the responsibilities of, Messrs. Kirk and Randall. The defendant guardians also relied on a provision in the Public Authorities Protection Act of 1893, and pleaded that they were not responsible for damages, as the matters referred to occurred more than six months before the commencement of the present action. Defendants Harston also pleaded that they received no complaints from Brooks as to the alleged conduct of Poole, the clerk of works. The first witness called was T. L. Fearon, manager to Brooks, who confirmed in great detail the statements of counsel as to the rejection by Poole of girders (supplied by present plaintiffs), glazed bricks, slates, and other materials, for many defects which witness asserted would have caused no material injury to the building either in appearance or constructional strength. The ironwork was rejected on the ground of differences in dimensions; the glazed bricks first supplied were rejected on account of colour not being approved. As to the conduct of Poole, he said that, having started the works himself, one Gosby acted as foreman for a short time, and left owing to illness. He was succeeded by Chapman, who left owing, he said, to his treatment by Poole, and witness again took the management for a while; a man named Brown acted for a time, and then Gosby returned on his recovery, but all refused to stay long. All these

changes of foremen were made in the thirty months the contract was in progress. Witness was cross-examined at great length as to the causes for the rejection of certain ironwork and the glazed bricks, but maintained that the qualities were good. Witness stated some 400 window sashes, which were condemned by the clerk of works, were put back in the storehouse for a few days, and were then primed up, and replaced in the building, where they were now to be seen. (It was not rendered clear for what defect they were condemned.) The Official Referee called for the clerk of works, and Mr. Poole having stood up, the Referee said this was a disgraceful way of carrying on; this was not simply one instance, but there were many. Counsel for defendants observed that, of course, one story was good till another was told. The examination in chief of the witness was not concluded till yesterday (Thursday) afternoon, when the cross-examination was opened by Mr. English Harrison, who sought to show that until after Brooks called together his creditors in April, 1893, witness did not complain of Poole or Messrs. Harston. A committee of creditors then decided to carry on the contract, with witness as manager. The financial difficulties arose because Brooks had expended £20,000 on materials and labour, and only received certificates for £10,000. (The Referee: That is, of course, in accordance with the usual custom of the building trades.) The case is still proceeding.

IN RE LINCOLN'S INN FIELDS TRUSTS AND THE LONDON COUNTY COUNCIL (IMPROVEMENTS) ACT, 1894.—Lord Justices Lindley and Lopes have given judgment in an appeal from a decision of Mr. Justice Kekewich in April last, as to the cost of inquiries in chambers made for the purpose of enabling the trustees of Lincoln's Inn Fields to distribute £12,000, the price paid by the County Council for the gardens under their Improvements Act of 1894. The gardens were inclosed, beautified, and kept in order by the trustees under an Act of 8 Geo. II., which empowered them to raise a rate for the purposes of the Act on the houses fronting the open space not exceeding 2s. 6d. in the pound. The Improvement Act of 1894, among other things, provided for the purchase of the inclosure by the County Council for the purpose of a public garden in consideration of £12,000 and the extinction of the liability to pay the rates imposed by the Act of 8 Geo. II. The Lands Clauses Acts were incorporated in the Act. The purchase had been completed, the £12,000 had been paid to the trustees and paid into Court by them, in accordance with provisions in the Improvement Act, 1894. Under an order of the Court the Chief Clerk made inquiries, and certified how the £12,000 should be divided. Mr. Justice Kekewich directed distribution, and ordered the County Council to pay the costs of the inquiry. The County Council appealed, it being argued on their behalf that the costs were made payable out of the fund distributable. Their Lordships now upheld the order of Mr. Justice Kekewich.

DRAIN OR SEWER.—THE QUEEN V. THE VESTRY OF BETHNAL GREEN.—In the Court of Appeal, on Tuesday, the Master of the Rolls and Lord Justice A. L. Smith heard an appeal from the judgment of a Divisional Court (the Lord Chief Justice and Mr. Justice Wright). The London School Board applied for a *mandamus* against the vestry of Bethnal Green to compel them to repair a certain sewer. The drain or sewer in question was constructed in 1866, and received the drainage of several houses. It did not appear that the previous approval of the Metropolitan Board of Works, or that any order of the vestry had been obtained for its construction. The question was whether it was a "drain" or a "sewer" within the definition of those words in section 250 of the Metropolis Management Act, 1855. If it was a sewer it was repairable by the vestry; if it was a drain it was repairable by the School Board as the owners of the premises. The Divisional Court held that the mere fact that the requisite consent had not been obtained did not prevent the new sewer when it was made from being a sewer repairable by the vestry. The vestry appealed; but the Court dismissed the appeal. The Master of the Rolls said that section 250 of the Metropolis Management Act, 1855, defined a drain and a sewer. Was this contrivance a drain or a sewer? It dealt with the sewage from more than one house. It was said that it was a combined operation made under the order of the vestry, and came therefore within the definition of a drain. By section 250 "sewer" was to include sewers and drains of every description, except drains to which the word "drain," interpreted as therein, applied. Therefore, if this was not a drain, it was a sewer. It was a sewer unless they could say that it was a combined operation for draining a group of houses under the order of the vestry. There was a combined operation dealing with the sewage of more than one house carried out without an order of the vestry, and it was a sewer, and not a drain. The person who laid down this contrivance without an order acted contrary to section 47 of the Metropolis Management Act, 1862. He had done a wrong thing, but he had made a sewer within the definition in section 250 of the Act of 1855. The vestry must

have known of this sewer and of its connection with their principal sewer, and it remained there for 30 years without objection. By section 68 of the Act of 1855 it vested in the vestry. The judgment was therefore right. Lord Justice A. L. Smith concurred. As regards section 69 of the Metropolis Management Act, 1855, in his opinion the proviso in that section applied only to sewers made by the vestry or district board of works, and not to sewers made by a third person.

CHIPS.

The death is announced at Cheltenham of Colonel Robert Home, C.I.E., of the Royal (late Bengal) Engineers, at the age of 61. The late officer was Inspector-General of the Irrigation of India, and Departmental Secretary to the Government of India from 1886 to 1889, when he retired.

A school-church at Wincham, dedicated to St. Andrew, was opened by the Dean of Chester on Wednesday week. The main room is 40ft. by 24ft., and has attached to it a classroom (or chancel), 18ft. by 16ft. The plinth of the building is of red bricks, but the upper portion of the walls of black and white half-timber work, and the open roof is of pitch-pine. Accommodation is provided for 180 children and 200 worshippers. Messrs. Ryland and Sons, of Northwich, were the builders.

In the Chaucery Division, on Saturday, Mr. Justice Chitty made, on the petition of the Haberdashers' Company, an order permitting the transfer of the proceeds of the sales of certain lands at New Cross, taken from time to time by various railway companies and the London School Board for the purposes of their several undertakings. It was explained that the Haberdashers' Company had recently entered into large contracts, involving a sum of about £50,000, for the erection of schools under the direction of the Charity Commissioners, and they therefore require the whole of this money.

The Knaresborough Urban Council have accepted the tender of Mr. Carrick (Durham) of £3,477, for completing the third section of the sewage disposal works, which includes also the laying-out of the land on the Haughs Farm, near to Grimbold Bridge. Mr. George Wilson, the town surveyor, is appointed as clerk of the works, which will be carried out from plans prepared by Mr. Balfour, of Houghton-le-Spring. The cost of the whole scheme is about £8,800, this being about £1,000 in excess of the original estimate, arising chiefly in the price paid for land.

At Tuesday's meeting of the City Commissioners of Sewers a letter was read from the London County Council agreeing to contribute one-half of the net cost of an improvement at the western end of Cheapside, by which a *minimum* width of 75ft. will be provided at the junction of Cheapside with Newgate-street, such contribution not to exceed £77,975. The court resolved to proceed with the improvement forthwith, and to serve notices to acquire the freehold and leasehold interests in the premises required.

The total realised by the six days' sale at Christie's of the late Lord Leighton's pictures and studies and other works of art was just over £32,000.

An effort is being made to raise funds for the preservation of the tower of the ancient church of New Shoreham, Sussex, to be visited on Saturday week by the members of the Society of Architects. The estimated cost of carrying out what is absolutely necessary is about £2,500, of which £1,800 has already been raised.

Mr. E. van Schepdael, assistant borough surveyor of Poole, has been elected borough surveyor and inspector of nuisances to the town council of Lymington, in succession to Mr. O. A. Bridge, resigned. There were 58 candidates for the post.

A design by Mr. Sykes, of Rochdale, has been accepted by the committee who have decided to erect a memorial to the local dialect writers in Rochdale Park. It will consist of an obelisk of granite, capped by a dwarf fluted column, and standing on a panelled die and plinth, which in turn are raised on two broad steps. The estimated cost is £300.

The town council of Torquay have under consideration a scheme prepared by the borough surveyor, Mr. H. A. Garrett, for constructing a marine drive, 1582 yards in length, from the ladies' bathing cove to Meadfoot. The estimated outlay is about £19,000.

The North-Eastern Railway Company have completed the construction at Blyth of new coal staiths at a cost of about £50,000. The informal opening took place on Friday.

The restoration of the tower of Cardingham Church has been commenced. The tower measures 100ft. in height to the pinnacles. It is proposed to place a peal of eight bells, instead of the cracked peal of five now hung therein. Mr. Sedding, of Plymouth, is the architect.

WATER SUPPLY AND SANITARY MATTERS.

BOLTON.—The Bolton Corporation have received the sanction of the Local Government Board to their proposed sewage filtration scheme, estimate to cost £76,000. The scheme has been designed by Messrs. Hinnell and Murphy, C.E., of Manchester, and will be one of the largest sewage land filtration schemes in the country, as it is intended to purify the sewage from the present precipitation works by means of land filtration from the population of the borough of Bolton and the rural district council's area.

GLOUCESTER.—Last week the works for the better supply of the city with water were inaugurated. Madan's-wood, the site of the reservoir, is about eight miles from Gloucester, and the water is conveyed to the city through 14in. cast-iron pipes, and is carried over the Severn by means of a light iron open-work bridge. The service reservoir is 100ft. long by 60ft. broad and 18ft. deep, and has a capacity of 675,000gal. With night and day pumping it is possible to deliver a million and a half gallons in 24 hours. The cost of the scheme was originally put at under £45,000.

MANGOTSFIELD SEWAGE SCHEME.—Mr. F. H. Tulloch, Inspector of the Local Government Board, has recently held an inquiry into the application of the Warmley District Council for sanction to borrow £17,000 for works of sewerage and sewage disposal for Mangotsfield. The engineer for the scheme, Mr. Walter le Maitre, of Staple Hill, gave particulars of the scheme, which combines the latest improvements for the scientific treatment of the sewage by means of precipitation in circular tanks, fitted with Candy's patent sludge-removal apparatus, clarifiers, and filtration through polarite beds.

PONTELAND, NEWCASTLE.—At a meeting of the Castle Ward Rural District Council a scheme of main sewerage and sewage disposal was unanimously approved by the Council, per plans by Mr. D. Balfour, M.Inst.C.E., F.G.S., Newcastle-on-Tyne, and application is to be made to the Local Government Board for sanction to a loan. Owing to the flat nature of the locality, it will be necessary to pump the sewage, which will then be treated by chemical precipitation and coke filtration, in conjunction with land filtration.

STAINED GLASS.

ST. SAVIOUR'S, SOUTHWARK.—A stained-glass window in memory of Philip Massinger—the first of the series of memorial windows to the great dramatic writers of the Elizabethan age which it is proposed to place in the nave of the old Priory Church of St. Saviour, Southwark, as reconstructed from Sir Arthur Blomfield's designs—was unveiled on Saturday afternoon by Sir Walter Besant. The window, which was designed by Mr. C. E. Kempe, is a single lancet, and has for its subject Massinger's tragedy, "The Virgin-Martyr."

CHIPS.

A group of board schools, with cooking-class room and caretaker's house, is about to be built in Netherstrey, Beeston, from plans by Mr. Albert N. Bromley, of Weekday-cross, Nottingham.

Memorial stones of new Wesleyan Sunday-schools, which are being erected at Littlemoor, Pudsey, were laid on Saturday. The schools, which will cost £1,200, are being built at the rear of the present chapel, and consists of a central hall 54ft. by 24ft., and seven small and two large classrooms; while in the basement is a tea-room.

Bolton was *en fête* on Saturday afternoon, on the occasion of the unveiling, by Lord James, of Hereford, of a statue in the park to John T. Fielding, who for over twenty years was secretary of the Bolton Trades Council, and an acknowledged leader in the textile trade of Lancashire.

The Staines Reservoir Bill, and the New River Company Bill, both of which measures passed the Hybrid Committee presided over by Sir J. Pease in the House of Commons (with modifications) a few days ago, passed on Monday the Examiner of Private Bills sitting to consider standing order proofs in the House of Lords.

Bruera Church, Cheshire, has just undergone restoration at the expense of the Duke of Westminster. The work has been carried out by Messrs. Parker Brothers, of Eccleston and Chester, under the superintendence and to the plans of Mr. W. M. Boden, architect, of Cheshire.

To meet the exigencies of a large population created by the establishment of the alkali works of Messrs. Brunner, Mond, and Co., Limited, at Winnington, in the parish of Northwich, a new church is being erected in the centre of the village from the designs of Mr. J. L. Pearson, R.A., of London, the builders being Messrs. Beckett and Co., of Hartford. The cost of the new edifice, exclusive of the tower, will be about £4,800, of which £3,500 has been raised.

Our Office Table.

The report upon the examination of the evening exhibitions in science and technology, made by the Scholarships' Sub-Committee of the L.C.C., is interesting in pointing out what we have so often referred to—namely, the waste of time and labour of some of the candidates in merely mechanical draughtsmanship. The committee complain of time and opportunity wasted in the mere copying of "pictures," the copyists having "obviously no idea of the constructional details of the mechanism they were representing, while in many cases the chief feature of the work was the high and varied colouring." One candidate for machine construction gained only 7 per cent. of the possible marks in the paper on that subject submitted—a sectional drawing of a locomotive on the North London Railway. The drawing had occupied between 200 and 300 hours, and was full of the most minute details, and had it been submitted by a wood-engraver's draughtsman, it would have deserved credit for the accuracy of its technique; but as the work of an engineers' apprentice, it is an example of a serious waste of time. The same observation applies to candidates' drawings in building construction.

The annual exhibition of drawings, needlework, designing in paper and colour, modelling in clay and cardboard, woodwork, cookery, laundrywork, and Kindergarten, executed in the various schools of the School Board for London, will be opened at the Hugh Myddelton School, St. James's-walk, Clerkenwell-green, E.C., to-day (Friday), at noon, by General Moberley, vice-chairman of the board. The exhibition will be open to-morrow, and on Monday, Tuesday, and Wednesday next, from 12 till 9 p.m. Demonstration lessons in cookery, laundrywork, and needlework will be given each day. Admission to the exhibition and demonstration lessons will be entirely free, and the ratepayers of London are invited to avail themselves of this opportunity of seeing specimens of the work being done in their schools.

The Corporation of Cork considered on Friday the position of the city engineer, Mr. M. J. M'Mullen, who had been suspended in consequence of the collapse of the Municipal Buildings. After some preliminary discussion, the secretary read the report of the law and finance committee in reference to the engineering department, which recommended that, in the event of the resignation of his office by the city engineer (M. J. M'Mullen), a pension of £250 a year, subject to the approval of the Lord Lieutenant, be granted to him on the understanding that all claims of his against the corporation, including costs in connection with the recent action at law at the suit of the corporation against Alderman Fitzgerald and him, be cancelled; that a new appointment be made upon the terms and conditions laid down in the report of the special committee *re* office of city engineer and surveyor, dated August 7th, 1880, but amended as to salary and limits of age; that his salary shall commence at £500 per annum, to be increased by £20 a year until such salary shall amount to £600 a year, which shall be its maximum, and that his age at time of appointment shall not be less than 27 nor more than 45 years. The adoption of the recommendations having been moved, an amendment was proposed "that no pension be granted to Mr. M'Mullen, but that his services be dispensed with." The amendment, after lengthened discussion, was rejected by 33 votes to 7, and the recommendations of the committee were then confirmed.

The congress this year at Glasgow of the British Institute of Public Health will be attended by over 700 delegates, representing county and town authorities and medical and kindred institutions. As in former years, the congress will meet in three sections, namely—(1) Chemistry and Engineering; (2) Municipal and Parliamentary; and (3) Preventive Medicine. Lord Balfour of Burleigh, Secretary for Scotland, is hon. president, and Sir James Bell, Lord Provost of Glasgow, is president of the congress. Professor William Ramsay, London, will preside over the chemistry and engineering sections; whilst Councillor Crawford, Glasgow, chairman of the health committee, and Dr. James B. Russell, chief medical officer of health, Glasgow, will conduct the deliberations of the other sections. The meetings will be held at the University of Glas-

gow, and will open on Thursday in next week, the 23rd inst., with a reception by Lord Provost Bell and the magistrates of the city. Lord Provost Bell, in the Bute Hall, will thereafter deliver a brief address as president of the Institute, and Professor Ramsay will follow with his address as one of the sectional presidents. Until Tuesday, 28th inst., when the proceedings close, the sections will be more or less engaged daily in discussing matters and problems pertaining to the public health. As usual, the congress is rendered attractive to visitors by the arrangement of social gatherings and excursions, besides visits of inspection to works and institutions of interest in Glasgow and neighbourhood.

The annual conference of the Sanitary Inspectors' Association, which was founded in 1883 and incorporated in 1891, will be held at Leeds in August. On the afternoon of Thursday, the 20th, there will be a reception at the town hall by the Mayor and Corporation, and the evening engagements include a meeting of the council and a smoking concert. On the following day the public conference will be opened at the town hall. Sir Benjamin Ward Richardson, president of the association, will occupy the chair, and several papers will be read. In the evening a public meeting will be held. Visits to the refuse destructors and to several Leeds works will take place on Saturday, and arrangements are being made for a dinner in the evening. On Sunday, the 23rd, the members will attend service at the parish church, when a special sermon will be preached by the vicar.

The annual meeting of the Society for the Protection of Ancient Buildings was held on Wednesday at Burlington house, Lord Balcarras, M.P., presiding. The annual report, read by the secretary, Mr. Thackeray Turner, mentioned that public interest in ancient buildings had greatly increased of late years. In the opinion of the society a noble field lay before architects in repairing and upholding instead of restoring churches. In the work of restoration, evidence of time, of art, and of human striving was often effaced and replaced by something as blank as the newest church in the newest suburb. If the few remaining unrestored churches were to be left the public must not be satisfied with the vague statements which were often put forth to the effect that the restoration of a building would be carried out on the most conservative lines, and that no objects of interest would be destroyed, but must refuse to contribute if the specification included anything beyond necessary repair. The report stated that the income of the society during last year amounted to only £295, and an additional sum of £59 19s., which was raised by special donations for the purpose of liquidating the deficiency of the previous year. The chairman, in moving the adoption of the report, said the great principle of the society was in effect that where there was a great and beautiful work of art, it should be regarded as a trust, and those to whom it belonged should act as curators. Mr. Hallam Murray, having seconded the chairman's motion, the report and balance-sheet were adopted. Mr. Somers Clarke, F.S.A., then read a paper on the preservation of the Coptic antiquities in Egypt.

A smart piece of work has just been accomplished in the repaving with wood blocks of New-street, Birmingham—an undertaking which was carried out in eleven days, without total stoppage of traffic, by the Improved Wood-Paving Company. The old pavement has been down ten years, and the concrete foundation was found to be in such good condition that it was not renewed. The new blocks are of Swedish yellow deal, are creased, and are each 3in. by 3in. by 5in. The contract for repaving was taken at 4s. per square yard, or £1,400, and was completed on Friday.

The opposition of the Brighton and District Master Builders' Association to the building by-laws made by the Hove Council last November, has been so far successful that the Works and Improvements Committee have come to the conclusion that some of them require modification. They have arrived at this opinion after a conference with the committee of the Builders' Association, and have submitted to the Local Government Board various alterations which they consider would make an improvement. The draft showing to what extent the Local Government Board approve of the modifications will be laid before the council this afternoon in the shape of a special report. If it is agreed to rescind the resolution making the original by-

laws, the council will be asked to agree to revised regulations.

A COMMITTEE of urban district councillors and commercial men has been appointed at Runcorn to consider the best means of fostering and extending the trade of that town. At a preliminary meeting, held on Friday at the town hall, Mr. J. Wilding, the surveyor, submitted a list of twenty available sites in the town for the erection of works, with information in respect to them, and it was resolved that this be kept open for reference in the surveyor's office. The secretary was instructed to reply to advertisements having reference to the purchase of sites, and it was also decided to advertise the facilities the town offered for manufactories of various kinds.

A GREAT many ingenious composite arrangements have been invented for rolled-steel columns. The latest one is given by a correspondent in the *Engineering Record*, and is suggested for tall buildings. For the lightest section, two Z bars are riveted to the web of an I beam, one Z bar on each side, which then forms a cruciform section. By this arrangement a single row of rivets is sufficient. The writer says: "This may be reduced still further, if desired, by substituting a star column composed of four angles. The section may be increased by using heavier I's and Z's by reinforcing the Z bar with angles," which makes a symmetrical cross-section or Maltese cross form. Built beams and Z bars can be used. "Quite a range of sizes can be made with only one row of rivets. It affords an excellent place for stowing pipes and wires, and the flanges being narrow, it can be placed at the junction of two partitions, thus occupying very little space. It affords ready means of attachment for beams, &c., and for fireproofing material, and contains no special section"—although its radius of gyration is not quite so great as in other types of columns, but that is seldom a disadvantage when the columns are supported at every floor.

In a paper on "Ocean Waves," by Mr. Theodore Cooper, M.Am.Soc.C.E., some interesting particulars as to waves and tides are given. It is there stated that on the Thames the mean range of the tide at Sheerness is about 13ft., at Deptford about 17ft., at London Bridge about 15ft., and from this point it diminishes gradually to the weir at Richmond, where it is 2ft. At the entrance of Bristol Channel the whole rise of spring tides is about 18ft., at Swansea about 30ft., and at Chepstow about 50ft. Mr. Scott Russell, an authority on waves, distinguished them into "waves of translation" and "waves of oscillation," the first including tidal waves, bores, ordinary ground swell; under the second head he included all other storm waves. These are due to disturbances of the upper layers of water, which diminish rapidly in successive layers below. The former class of waves are the most troublesome to encounter, and to reflect or send back the roller by a perpendicular face of masonry is the most effective plan for the engineer to adopt. Places open to the Atlantic have to encounter these waves of translation.

A service for the inauguration of the new choir stalls at All Saints' Church, Southport, was lately held. The work has been executed in Riga oak by Messrs. Jones and Willis, of Birmingham, Loudon, and Liverpool, in the Decorated style from designs prepared by Mr. Henry Jones, architect, Southport. The stall ends are shaped and filled with elaborate tracery, and the canopies are carved and filled in with tracery, the dividing columns turned with moulded bases and annulets and carved caps. The backs of the seats and fronts of the desks are framed with open tracery, with cusped heads having carved tops, harmonising with the backs of the stalls.

The Lord Mayor and Sheriffs went in state on Wednesday to the church of St. Mary the Virgin, Aldermanbury, for the purpose of unveiling a monument erected on its south side to John Heminge and Henry Condell, friends and fellow-players of Shakespeare, who brought out in 1623 the first collective edition of his works "according to the true original copies." The monument now raised to their memory has been set up in Aldermanbury, where Heminge and Condell lived for many years, brought up families, and, with their wives, were buried. The monument itself is of polished Aberdeen red granite, with a bronze bust of Shakespeare—modelled after the Stratford bust and the Dreshout portrait—at the top. In the centre is an open book in light grey granite, representing the title page and a portion of the preface of the first folio. On the pedestal are tablets bearing inscriptions commemorative of the work of which the monument is a recognition.

MEETINGS FOR THE ENSUING WEEK.

SATURDAY (to-morrow).—Northern Architectural Association. Excursion to Bishop Auckland. Train from Central Station, Newcastle, 1.48 p.m.

SATURDAY (July 25th).—Society of Architects. Visit to the churches of Old and New Shoreham. Train from Victoria Station 10.40 a.m. Devon and Exeter Architectural Society (Plymouth, Devonport, and Stonehouse Branch). Excursion to Buckland Abbey, July 25th, leaving Plymouth Station (G.W.R.) 1.50 p.m.

CHIPS.

In the annual report of the Board of Trade on the working of the Bankruptcy Acts, the number of failures during the past year shows a reduction on that of 1894 amounting to about 9 per cent.; the liabilities show a reduction of nearly 15 per cent. The estimated loss to creditors is the lowest since 1890, and shows a reduction of over 23 per cent. as compared with 1893. These figures seem to be the result of the improved condition of business. The building trades show total liabilities of a little over half a million—viz., £531,840.

A statue of the late Dr. J. Collingwood Bruce, which has been erected on Bruce buildings (built on the site of the old Percy-street Academy), Newcastle-on-Tyne, was unveiled on Saturday by Sir Gainsford Bruce, one of Her Majesty's judges, and son of the historian of the Roman Wall. The sculptor of the structure, which represents Dr. Bruce standing with a roll in his right hand, is Mr. Ralph Hedley, of Newcastle.

The town council of Chatham are applying to the Local Government Board for sanction to borrow £20,000 for the erection of a town-hall and municipal buildings, and an additional £4,000 for a free library and museum.

The tender of Messrs. Beckett and Co., of Hartford, for the building of the new Government offices at Warrington, including the County Court and Inland Office, for a sum of £8,235, has been accepted. The vacant land adjoining the Parr Hall and the gymnasium in Palmyra-square has been chosen as the site of the new building.

The foundation-stone of Dryfesdale, Lockerbie, new parish church was laid with Masonic honours on Saturday afternoon. The building in course of construction occupies the site of the former church, and is estimated to cost about £4,600. Sittings will be provided for 870 worshippers. The architect is Mr. F. J. C. Carruthers, of Dumfries and Lockerbie.

In the House of Commons on Tuesday Mr. Chaplin, on behalf of Mr. Balfour, announced that the Bill creating a Water Trust for London and the Metropolitan counties, which has come down from the House of Lords, is not to be further proceeded with this session.

The Duchess of Connaught has consented to lay the foundation-stone of the Aldershot Hospital on Tuesday, July 28, at 4.30.

The monthly memorandum prepared by the Labour Department of the Board of Trade states that in most industries the state of employment continues good. The percentage of unemployed in the trade-unions making returns was at the end of June 3.2 per cent., as against 3.3 per cent. in May and 5.6 per cent. in June of last year. The building trades continue fully employed, the percentage of unemployed in unions making returns being only 1.5 at the end of June, compared with 1.6 in May and 2.5 per cent. in June, 1895. The furnishing trades are still busy, the percentage of unemployed union members at the end of June being 1.4, compared with 1.1 in May and 2.7 in June of last year.

The City and South London Railway Bill was disposed of by a House of Lords Committee on Tuesday. The committee came to the conclusion that the preamble should pass, and that Clause 7, which was inserted in the House of Commons for the protection of the Church of St. Mary Woolnoth, should be deleted. Practically, therefore, the Bill stands in the form in which it was originally introduced into the Commons.

A band-stand in Hanley Park, constructed by Messrs. Walter Macfarlane and Co., of Glasgow, was opened last week.

Sir Albert Rollit, M.P., reopened on Monday the Friendly Societies' Convalescent Home at Dover, which has undergone extensive alterations and additions.

Mr. Justice Stirling granted, on Saturday, a petition presented in the matter of the Manchester, Sheffield, and Lincolnshire Railway, for payment out of court to the Eyre Trustees of £301,000, which the railway company had deposited as part-payment and on account of the purchase-money for the portions of the Eyre Estates at St. John's Wood, which they required for the purposes of their undertaking in connection with their terminus in London.

Trade News.

WAGES MOVEMENTS.

BRADFORD.—The dispute between the master plumbers in Bradford and the workmen regarding the placing of certain shops on the "black list" has been declared at an end by the masters, who proceeded on Monday to fill the places vacant. Some fifty men are affected.

DUBLIN.—A settlement of the building trade dispute seems to be as remote as ever. Some time ago terms agreed upon by the masters were submitted to the carpenters and joiners at an aggregate meeting of the men held in the Mechanics' Institute. The substance of these terms were that for nine months of the year 36s. per week of fifty-four hours was to be paid, and that for the six weeks before and after Christmas the wages were to be regulated at 3½d. per hour for weeks of forty-five hours. The claim of the men is for 36s. per week of fifty-four hours all round, so that the only difference between masters and employes is in reference to the periods before and after Christmas. At the meeting above referred to, the masters' offer was rejected by an overwhelming majority by open voting. The local executive of the Carpenters' and Joiners' Association have since taken a ballot vote from each of the branches into which the association is divided, on the same issue, at which the men decisively rejected the masters' proposals.

The returns of properties sold last week at the Estate Mart realised £102,183—not so satisfactory a result as was expected for the season of the year.

A memorial bust of Dr. Arnold, of Rugby, in Westminster Abbey, was unveiled on Wednesday. The bust, which is the work of Mr. Alfred Gilbert, R.A., has been placed in the south-west angle of the nave, anciently the baptistery, and once the consistory court, and opposite the bust of the great head-master's son, Matthew Arnold.

The new Roman Catholic church of St. Thomas of Canterbury, at Sevenoaks, was opened on Wednesday. It is a memorial to the late Cardinal Manning, and cost £1,500.

The partnership hitherto satisfactory between G. H. Hitchon, J. Laucaster, and T. Pritchard, land agents, valuers, surveyors, architects, and auctioneers, Burnley, Bacup, and Nelson, under the style of Hitchon, Son, and Lancaster, has been dissolved so far as regards J. Lancaster.

The Strand Improvement Bill, which has already passed the House of Commons, came before a select committee of the House of Lords on Wednesday. The measure has for its object the widening of the Strand and the improvement of the approach to the Hotel Cecil in the Strand by the removal of the block of buildings which now occupies a large area immediately in front of the hotel. Their lordships passed the preamble of the Bill.

The Duke of Norfolk unveiled on Wednesday the statue of Cardinal Newman, which, rejected by Oxford, has now been erected in the grounds of Brompton Oratory. The statue is of white marble, the pedestal being of brown Portland stone. Messrs. Bodley and Garner are the architects; the work has been carried out by Messrs. Farmer and Brindley, and the statue was modelled by their artist, M. Chavalliaud. The cardinal is represented standing, in his ecclesiastical robes, with a book in the left hand, and his cardinal's hat in the right.

The Callander and Oban Railway Bill, promoted to extend the line to Ballachulish, was passed on Tuesday by a select committee of the House of Commons.

In the mining village of Pontygwaith, Rhondda Fach, on Monday week, the church of St. Mary Magdalene was consecrated. It has been built at the cost of £3,000, borne by Mrs. Llewelyn, of Baglan Hall, and is First Pointed in style. The three-light window in the east wall is of painted glass, and represents the Magdalene at the Foot of the Cross and St. John. The artist is Mr. Newberry, who has recently executed some windows in the private chapel of the Bishop's palace at Llandaff. Accommodation has been provided for 370 worshippers. The building is of native stone, with Douling stone dressings, the roof being covered with green slates. The pulpit and font are of green Bridgend stone, and the organ was built by Messrs. Harrison and Harrisou, of Durham. The architect is Mr. G. E. Halliday, the diocesan surveyor for Llandaff.

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WHAT THE PUBLIC MIGHT OBTAIN.

(A SEQUEL TO "WHAT THE PUBLIC EXPECT.")

"WHOEVER thinks a perfect work to see, Thinks what ne'er was, nor is, nor e'er can be." So says Pope, who, in his own individual line, came as near perfection as any author known to fame; and in saying so, he is only expressing the opinion of all reasonable men. When the public expect—as they practically do—from every architect more knowledge and thought and invention and observation than any one human being ever possessed, or is likely to possess, they are, as a rule, quite unconscious of doing so. The architect, as we pointed out a fortnight ago, is supposed, amongst other things, to know all about designing a house, a church, a Board school, a set of offices, a factory, a town hall and council-chamber, and fifty other sorts of buildings. But it is not the same individual member of the public who expects him to understand each and all of these sorts. Perhaps the architect has passed his life in arranging ordinary street buildings, shops and warehouses. He knows all their ins and outs—how they should be planned, and what they will cost. Then, however, he is invited to submit a scheme, say, for a country house. The client thinks—the architect thinks likewise—that anybody who has studied construction can manage this easily. We all live in houses, so, of course, we all understand houses. But that does not follow. The architect who was successful enough at his own speciality, finds that in this new one he has much to learn. It is not as simple as it looks; and the owner, who called him in because he was a man of experience, is disappointed. Or, again, the architect may have passed his days in building houses. Like all the rest of the world, he had a beginning. He tried his "prentice hand" on somebody—let us hope on somebody who, but for him, would have fallen into the still worse clutches of the jerry builder. He made his mistakes—as apprentices do. If there was "anything in him," he had his successes also, which helped to compensate both his clients and himself. By degrees he gained facility in his craft: conquered draughts, defeated smoky chimneys, and showed himself more than a match for drains and sewers. In house-building he grew at last to be the right man in the right place; but now comes his temptation. He has the chance, perhaps, of securing a town hall. He works out the plan to the best of his ability, feeling all the while that his 'prentice days have come over again. He devises a showy exterior, having lived long enough to know that committees, like most other people, choose designs for the outside, though, after they are executed, they judge them by the inside. His scheme is approved, and he does his best with it. But in this new department he is only a beginner. He never had occasion to study acoustics, and his hall is as full of echoes as the Peak Cavern. With ventilation he had never been concerned except on a small scale. His inlet ventilators somehow fail to act. The outlet ventilators kindly try to help him out of the difficulty by abandoning their own duties and pouring down cold air without stint. But this well-intended assistance does more harm than good. The hall feels stuffy, and yet the audience cough and sneeze and blame the architect for it. As they leave they get in each other's way, and wonder that he did not foresee how one stream of people, on his plan, was sure to

clash with another stream. All through the work there are such imperfections as these, and it is not strange if a succession of such cases produce a popular impression that no professional men do their business so badly as architects.

The remedy for all this lies with the public themselves. There is no reason in the world why they should offer their buildings, to be thus experimented on by beginners whether young or old. They do it because they have got a fixed idea that one architect is about as good as another, and that every architect ought to understand every class of work. The sooner they get rid of that idea, the better for them and the better for us. No living man can be at his best in all the innumerable and endlessly varied structures which modern civilisation requires. He may be competent to deal with some half-dozen or a dozen classes of them; but it is not even certain that because he may be a master at some highly complex and refined class he will be equally good at a commoner and simpler one. The architect who has produced an admirable church may, or may not, turn out an equally admirable mansion. With practice, no doubt he will do it; but practice, as applied to houses, may be the very thing he lacks. On the other hand, to be a successful house designer, as our ideal middle class reckons success, implies more oftener than not some lack of the qualities which go to make the highest type of architect. We do not refer here to the success of exceptional men like Mr. Norman Shaw or Mr. Ernest George. We are thinking of many estimable and useful persons "Whose duties walk their narrow round, Nor make a pause, nor leave a void"; persons estimable and useful enough while they keep to the things they really understand, but neither useful nor estimable when they launch out and try to go beyond them.

"But why," it may be asked, "should any architect attempt what he does not understand? Why cannot he keep to his own speciality, so gaining credit to himself and giving satisfaction to his clients?" There are several reasons. The young architect seldom has a speciality. He does not yet know what chances he may get, or what kind of work will come to him. This, at least in the early part of his career, will depend very much on who his friends are; and next to this, on what sort of building it is at which he first makes some modest success. Not knowing this beforehand, he naturally tries to qualify himself all round. He cannot do it: no one can do it; but commissions, to a young man, are so rare that he cannot afford to let any escape him. He is less to blame than older and more prosperous men, who could afford this, but who rarely allow it. The specialist usually belongs to London or the large towns, and people who know him as such consult him for his own class of work, in whatever part of the country it may arise. But this does not suit the local architect. He, naturally, is not a specialist. His own town or district is seldom large enough to give him continuous practice in any class of works except the simplest. He has built a number of moderate-sized houses. He is constantly employed on alterations and repairs. He makes surveys of dilapidations, and sees that covenants to paint and the like are punctually fulfilled. There is a constant demand for those who can do these things, and will do them carefully. In a sense, they are architects, and they are known as such to the public. But when the public goes on to assume that everyone of them who, by courtesy, is called an architect, must therefore be qualified to design the new town-hall, or church, or hospital, or school of art, or what not, which is going to be built in his locality, the public is only preparing a rod for its own back. It really ought to know better. There are as many kinds of so-called

architects as there are of so-called engineers. The public are too wise to call in a "sanitary engineer" when they want a railway, or an "electrical engineer," when they require a steam-engine. It is time they gave up inviting house or shop architects to design their churches and chapels, or factory architects to arrange their town-halls and colleges.

The sum of the whole matter, then, is this: The things that architects are required to know and to do have become so numerous—through the complexity of modern society—that no one man can possibly know or do more than a fraction of them. The architectural profession, which never, perhaps, since the world began, contained a greater number of able men than it does at this moment, is, as a whole, quite equal to knowing and doing all these things. Just so; any of our great Universities is quite equal, as a whole, to teaching all the things which make up the highest form of education. But nobody in his senses expects each graduate of the University to know them all, or each professor to teach them all. The world does not call a professor of physics incompetent because he may be far from clear about the meaning of a passage in Lycophron. It does not despise a mathematical examiner because he has not read Weissman's latest dissertation, and because any physiologist could prove him an ignoramus on questions about protoplasm and cell-division. So it is all round. However eminent each authority may be, he is not called upon, like the unhappy architect, to take all knowledge for his province. Everywhere save in building matters the public are wiser than this. Some day they will be wiser even here, and will no longer fancy that whatever some one architect can do, every architect ought to be able to do equally well, whenever they like to ask him. When they want their work really well done they will call in—as they do in all other professions—a specialist to do it, and they will find—what they do not find elsewhere—that the specialist's fees are no higher than those of the man who knows a little of everything.

Here, however, there does arise a difficulty. It is the same difficulty that the public finds when it deals with lawyers or doctors. Who are the specialists for each department, and how are the public to hear of them? We know how they are supposed to hear of them in medical cases. They ask the general practitioner, and he advises them whom to consult. Does he always do it willingly, and is he never tempted to recommend that specialist who differs least from himself? We do not know the secrets of another profession, and we cannot say. But we can say that for the "local man," the general practitioner in architecture, to recommend a specialist is very rare—an almost unheard-of thing. The public must learn about him in other ways than this. In reality, it finds much difficulty in learning about him. Here and there a specialist has done so much work in his own particular province that his name becomes known even to "the man in the street." Everybody, for example, who took the slightest interest in ecclesiastical matters 30 years ago, had heard of Scott, as a specialist in churches. Elsewhere, an important public appointment connected with some special branch of design, sets a man high enough for the world to remember him as a master of that branch. The late architect to the London School Board must in this way be pretty generally noted as a master in board-school arrangement. To have been engaged on a building of great popular resort, too, will imprint a man's qualifications on the memory of the masses. Owen Jones, for example, decorated the columns and girders of the first Exhibition building, and it was to him, thenceforth, that people looked for advice and help whenever architectural colouring was in question. But for every specialist who gains fame in

ways like this, a dozen, perhaps not at all inferior to him, are hardly heard of beyond the limits of their own profession. The public needs them, but it does not know them. If it could only get hold of them they are ready, each in his own line, to do its work with thoroughness and success. The secret of all the complaints we hear—as far as they are fair and just—is that people do not put the right architect in the right place; and the reason generally is, that they do not know how to find him.

It is not always the best-known specialists whom it is wisest for a client to call in. Unless he has a large and important commission to offer, they may only be able to give it the dregs and leavings of their attention. He will be a lucky man if he meets—as it is quite possible that he may meet—one who is equally well qualified and is less pressed by business. Amongst architects, emphatically “the race is not to the swift, nor the battle to the strong, nor riches to men of understanding.” Some architects are run after because they were born “in society”; some because they have diligently elbowed their way thither; some because they have the art of making things look well on paper, and only on paper; and some, again, because they have stuck to their party, whether religious or political, through thick and thin. But a man is not the better architect for any of these things. Most likely he is a worse one, for they take up the time and attention which he needs to bestow upon his buildings. They may help to bring in work, but they certainly do not help to turn out work. So it comes to pass that the true architect is commonly but little heard of. He is not advertising himself or making influential friends; in other words, he is not taking the course which is pursued by the “successful man.” Neither does he emulate the “surveyor-of-all-work.” It is not all fish that comes to his net. He studies his own specialty and keeps to his own line, or, at least, to lines which lie in close proximity to it. He is less concerned to know something about everything than everything about something. It is his services which the public might obtain, if they took the trouble to find him out; and when they obtain them they get the best which human skill and diligence can do for them at the present stage of the world's history.

PRECEDENT OR PERSONALITY.

A GREAT preacher has spoken of the tendency among some men to assume the rôle of apostles before they have learned to be disciples, a declaration which is very true of those of small attainments who profess to teach and instruct others, and to assume a brief authority before they have taught themselves. We see hundreds of such people in all vocations of life, the founders of small cliques and sects who presume to assert their own individuality in opposition to the collective wisdom of the age. They lay down dogmas with all the authority of a great church, or with equal presumption they declare all that has been acquired in the past is out of date, and therefore ought to be repudiated. The typical modern “inventor” of a new material or apparatus, or the self-assertive exponent of a new “style,” is so extremely conscious of his own importance, that he cannot or will not hear of any other idea. Did he but examine the records of the past, all his conceit would vanish; but this is just what he will not do, and the self-assumed inventor is generally the man most determined to shut himself up in an environment of his own self-satisfaction. He is extremely bigoted also, for he will not hear of the law of evolution of art or anything else, for this acknowledgment will considerably lessen his share in anything he does. Has the egotist in art ever seriously considered the origin of

his own calling? Does he know that a great authority on this matter, Herbert Spencer, has shown that the professions of architecture, law, medicine, and engineering, have all developed from the clerical profession—that the clergy in ancient times practised all these vocations? The most superficial reader knows that the clergy were the medical men at not a very remote period, and even practised medicine in country places a century or less ago; that the Egyptian priests were the earliest engineers, and that the old ecclesiastics and monastic orders were the architects of the great cathedrals and monasteries of the Middle Ages. With these facts as to the growth of our leading professions, it scarcely seems possible that any educated person can imagine he can initiate a new movement without any reference to the past, or that a new theory of design can be started from modern data, ignoring all that has been done before. But so it is. There are men who will not study, who, resting entirely on their own limited ability and practice, set all precedent and tradition at defiance till they find out by sad experience that they have been forestalled; that the best thought of their art is, after all, poor and imperfect when compared with that of old work, and what they had cherished was a new or original idea turns out to be a repetition of something quite old. These men start at a decided disadvantage to themselves, for not knowing what has been done so well as their neighbour, they take a much longer time to accomplish it, or stumble over little difficulties which have been solved or overcome. Let us just imagine, for instance, two architects, one who has ignored all types and precedents, and the other who has made himself familiar with them, setting to work to design, say, a theatre or a hospital; the first, in his own self-consciousness, will arrive at a solution of the plan after considerable labour, without having realised the actual requirements of the building; the other will, by taking a shorter route, adopting accepted points, arrive at the solution in much less time, confining his attention only to special circumstances and details. The man without a precedent has been “beating about the bush,” and, after all, has only approximated to a good arrangement, while his friend has adopted all that skill and experience have formulated. The independent designer, in his self-imposed way, is worthy of all credit for his design in proportion only to its fulfilment of the conditions; but if, to avoid study, he adopts a crude idea of his own brain, he commits a wrong on his client and his profession. We cannot doubt the wiser course. The man who has a clear history at his back is more competent, because he does not trip up; and we affirm, indeed, that the ablest of the independent school are indebted to traditional teaching, though they, perhaps, do not know it, or refuse to believe it. They really work and design unconscious, perhaps, of the existence of their own training. Can anyone, indeed, forget the influence of tradition in moulding his thoughts—that inherited power of unconsciously using types or ideas which he brings into requisition every time he draws a plan or sketches an elevation?

How far ought tradition and precedent to control the architect is a question that has been often asked and discussed. The man of independent mind who thinks everything he does right, and is a “law unto himself,” is apt, as we have seen, to be opinionated and selfish; he thinks and works on the principle of “individualism” to an extent calculated to destroy all unity of aim, and to set up a little coterie or manner of his own, which is inimical to true art. There was nothing like this in the old historic art periods we praise so much. Every craftsman and artist thought and worked for himself according to his lights, but never in opposition to the rules

of his guild or fraternity. He ever had before him those traditions and principles of his art which were handed down from father to son, and from master to pupil; he never wilfully set himself to invent a new style, or to turn his back on rules and principles of universal obligation, and in this natural attitude towards the past he is very unlike the modern schismatic who delights in his own opinions and in setting at defiance the accepted doctrines of art. Restraint and discipline are irksome to many; and it is so easy not to have to consult authorities, or consider questions of propriety, and to act on one's own impulses. The lazy man finds it easier to do so. But has the individual ever accomplished much in architecture in opposition to the current of art tradition? The history of architecture has not been the history of individual action. William of Sens, William of Wykeham, Abbot Suger, Wren, Inigo Jones, Chambers, Pugin, Barry, Scott were master minds. Each may have contributed something, strengthened or retarded the current; but their influence was more in the direction of imparting individual impetus to the stream which had already set in, than of arresting its course or altering its character. The continuity of English architecture was only broken once, and that was in the 15th century, from many national and social causes. Since then, indeed, we have had a succession of revivals; but even these can hardly be said to have been started by individuals. Pugin, perhaps, did more for the Gothic Revival than any other man; yet it would be absurd to say he was its instigator or pioneer, or had more to do with it than a score of others, including Walpole, Walter Scott, and the authors of romantic literature. The individual influence may have been felt, but only where he became a passive instrument in handing on the tradition. Our leaders of art of to-day are indebted to the past, so far at least as purely art functions consist; they have been steadfast in holding to historical associations. Sentiment is a quality in art which cannot be uprooted: where an endeavour has been made to do so, a revulsion has soon followed, as when pagan traditions for a time supplanted national art in our churches and dwellings. We need refer only to monumental design, when urns, inverted torches, laurel wreaths, and other heathen emblems came to be used in place of the older Christian symbols for monuments in our churches and cemeteries; but were soon supplanted by the latter. The Gothic Revival was a noted example of this revulsion of feeling, which no personal predilection has been able to overcome.

A “healthful scepticism” has been a kind of tonic in architecture, for there are many lazy people who find it easier to take things as they are, to borrow and imitate, than to observe and deduce. To these sort of followers precedent is a snare, as they help to produce the very evil they deplore—namely, that kind of destructive anarchism which seeks to do away with all authority. To take a few examples of what we mean. There is a tendency amongst architects to follow precedent when the circumstances are altogether changed, as when, to take a well-known case, a building intended mainly for preaching is made to resemble a traditional Basilican church, originally built for processions, with arcades and chancel and a ritual—well adapted for a modern Anglican church, but unmeaning where a large area within sight and sound is required. Here adherence to precedent is clearly mistaken. For a like reason a tower without a belfry, a mullioned or traceried window in a dark street, a pointed arch under a flat ceiling, a turret when there is no distinct use made of it within, cupolas which have no meaning in the plan, and a host of other forms derived from constructive uses are meaningless features. In each case a wrong prece-

dent has been followed; a little research would show that for each of these purposes a more suitable type can be found. It is not always a good excuse to say: "I will discard precedent altogether, and try to be original." We have had heaps of original designs for these things, often atrociously absurd or whimsical, which offend one's common sense of fitness the farther they depart from recognised forms and principles. The architect is wise to make perfectly sure that there is no suitable precedent open to him before he condemns all, and if he carefully follows this rule he will be spared many a pang of ill-placed confidence in his own powers. Even the engineer, whose work is more completely independent of the past, has learned in the sadness of his experience that he might have done better if he had learned a little of the historical achievements of his art. Quite as disappointed and vexed is the architect who finds he has made some mistake in a detail; or the carver or sculptor, if without justifiable authority he introduces a wrong presentment of a saint or a "seated angel" on a hammer-beam without a precedent. These are things enough to make one blush for a want of legendary traditions. They may appear small and trifling matters, but it is safer to follow them than to introduce arrangements which have no authority. A discriminative regard for precedent is further the only way to insure that unity in our designs which we are in danger of losing altogether in the conflict of modern ideas. A distinction of vital importance is that between unity and uniformity. The bad and servile copyist only attains the latter while he loses the former quality. These observations may help us to answer the question we have put: How far ought tradition and precedent to control our work? They may be summed up in the admonition to select the most suitable precedent for our purpose, or to avoid those which have been the result of different conditions to our own. Observing this principle, we shall be saved the painful reproach often levelled at architects, that they lack originality in their pertinacity for precedent.

IS TECHNICAL INSTRUCTION A FAILURE?

OUR technical schools are doing much to specialise branches of engineering and architecture; but the question that is now exercising the minds of those interested in these pursuits is, What the result will be of these educational processes in the future? Will they turn out better handicraftsmen than did the old system of apprenticeship to the trades? This question will much depend on the direction given to the studies of the pupils, and to their natural aptitude for particular branches. It is a common error to imagine that if a lad enters one of these schools he can, by going through a certain course of instruction in classes and workshops, be turned out a skilled tradesman in any branch. The evidence of those who are able to estimate the educational facilities given at these schools has shown that too much has been expected; that while many young men are trained in mathematics and physical science, in electrical engineering and laboratory work, they come out with but a very general and, in many instances, useless knowledge of their trade. They have undergone a general and useful drill in many things they ought to know, but are unable to compete in everyday building or engineering work with those who have been privately trained in the workshop. The report of the committee appointed to inquire into the state of apprenticeship in the London building trades, published last year by the Technical Education Board, left little doubt as to some of the causes which have operated to diminish the number of apprentices; also as

to the defects of the instruction given in technical schools and classes. The classes give the pupil an exercise in some handicraft like carpentry or plumbing, but it lacks the reality of the shop or the building. A set of questions are given on timber or framing, an example to scale is proposed for a sash window or framed door—a useful exercise in drawing, but without any practical reality. These exercises turn out textbook experts, who have been crammed, and mechanical draughtsmen, neither of whom would be able to make a set of working drawings for a given building.

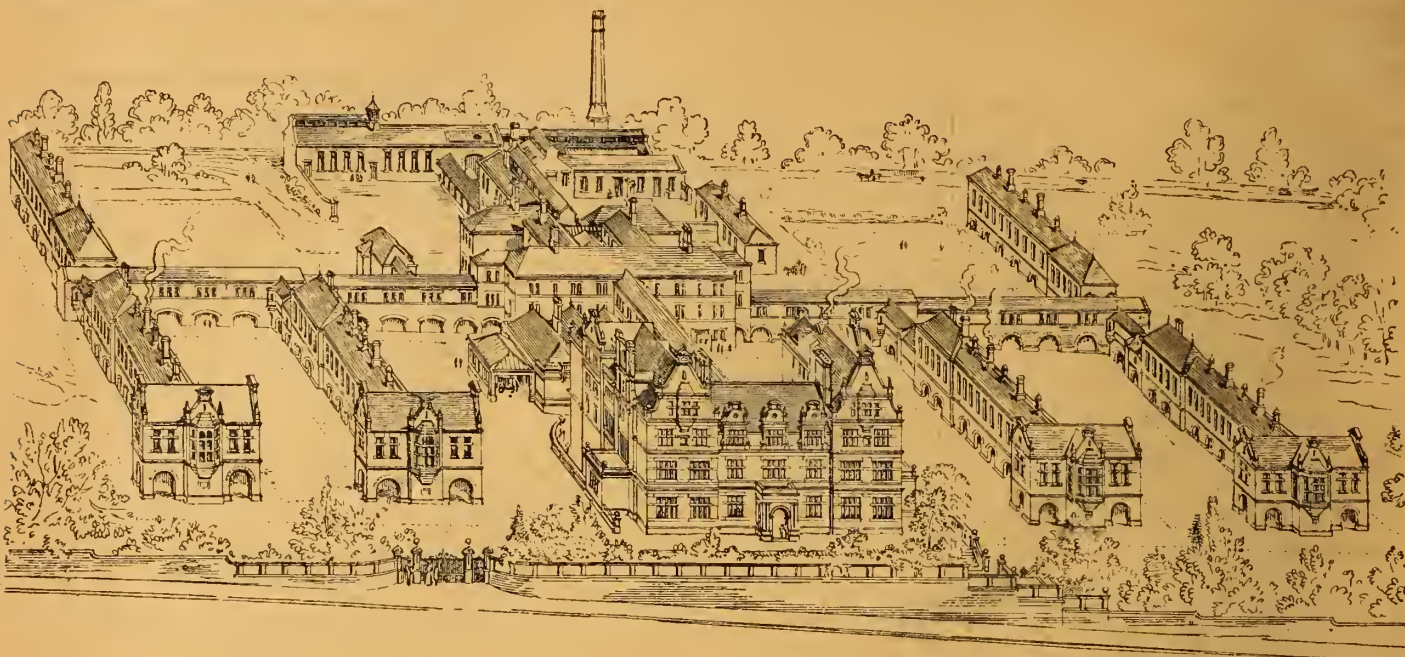
Do we get efficient masons and bricklayers from the classes held in London? The City and Guilds of London Institute is doing a splendid work of a preparatory kind in instructing youths in subjects which cannot be imparted in the shops, such as plane and practical geometry, drawing or building construction, the properties of materials and their use, the setting and cutting of brick and stone, jointing and joggling arches, and other theoretical matters; but when it comes to practical masonry and brick-setting, we find that masonry is taught by bricklayers, and the materials supplied in the workshop are bricks. Although masons are supposed to be taught, they are practically excluded. In other trades we hear of similar drawbacks; the instructors are not generally practical workmen in the same sense as a builder's foreman. Often they have been trained exclusively in the technical schools, or have passed the exams. of the Science and Art Department, the Carpenters' Company, or other colleges. However well-arranged and equipped the workshops are, they fail to impart the practical qualities which the foreman's shop or the actual building supplies. The specimens executed in the schools have no connection with the building; they are not pieces of work carried out from the architect's drawings, and under his and the foreman's supervision, but detached studies and problems, often from a set of questions that have been given before.

If we turn to the evening exhibitions in science and technology of the Technical Education Board, the report of which has just been issued, we shall see how varied and comprehensive are the subjects given in papers set at the examination, and how valuable they are as educational facilities. The papers include questions on arithmetic, English, drawing, and the special subjects comprise botany, building construction, chemistry (inorganic), electricity and magnetism, machine construction, pure mathematics, mechanical engineering, mechanics, physics, physiology, plumbing, and steam. For young apprentices and others engaged in the building and mechanical trades, nothing could be more usefully arranged than this list, each candidate can select the special subject which concerns himself or the particular trade in which he is engaged. We cannot find fault with such a question in building construction as the following:—"Draw inch scale plan and sections of a framed wooden skylight in a tiled roof over a room; give dimensioned sketches of the details, showing what precautions you would take to render it perfectly water-tight; daylight size, 2ft. 6in. by 3ft. 6in." The problem set is one continually arising in buildings, and the requirements reasonable; but the problem to be solved is rather different from that which the architect has, when he makes a working drawing of such a skylight from his design. He has the whole building before him, the position of the skylight in relation to the other parts of the building, the access of light, the angle of the roof, and other data. But the candidate has to ignore everything except a skylight, which may be put anywhere, and he has not even the slope of roof given. Another question is to draw to an eighth-inch scale "the elevation of a chimney

breast for a building having a kitchen in the basement and three good rooms above," to indicate the course of each flue, &c. A useful exercise in drawing; but there are data which the student must imagine for himself—the sort of building—the positions of doors on each floor. The exercise hardly brings the faculties into operation which the practical draughtsman calls out when he draws a section of a four-storied house having a number of practical points to consider, such as height and construction of roof, the "sailing" over to meet the exigencies of elevation, and so on. Construction can only be properly taught as a part of an organic whole, and for this reason it is preferable to set the pupil to prepare drawings for whole buildings, or details for portions already designed. There are, of course, questions of an abstract kind, like the design for a wood floor for a public room to carry a certain load, or a design for a girder of a given span to carry a certain weight, which are useful exercises. The examiners point out the mischievous tendency of much of this school work; examples of time and opportunity wasted on the mere copying of "pictures." Many of the drawings presented in building construction and mechanism fail to convey any idea of the subject, but are specimens of shading and colouring. Carefully finished drawings and minute details are seen in these exhibitions of candidates' work which have taken days and weeks to execute. We have seen ourselves designs for cathedrals and town halls executed with the most remarkable technical minuteness, but without the slightest idea of good construction or design. Engineers' apprentices waste precious time in hatching and shading in colour or ink of engines and machines, but which are mere copies; and who has not seen drawings of horizontal engines of old types, full of elaborate drawing and shading, or models, and on which months of labour have been wasted? The same report remarks: "The most conspicuous feature of the examination is the want of power of the great majority of the industrial candidates to deal with the simplest applications of arithmetic to their own trades. Candidates who obtained very high marks in building construction, in machine construction, and in some cases in geometry appeared to be absolutely powerless to carry out comparatively simple arithmetical calculations." The Technical teacher is consequently compelled to devote the greater part of the first session to arithmetic, which ought to have been learnt in the elementary schools. But the complaint is that the rules are learned as "rules," and not mastered as principles—a remark which applies in a general sense to the trades taught in the technical schools. In the Board School Exhibition at the Hugh Myddelton School that is now open, we find a large proportion of the exhibits are of a very creditable kind, great accuracy and finish are exhibited in the designs, the woodwork, and metalwork, though there is a want of proportion between the mental effort and the manual labour, and a great deal of wasted labour.

THE HALIFAX NEW INFIRMARY.

TO-MORROW (Saturday) the Duke and Duchess of York will open this important new building. The old infirmary, which the new one replaces, was opened in 1838, and it had long been found inadequate for the town and district. In 1889 it was agreed, at a public meeting, that the existing infirmary was quite out of date for present and prospective requirements; that it would be unwise to spend a large amount of money on the old site; that a more extensive site be secured, and that a new infirmary be built on the most approved modern principles. Before the close of the meeting, subscriptions to the amount of £16,550 were promised. An offer of the present site, upwards of thirteen acres in extent, having been obtained, its purchase was in due course completed. The committee pre-



HALIFAX NEW INFIRMARY.—(Messrs. WORTHINGTON and ELGOOD, Architects.)

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pured detailed instructions, as a guide to architects in the preparation of plans for the new buildings. In these instructions the committee embodied the principles laid down by the subscribers as to the general character of the buildings; they also required that the general scheme should be so arranged as to permit of future extension by the addition of ward pavilions.

A limited number of architects were invited to submit designs, and Mr. Alfred Waterhouse, R.A., acted as assessor. The committee accepted those of Messrs. Worthington and Elgood of Manchester, who were accordingly appointed the architects, and their work has been carried out as shown by the accompanying illustration, for which we are indebted to Messrs. Stott Bros., lithographers, Halifax.

The foundation stone was laid in June, 1893, with Masonic ritual, by the Earl of Mount-Edgcombe. The total cost of the contracts executed, and of the work yet to be done (exclusive of the site and of the boundary wall and lodge, which are left over for the present), is estimated at £72,625, leaving a deficiency of about £20,000 to be provided for.

The design of the buildings is of a Free Renaissance character, the parts towards the main frontage being treated as the most marked architectural features. All the buildings are constructed of local stone from the quarries of Southowram, Hipperholme, and Ringby. The outer walls are "cavity" walls, and have damp-courses throughout, and the whole of the buildings, except two floors of the front block, are fireproof. The main frontage is to Free School-lane, having the front administration block in the centre, which is three stories in height except at the wings, which are four-storied. This block is flanked by ward pavilions on both sides, which are detached from each other according to accepted sanitary principles. The chief feature in the general arrangement of the various buildings is that the wards are only one story high, and that they are, together with all administrative offices, dining-rooms, kitchens, &c., upon one floor. The necessity for raising patients by lifts to different floors is thus entirely obviated. The ward floors do not rest on an inclosed basement, but are well raised from the ground, by means of arches, so as to give an air space between the floors and the ground, and a free circulation of air round every part.

A central line drawn north and south from Free School-lane to the back of the site would pass through all the administrative parts of the hospital. Such a line would intersect the front entrance and the front administration block, and would then follow the course of a main corridor leading past the surgical block to a central hall. From this branches right and left a long corridor leading to all the wards. Continuing from south to north, the line would pass through the kitchen

block and along a covered way leading to that containing the washhouse, laundry, boiler-house, engine and dynamo-house, &c. The various departments, though connected with each other by corridors, are otherwise distinct, and have circulation of air on every side. The front block, facing Free School-lane, contains upon the ground floor waiting and secretary's rooms, matron's office, and sitting-room, house surgeon's rooms, and board-room, with separate lavatories, &c., in the wings. The complete scheme provides for a nurses' home on the east side, facing Heath-road; but as the building of this home is deferred, the nurses are for the present accommodated in the upper floors of the front administration block, in rooms which are both pleasant and commodious and effectually separated from the hospital proper. The nurses' approach to the wards is by a first-floor corridor, from which a staircase descends to the central hall.

The surgical block is a one-storied building, at the entrance to which is a large glass-covered area to shelter carriages, ambulances, &c. This block contains porters' rooms, accident receiving-room, examination-rooms, dispensary, &c., and a large hall, which for the present will be used for out-patients. It is proposed, when the whole scheme of the hospital is completed, that an out-patients' department shall be built on the north-west portion of the grounds, at the point nearest to the town, with access direct from the new Clover Hill-road. It is expected that this will shortly be carried forward into the town.

The central hall, which is at the junction of the two main corridors, is two stories in height with a gallery on the first floor. Round it are grouped a number of rooms for the general service of the hospital—comprising assistant matron's office, linen-store, sewing-room, and library, also the dining-room for the matron and house surgeons, and spacious dining-halls for the nurses and servants respectively—all these being provided with pantries. Adjoining the north side of the central hall is an airy and well-lighted service-room communicating with a large and lofty kitchen, adjoining which are a scullery, a pantry, and two store-rooms. Close to the central hall are stairs and a large lift, communicating with the first floor (on which are placed the servants' bedrooms, box-rooms, lavatories, &c.), and with the basement, which, owing to the levels, forms a ground story on the lower side. Here are receiving-rooms for stores with goods entrance. The coals are unloaded direct into the coal-store from the outside, and taken up to the centre of the building for distribution by a lift provided for this special purpose.

The wash-house and laundry are situated at the rear of site, and are separated from the kitchen by a large grass-covered drying ground, which will serve as a supplement to the drying arrangements in the laundry. The drying-chamber

itself is placed between the washhouse and the laundry proper, and is roomy and well lighted. It is heated by coils of steam-pipes laid under gratings placed in the floors, air being admitted from the outside, and the supply being easily regulated by means of valves. The moist air is extracted through a flue connecting with the long chimney, this flue being also regulated by means of easily-worked valves. In this block of buildings are placed two steel steam boilers 30ft. by 8ft. In a detached building is placed a disinfecter.

The administrative parts of the infirmary, as above described, are intended to serve for double the number of patients which is being provided for at present.

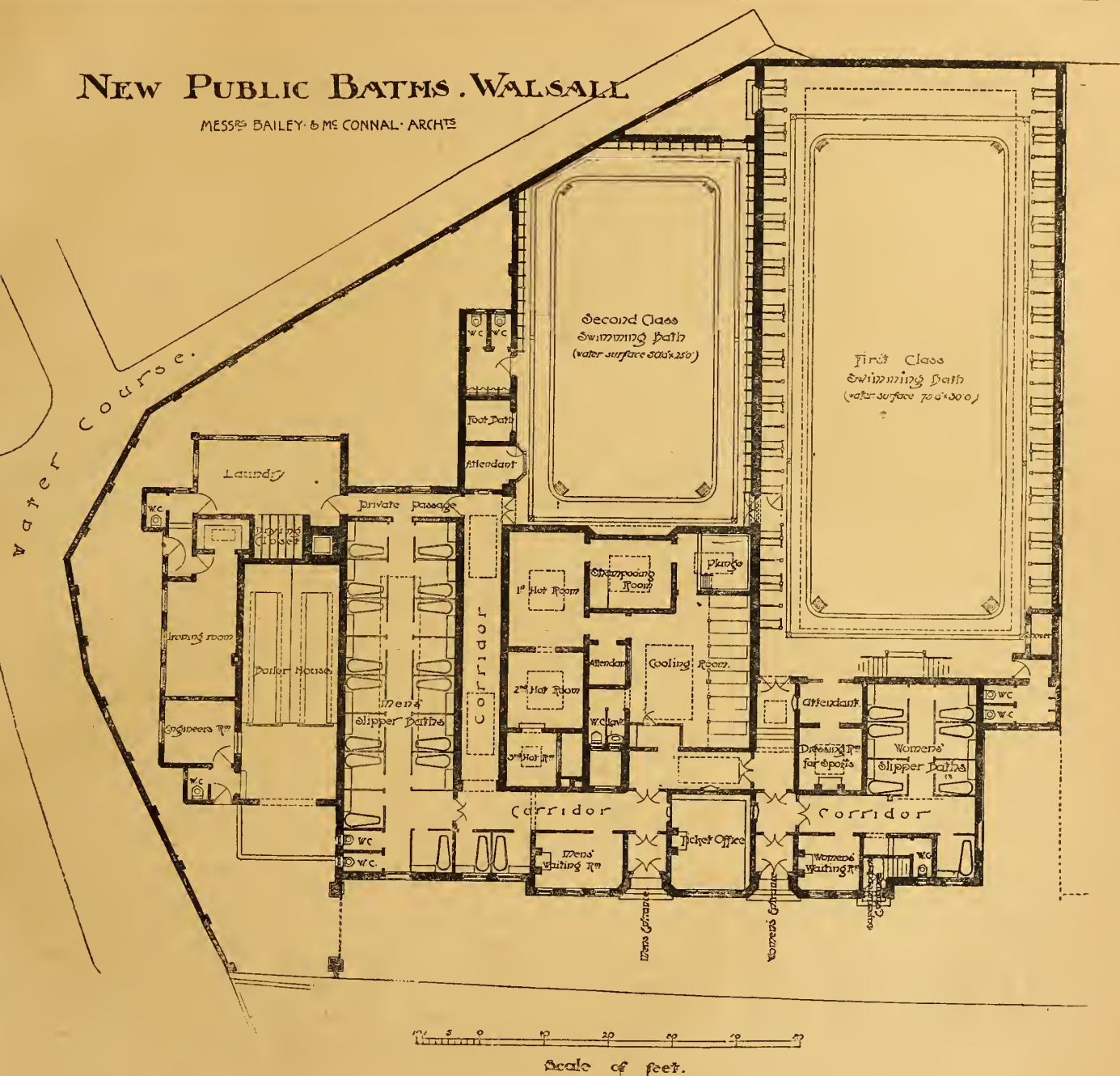
The present ward pavilions are six in number—viz., three for men, two for women, and one for children—and will contain 150 beds. Each pavilion is detached, and raised from the surface of the ground, so that it has a clear air-space all round, and has a cross ventilating passage from side to side, at each end of the ward. On one side of the entrance passage connecting each of the ward pavilions with the main corridor is a small ward for special cases, a patients' clothes-room and housemaids' closet. On the other side is a nurses' duty-room with pantry, and store-rooms for ward linen, splints, &c. The large wards are all alike, and (except the children's ward) contain 20 beds each. They are 88ft. long, 28ft. wide, and 17ft. high to the centre of the coved ceiling. Four of them have oak floors, the floors of the other two being laid with Terrazzo mosaic. All these floors are based on concrete, carried by iron girders. The walls are of Keene's cement, painted with four coats of Gay's enamel paint. All recesses are avoided, and all angles rounded, so as to prevent lodgment of dust and impurities of any kind. Each of the large wards is heated by two double fireplaces and, when needed, by steam heaters, which serve also as inlets for fresh air. At the further end of each ward are lavatories, bath-room, nurses' scullery, &c., and in each of the four wards, which face south, is a cheerful day-room, having an oriel window overlooking Free School-lane.

The operating theatre is entered from the main corridor, and in the approach to it are ante-rooms for patients about to undergo operations and for their reception afterwards. The theatre has a good north light, and a floor of white Terrazzo.

The mortuary is a simple building, well arranged for its purpose, the interior being lined with cream-coloured glazed bricks. Attached are a post-mortem room and a pathological room.

The whole of the buildings and grounds are lighted by electricity, there being an installation on the premises consisting of a 52H.P. combined steam-engine and dynamo and 60 storage cells. The installation is to some extent duplicated by a 10H.P. gas-engine and a small dynamo for use in case of accident to the steam-engine.

NEW PUBLIC BATHS, WALSALL

MESSRS. BAILEY & M^S CONNALL, ARCHTS

0 10 20 30 40 50
Scale of feet.

PUBLIC BATHS, WALSALL.

THESE baths are situated near the bottom end of Lichfield-street, within a stone's throw of the centre of the town, and stand a little back from the thoroughfare, thus having an intervening piece of land, which will probably be disposed of. This fact, coupled with the limited amount of money allotted by the Corporation for their erection, has prevented any display of architectural interest in the exterior. The approach from the street is along an asphalted carriage-way, which will be neatly bordered with grass, and shrubs, and flowers. The buildings include first and second-class swimming-baths, slipper-baths, and Turkish baths, with a residence for the superintendent, ticket-office, boiler-house, wash-house, and all other necessary appurtenances. The first-class swimming-bath is in a hall 96ft. 6in. long, by 46ft. wide, the bath itself being 75ft. by 30ft., with a water depth ranging from 4ft. to 6ft. 6in., and there are 48 boxes for bathers, and a commodious two-tier gallery for spectators all round the hall. The second-class swimming-bath is contained in a hall 60ft. 6in. by 37ft., the water surface being 50ft. by 25ft., and the depth varying from 3ft. 6in. to 5ft. 9in. The other arrangements are much the same as in the case of the first-class bath, except that there is no gallery. The slipper-baths number seven for women, and eighteen for men, and the Turkish department, which is expected to be a great attraction, is very complete. The building was put up by Mr. R. Merton Hughes (Birming-

ham), from designs by Messrs. Bailey and McConnal, architects, of Walsall.

THE COMPETITION FOR THE PALAIS DES CHAMPS ELYSEES.

THE competition amongst French architects for the two new Palaces of Fine Arts, proposed to be erected in the Champs Elysées, is the most important amongst French competitions of recent years. The designs sent in are at present on exhibition in the galleries of the Palais de l'Industrie, and attract large crowds of Parisians interested in the adornment of their fine city. The decision of the jury will probably be made in a few days, and the premiated designs once more exhibited to the public. This competition differs from the important one recently made for the scheme of the *ensemble* of buildings for the Exposition of 1900, in the fact that, whilst a large proportion of the buildings proposed for the Exposition were to be temporary constructions, these two palaces are destined as lasting monuments, affording the best possible idea of the talent of the French architects of the end of the 19th century.

The programme of this competition was distributed towards the end of April last, and a little over ten weeks were allowed for the preparation of the important sets of drawings necessary to illustrate plans and designs, an incredibly short limit of time when the resulting work is considered. Competitors were required

to send in plans and designs for a large and a small palace to be constructed in the Champs Elysées in place of the Palais de l'Industrie to be demolished.

The larger palace would be destined to contain during the time of the Exposition of 1900 the contemporary and centenary exhibitions of works of art, as well as exhibits special to the teaching of art. The minimum surface to be disposed of would be 48,000 square yards, both on the ground floor and the upper story. After the year 1900 this palace would be used for agricultural and other shows, various exhibitions and fêtes, and chiefly for the annual Salons. The smaller palace would, during the Exposition, contain the retrospective exhibition of French art, which would occupy, on the ground and first floors, a minimum surface of 8,500 square yards. After the Exposition, this palace would be employed as a museum of works of art, and would contain galleries for temporary exhibitions, examinations, and competitions. The programme included a block-plan of the form and position of the two buildings to be placed one on either side of the fine new avenue to be made facing the Hôtel des Invalides on the opposite side of the Seine. The competitors were to furnish block-plans of the two palaces drawn to a small scale, plans of each floor, two sections, the side and back façades, all to a scale of $\frac{1}{4}$ in. to the foot, and the principal façade to $\frac{1}{2}$ in. scale, together with a report explaining the scheme and an estimate of the cost per square or cubic metre. Liberty was left to

the competitors either to sign their designs or to use merely a distinguishing mark.

Five premiums amounting to £1,800 will be awarded for the larger palace, the first premium being £600, and five premiums amounting to £600 for the smaller palace, the first being £200; the premiated designs becoming the property of the administration, with the right to draw from them any ideas which might be thought suitable. The maximum cost of the larger palace would be £640,000, and of the smaller £160,000. The jury would be composed of the Ministers of Commerce and Fine Arts, the various presidents of art societies, eighteen members appointed by the Minister of Commerce and the Paris Municipal Council, and eleven architects elected by competitors. This programme was distributed to nearly 300 intending competitors, the greater proportion of whom, however, gave up the idea of competing at the commencement or during the preparation of their schemes, when the necessary heavy expense or the difficulties of the competition were realised, for only 59 sets of plans and designs have been presented. These various sets, each composed of seven or eight large stretchers, or a total of 456 artistically drawn and coloured drawings, occupy the wall-space of seventeen of the large rooms of the Palais de l'Industrie. About a dozen of the schemes are either incomplete or lack interesting qualities; all of the remainder contain points of interest in plan or design, and from amongst these ten or twelve may at once be placed in the first rank for their very evident and remarkable qualities of both plan and design. The smaller building appears to have offered less attraction to the competitors, requiring quite as much effort of imagination and almost as much work of drawing as its larger neighbour, the premiums also being smaller. The important and difficult problem to be solved for the larger building was the manner of lighting the picture galleries, which require a large wall surface and top lighting, necessitating blind walls presenting much difficulty for their proper decoration in façade. A certain unavoidable skew in the plan of the building, necessitated by the position of the new avenue to be placed in the axis of the Invalides, offered also a certain difficulty, and afforded an opportunity for skilful planning and designing, with a view to hiding this defect in the best possible manner.

The plans and designs for the larger palace, sent in by M. Jacques Hermant, are amongst the best, and will probably carry off a large proportion of the votes. The principal façade is placed on the proposed avenue, and is simply, but harmoniously, composed. The central feature consists of an imposing entrance arch, 80ft. across, flanked on both sides by a blind colonnade or loggia, the wall surface of which is brilliantly decorated with marble, mosaic, and painting work, the whole dominated by three immense domes lighting the central nave or sculpture hall. The domes are constructed of iron covered with copper, heightened with bronze and gilded lead ornaments. They would be very effective in execution, and give a touch of modernism to the *ensemble*. The plan appears to be excellent as regards arrangement. The sculpture hall, with two stories of galleries for sculpture and painting, occupies the whole length of the façade; the monumental staircase, concert hall, restaurant, and the museum of decorative arts are at the back, and face the principal entrance. The architect has skilfully arranged the top lighting of the picture galleries on the first floor by means of the roof covering the sculpture hall, which is itself lighted by the three domes, and two terminal half domes at either end. The picture galleries open widely on the central hall, and would thus be well ventilated and cool, a great improvement on the existing close rooms devoted to paintings. From these galleries a full view of the sculpture gardens and the decorated domes would be obtained.

The design of M. Albert Thomas, architect of the present Palais de l'Industrie, appears to have every chance of carrying off one of the first premiums. The style of the façade is somewhat severe, and follows Classic traditions; the severity is, however, lessened by the fine coloured fresco covering the wall surface of the colonnade, and the ingenious decorative effect of the angle pavilions. The elliptical dome forming the central feature would be very effective, but would require long and careful study before execution.

M. Esquié has designs for both the larger and the smaller palace. The great originality for which this architect is noted, and which was especially to be remarked in his design sent in to

the recent competition for the Opéra Comique, is here manifest, making the design very attractive and much in favour with the public. The principal feature of the façade is the monumental arched entrance surmounted by a low dome, flanked by a blind colonnade; the square extremities of the building permit the arrangement of an interesting façade on the avenue of the Champs Elysées, which has been rather neglected by most of the competitors, to the advantage of the principal front on the new avenue. The smaller palace by the same architect is less interesting; it appears too monumental, and its dome is too important.

M. Gustave Rives, architect of the well-known Magasins Dufayel, or Dome Clignancourt, employs as a central feature a dome somewhat similar to that which dominates the Dufayel building. A special feature of the plan is the arrangement of rotunda disengaging the central entrance reserved for visitors on foot, and allowing carriage-ways to the interior of the building. M. Rives is evidently of opinion that the new palace should present a type of a modern style of architecture; but the courage of his opinions as here displayed will surely bring down the wrath of the Classicists on his design. The style is gay, bright, and Parisian in character, employing a large quantity of new materials for construction and decoration, possibly a rather too profuse use of iron, aluminium, bronze, mosaic, and ceramic work to suit a building which should present a somewhat severe and monumental grandeur. Still, the design of M. Rives is very interesting as a type of modernism brought about by the use of modern materials; but it is much to be feared that his ideas will not be favourably received. M. Girault, the architect who carried off the first premium in the recent competition for the scheme of *ensemble* of the buildings of the Exposition of 1900, has an interesting façade, as usual very cleverly drawn and coloured, with three wide entrances, each surmounted by a decorated dome. The design is well composed, and the plan has been carefully studied. This architect will probably obtain one of the premiums for the larger palace. The smaller palace is interesting as regards its plan—a wide vestibule of elliptical form gives access to the large sculpture galleries on either side. The rooms destined for painting exhibits are grouped around a central semicircular covered garden, surrounded by a portico. The building is composed of a ground floor only, an arrangement which is sure to be successful in the eyes of the jury.

MM. Deglane and Binet have an effective façade dominated by a lofty dome surmounting the central pavilion, flanked by two smaller pavilions.

The façade of M. Mewès is delicately artistic, and should obtain a certain success. The portico with seven entrances to the building is, however, a somewhat doubtful arrangement in a practical point of view.

The designs of MM. Gaudet, Cassien-Bernard, Blavette, Raulin, and Ulmann come in the first rank with the above, and will probably obtain a large number of votes; amongst the designs for the smaller palace, that of M. de Baudot is very interesting for its style, freely accentuating an originality in construction, and for its polygonal plan of star-shaped form.

The decision of the jury has been made known since the above was written, and the award of the first premium for the larger palace has come as a great surprise to all. The winner of the first premium of £600 is M. Albert Louvet, of the second, £480, MM. Deglane and Binet, M. Albert Thomas carries off the third of £320, M. Girault the fourth, and M. Troppey-Bailly the fifth. The discussion made by the jury over the various plans and façades was long and animated, and it was only after a number of rounds of voting that the final decision was made, the opinion being that no single scheme was worthy of execution in its integral state. The arrangement of plan was the principal consideration of the jury, the question of beauty of façade being made quite a secondary matter; the scheme of M. Louvet, although presenting a rather insignificant façade, possesses in plan a wide gallery perpendicular to the large hall parallel to the façade, affording a long vista on entering the building, which seems to have pleased the jury and decided its vote of the first premium to this design. When, however, the proposition of M. Bourvard, the chief director of the coming Exposition, is considered, the decision is perhaps not unreason-

able. The premiated schemes become the property of the administration, to whom belongs the right to adopt any portion or portions of these designs which may be thought interesting or practical. The jury, therefore, in choosing one scheme which appeared to combine several excellent arrangements in plan, although much less interesting as regards façade, and four other designs which, in its opinion, presented the best and most agreeable façades, was merely serving the end in view—namely, the ultimate arrangement by the director of the Exposition of a scheme which would combine the various interesting points culled from the five premiated schemes, and the formation of a building as perfect as possible, for the execution of which the premiated architects would be invited to compete. It would be invidious to repeat the various opinions and stories which are going the round of the Parisian ateliers concerning the decision of the jury; but, in any case, it is the opinion of all that the director of the work of the Exposition, M. Bourvard, is probably doing what he judges as best, and is just the man needed to carry the whole scheme to a successful end.

For the smaller palace, the first premium of £200 is awarded to M. Charles Girault, one of the laureates of the larger palace; the second to MM. Cassien-Bernard and Cousin; the third to MM. Toudoire and Pradelle; MM. Mewès and Deperthes carrying off the fourth and fifth premiums respectively. The premiated designs for both palaces will be illustrated in the BUILDING NEWS shortly.

BRENT TOR.

EVERYONE who has travelled by South-Western Railway from London even unto Plymouth, when skirting the north-west wilds of Dartmoor, has probably seen a sharply-marked rock-topped hill, a thousand feet or more high, on the summit of which a tiny church stands sharply out in outline. This is Brent Tor, and before the picture of it a recent visit has photographed upon my brain fades perceptibly, the following notes may prove interesting.

Brent Tor, or Brentor—the first word from the Saxon *brennan*, to burn; hence burnt Tor—as its name suggests, is of distinctly volcanic origin. It is, indeed, a defunct volcano, for although the evidences are not nearly so clear as they were when I drove, last summer, through the very core of an extinct volcano on the lovely road between Jelde and Las Palmas, in the Canary Isles, yet everything points the same way. An ancient writer refers to the spot as “a high, rocky place, on the top whereof stands a church full bleak and weather-beaten—all alone, as it were, forsaken—whose churchyard doth hardly afford depth of earth to bury the dead.” An eminent geologist (Sir Henry de la Beche) considered the green stone and solid trapezoid rocks constituted the lava, the composition of the Tor being mainly purple-bedded ash, together with scoriaceous and compact trap of a greenish-grey colour. As one ascends and nears the top, much of the stone is porous, resembling a cinder—a variety of tephra probably. Unlike any of the neighbouring tors, the mound does not contain a single particle of granite. The soil, strata, &c., are uncommonly similar to the hills which go to form the offspring of Mount Etna.

The ascent is very precipitous; there is no proper path, and the surprise is how the priest and his people contrive to get to and from church in winter time. As for funerals—for dead bodies have been buried in the wee graveyard at top from time immemorial—the difficulty must be even greater. The worst place, however, I ever saw in this respect is up in the Geiranger Fjord in Norway, where the rocks on either side the stream are thousands of feet high. On these steep cliffs, perched in apparently inaccessible positions, are ever and again houses. When a death occurs in any of these the coffins have to be let down the almost perpendicular cliffs by ropes.

Brent Tor is not particularly high, being, as remarked, little over 1,000ft. above the level of the sea, which is some 20 miles away. This gives it the same mean altitude as Buxton in Derbyshire, which, I believe, stands higher than any town in England.

By the way, to digress for a moment, everybody may not be aware that the keyhole of the north door of the Lady Chapel (“my Lady Chapel,” Lord Grimthorpe used to call it) at St. Alban’s Abbey is exactly on a level with the top



of the cross that crowns the dome of St. Paul's Cathedral.

Brent Tor is by no means the highest peak on Dartmoor. Yes Tor, which tops them all, is rather more than double its height. The church, however, with the exception of that at Princetown, holds the loftiest position of any church in Devonshire. Further, it lays claim to be the smallest. In plan it is a simple parallelogram measuring 38ft. 2in. by 15ft. 3in. (inside measurement), whilst its western tower on the outside measures 12ft. 5in. by 11ft. 3in. This tower is 32ft. 6in. high—i.e., it rises 20ft. above the parapet of general fabric. At Culbone, in North Devon, on the border-line of Somerset, there is a very tiny church, which enjoys local claims to be the smallest in the county—yea, in all England. It is so romantically situated in a deepcombe that in winter time the sun never rises high enough to shine over the hills on to the actual building. The smallest church in Northamptonshire is St. Michael's at Farndish. I recollect when in 1863 we were restoring St. Mary's, Higham Ferrers, not far away, under the late Mr. William Slater, architect, I lodged with one of the late Lord Fitzwilliam's postboys. He illustrated the size of Farndish Church very quaintly one day, somewhat in these words: "You see, we had a good old time, and the beer was dealt out to us post-boys in buckets. Well, afterwards, I started to walk home to Higham, and it came on a bit foggy. Howsoever, I kept well on, when presently I stumbled over something, and nearly fell. I looked down to see what it was that had almost brought me a cropper, and, blow me, if it wasn't Farndish Church!"

Brent Tor Church has a very old foundation. Bishop Bartholomew (A.D. 1161-84), "the luminary of the English Church," confirmed to the Abbey of Tavistock, amongst other churches, this one of "St. Michaelis de Rupe," and in Bishop Quivil's Register (A.D. 1280-91), the same thing is mentioned. Later on, the dedication of a new church occurs in Bishop Stapleton's Register (A.D. 1307-26) under date of A.D. 1319:—"Quarto die mensis Decembris, Dominus dedicavit, Ecclesiam de Brente Torre"—i.e., "the fourth day in the month of December, the church of Brent Tor was dedicated to our Lord." There is a reference to the edifice also in Bishop Stafford's Register (A.D. 1395-1419).

Brent Tor Church stands a useful landmark to wanderers in the almost trackless wastes of Western Dartmoor. Of its origin, in a position of such lonely altitude, traditions somewhat vary. It is generally accepted, however, that the founder of this little sanctuary was in danger of shipwreck when returning to England after a long and eventful foreign voyage, and vowed that, if spared to reach the shore, he would build a church on the first point of land he beheld. Another version is that in the days of King Henry I. a shipwrecked mariner, drifting in an open boat, made the same vow. As the tide carried him into Plymouth Sound he espied the high land we are interested in. Although so far from the English Channel, in some conditions of the atmosphere, it is a fact that Brent Tor stands out, and is seen clearly from the seaboard, when the lower and nearer coast is scarcely visible. Further, in fine weather, the sea can be distinctly seen from Brent Tor.

Now, to digress again a minute. We referred to Plymouth Sound just now. Facing it is the Hoe, a grand public resort reminding one, both in position and aspect, of Dufferin Terrace, Quebec, the noblest promenade I know anywhere. On the Hoe, at Plymouth, military bands play regularly, and there it is, too, of all places in the world, that delighted listeners can "both hear the music and see the Sound!"

But to return to the building of Brent Tor Church. It is recorded that, as the work proceeded, his Satanic Majesty got uncomfortably obtrusive, and hindered the artificers so wearisomely, that, at last, losing all patience, St. Michael came to their rescue, and hurled after the fast retreating Devil an immense mass of greenstone. As this story is also related in

connection with the building of the chapel of St. Michael, on St. Michael's Mount, near Penzance (originally erected A.D. 1044 by Edward the Confessor), in early days the rock-shying process does not seem to have been uncommon! Indeed, it is not confined to England. I remember once being upon the rugged island of Torghatton, situated on the west coast of Norway, just about on the line of the Arctic Circle. Here one Finnish god (or devil—I don't recollect which!) threw a small mountain at a rival, and the missile went right through the higher part of the island itself, of which fact proof positive exists; for a big hole was pierced through, and is seen to this day.

As is not unfrequently the case in similar situations, the top of Brent Tor is distinctly damp, and it is stated that the very coffins in the vaults sometimes float. My late and revered friend, the Venerable Archdeacon Denison of East Brent, when he had just acquired the living he he loved so long and so well (over 50 years ago), found his parishioners practically without decent drinking water. He was the actual and very practical means of getting them an inexhaustible supply from the top of Brent Knoll—a high hill over and above the village. East Brent is in Somersetshire; another village, called South Brent, in Devonshire, is on the southern border of Dartmoor.

The church, as already mentioned, stands upon the summit of the Tor. Whether it always did so is a bit of a query. In Britton and Brayley's "Beauties of England" are illustrations of Brent Tor, showing a portion of the rock as of greater altitude than the building. One might suppose this to be a fiction on the part of the artist (S. Prout), only the letterpress says the church is "near the top." It is possible that some of the higher stones have been quarried away at some time; but this is not probable.

The church (Norman, Early English, and Perpendicular) was restored six years ago at the expense of the Duke of Bedford, I believe from the designs of Messrs. Hine and Odgers, Plymouth. The oak roof is entirely new, which is to be regretted, as the old one was of a remarkable kind. The principals—33 of them—of which the accompanying section was drawn by my friend the late Mr. Edward Ashworth, architect, of this city, in 1851, were each and all made out of one stick of crooked oak. So every principal represented one tree.

I counted, during my recent visit, the principals in the new roof, all of which are cut out of the solid, and found there are now only 26. The tower has a sundial, and contains three bells. Two of these seem very ancient, and on one of them is inscribed, "Gallus vocor ego—solus super omne sono,"—i.e., "A cock I am called—I alone over all sound (crow)." The registers date from 1720.

It may be useful to jot down, for future local reference, the inscriptions in this remarkable little church, situated so lonesomely upon the wildsome moor. The earliest is inscribed upon a slate, on the outside wall of the fabric, just east of the north porch. Beneath the words "Memorari Mors," is carved a grotesque angel. Then comes the following:—"Heare under this stone lyeth the body of Walter Batten of brinsabach, who was buried Aprill the sixth 1677, also Alec his wife was buried the third day of desember, 1681." Here is another:—"Heare under this stone lyeth the bodie of John Cole jun. of Litton, who departed this life the 23rd of November 1694, Æta: 22 Also, Johan, his sister, who was buried the 1st of February 1694 Æta 11.

"If thou be serious (Friend) peruse this stone;
If thou be not soe: pray: let it alone;
Against death's poison, vertue's the best art;
When men seem to die, they but depart.
Live well: then at the last with us thou'lt feele
Bare dying makes not death, but dying ill."

All the other monuments are of comparatively recent date. "Roger Rice, of the parish of Launceston," was buried there in 1831, aged 55, and his wife, Elizabeth, followed him thirteen years later. Two little kinsmen, Willie and

Elizabeth, 14 and 2 years old respectively, were buried in 1834. They were not brother and sister. On the lad's stone are the lines:—

"Dear friends forbear to mourn and weep,
While sweetly in the dust I sleep.
My parents dear I have left behind,
A crown of glory I hope to find."

And on the little one's:—

"Happy infant, early blest,
Rest in peaceful slumber rest,
Early rescued from the cares
Which increase with growing years."

On an altar-tomb to "Joseph Glanville, of this parish, yeoman, who died the 30th day of August, 1856, aged 60 years," are the following lines:—

"Grieve not, dear wife, it is in vain,
Dear child forbear to mourn,
We only part to meet again,
When that your glass is run."

Deep down in the valley betwixt and between Brent Tor and Dartmoor's rugged side winds the restless river Tavy, here a mere brook, whose sparkling, clear waters bound and splash over and around the boulders of Polyphant stone that lie thick in its bed. Polyphant works almost like soapstone, and is of a grey tint. It has been used advantageously in architectural work, and the late Sir Gilbert G. Scott, R.A., introduced it for reredoses, &c., in churches in the west with good effect. St. John the Baptist, Stowford, might be mentioned as an example; the deceased gentleman restored it in 1874.

On the western bank of this lovely river, rolling restlessly as it does over cataracts of big stones, and just a mile apart from each other, are the churches of St. Mary Tavy and St. Peter Tavy. In the latter, now placed against the east wall, is the lower part of the old oak 15th-century rood-screen. On the panels are some well-painted Mediaeval figures, and the carving in the tracery above them is particularly crisp and spirited. In the tower arch is a Jacobean screen of oak, 9ft. 3in. by 6ft. 2in. high, with a central door, and grotesques 6in. high perched upon the N. and S. ends of the cornice. It contains 16 carved panels 2ft. 2in. by 7½in. I am inclined to think it was made for the position where it now stands—and if so, it is the only old western screen I remember meeting with in the county.* In the graveyard around St. Mary Tavy's Church there is the old 15th-century cross of granite, with a base of four steps, and the parish stocks stand handy in the S.W. porch. Recently a well-designed chancel screen has been erected in this charming little church. But when one remembers the exquisite 15th-century carving upon the hardly-treated remains of the old rood-screen at St. Peter Tavy, and then examines the modern screen, one unconsciously wishes the 19th-century artificer who fashioned it had taken inspiration from the work of his predecessor four centuries before.

This church also contains a "made-in-Germany" rood, although it is not apparent why those who require roods go abroad for that which can be made equally well—yea, probably better—at home. A lady from South Kensington told me the other day of a London church which had recently acquired a large rood, fashioned by a sculptor at Bruges. Under what conditions he made it was not mentioned; but, she added, in a confidential tone, "and he's never been able to get a farthing for it!"

But there, even as we chatter by the way and pick our steps daintily through forests of bright foxgloves, and amidst green banks thickly spotted with the tempting red fruit of the wild strawberry, a turn in the path hides the church-capped rock of Brent Tor from view, and the fair market town of Tavistock, venerable in the historic associations of its famous old abbey, looms into sight. Adieu!

Exeter.

HARRY HEMS.

WARMING BUILDINGS BY HOT WATER.—IV.

By FREDK. DYE, Author of "Hood on Warming Buildings," &c.

THE LATEST INFORMATION.

A ONE-PIPE SYSTEM, WITH DUPLICATED AND GRADUATED MAINS.—It is difficult to give this system of apparatus a

* The late Mr. Ashworth—a most careful chronicler—in his paper upon "Dartmoor and its Border Churches," read before the Exeter Diocesan Architectural Society, May 8, 1851, whilst describing this church in detail, makes no mention whatever of a tower screen.

chanical type. For all others it leads to too many mistakes in execution, and too many disputes when the accounts are finally being made up, to form a satisfactory means of getting a design carried out.

An eminent builder, when asked what sort of specification he preferred, is said to have answered, "Details, details, lots of details," and the architect whose aims are high would find little to quarrel with in the answer. The way to get work well done is to settle every point in its form by drawings, and not by descriptions. But when this has been done, there is still something wanting. Qualities of materials, in particular, and prices of goods, have to be put into writing. Provisions of money for special purposes—which, while the contract system lasts, afford an architect almost his only chance of modifying and improving his design as it grows up—have to be inserted by means of written clauses. Many points of workmanship, such as the bond of brick or rubble walling, the lap of slates, the composition of concrete and mortar, the thickness of lead and zinc, and the like, can only be properly provided for in words. A specification of some kind, therefore, is still a necessity; but on the second type it is mainly a specification of materials and workmanship. Everything that can be drawn has been drawn, and what remains is to compose a statement explaining those things only which drawings are unable to make clear. So much, it is always necessary to write. Directions about materials and workmanship are, in fact, the essence of a practical specification. On the second type they constitute nearly the whole of it, because everything else that the builder needs to know has been clearly shown on the general plans and details. On the other type they are equally indispensable, but they are then imbedded in and encumbered with great masses of verbiage meant to make up for the lack of drawings.

Now a very little experience shows that descriptions of materials and workmanship are things which have a tendency to recur. If a series of works go on in the same locality, many such descriptions will inevitably have to be repeated in each successive specification. If they are well drawn up, and if no reason appears for varying them, it is perfectly proper to repeat them in the very same words; and, as a matter of fact, this is commonly done. A previous specification is taken, clauses not wanted are struck out, new clauses are composed and added, and the whole is then copied. But if the previous specification happens to belong to a different sort of building, many clauses which are wanted are likely to be absent. Then they have to be made up from memory, or invented to provide against possibilities—unexperienced as yet, perhaps, by the architect who is at the moment dealing with them—though familiar enough to other members of the profession. All this suggests the idea of putting together more clauses than are likely to be wanted for any one contract, and of having these clauses detached from each other and numbered. If we imagine them arranged under the usual heading, and written or printed with room for such variations as each architect's experience may suggest, we get what may be termed an "adaptable specification." Containing a great many more descriptions than are needed for any one building, it will be a kind of magazine from which specifications of many different sorts may be made up. Yet at the same time it will be the natural place in which the user's own improvements will be from time to time recorded. As it is, such improvements are apt to die out of the memory and be forgotten; and so it comes to pass that stock specification clauses often have a longer life than they deserve. The "adaptable specification" will preserve, and insure the future use of, every valuable modification of them; and thus, instead of making its user careless and perfunctory, it will do more than anything else to keep him observant and progressive.

I.—PRELIMINARY, SUNDRY, AND GENERAL.

I. 1. TITLE.—Specification of works required to be done, and of materials, labour, goods, and sums of money required to be provided by the contractor, in the erection of, and the appurtenances thereof, at, in the County of, for

I. 2. CONDITIONS OF CONTRACT.—The whole of the works are to be done in conformity with the "conditions of contract" for those works, and are to be executed under the direction, and to

the satisfaction of, the architect, Mr., of, in the County of

I. 3. NOTICES, APPLICATIONS, AND FEES.—The contractor is to give all notices legally required, whether to district surveyors, borough surveyors, local boards, vestries, sanitary or other local authorities, or any other persons. He is to make all necessary applications to such persons or authorities, and is to pay all fees and charges legally demandable by them.

I. 4. SUB-LETTING.—The contractor is not to sub-let the works, or any part of them, without the written and signed permission of the architect.

I. 5. WORDING OF THIS SPECIFICATION.—All the instructions in this specification, such as "do," "provide," "build," and the like, are to be read and understood as directions given to the contractor, and are to be followed by him accordingly.

I. 6. WATER FOR WORKS.—Provide at all times a sufficient quantity of clean fresh water for the various works included in the contract.

I. 7. PULLING DOWN.—Carefully pull down the buildings now on the site [as far as shown on the drawings]. Take up and remove the whole of the old foundations, walls, and concrete.

I. 8. REMOVING OLD DRAINS, &c.—Take up and entirely remove from the site the whole of the old drains, whether of brick, earthenware, or any other material, and all the appurtenances of them. Empty all existing cesspools, and remove their inclosing walls. [Fill up with clean ballast or hard brickbats the old wells at present on the site, well ramming down the filling-in.]

I. 9. OLD MATERIALS.—The old materials, from buildings pulled down on the site, will be the property of the contractor. [He will be allowed to re-use, in the core of the thicker walls, such old bricks, after they have been properly cleaned, as the architect may consider sound and suitable; also These are to be stacked on a convenient part of the site, and the rest of] the old materials, together with all rubbish on the site, are to be cleared away from it before the new works begin.

I. 10. OLD MATERIALS.—The old materials, from buildings pulled down on the site, will remain the property of the contractor. The architect will select from them those which the contractor is to re-use under his (the architect's) directions, and these are to be carefully stacked on a convenient part of the site, and protected from injury till they are required. The rest of them, together with all rubbish then on the site, are to be cleared away from it before the new works begin, any part of them which the architect may direct being delivered at a spot not exceeding a mile in distance from the site.

I. 11. TREES ON THE SITE.—The contractor is to protect and carefully preserve from injury all the trees now on the site, except those which must necessarily be removed in order to put in the foundations or drains shown on the drawings.

I. 12. FENCING-OFF GARDEN.—The contractor is to put up and maintain a sufficient fence, during the whole progress of the works, between the portion of the site on which the works are to go on, and the garden or grounds. He is to compensate the contractor for the injury done by his workman, or arising out of the execution of the works, to the garden and grounds, and to the paths, buildings, trees, plants, or other property pertaining to them.

I. 13. HOARDING.—Provide and maintain till the completion of the works, along the whole of the street boundary, a proper hoarding 6 ft. high above the ground. Form the necessary gates in it, and carefully remove the hoarding and gates just before the building is given up fit for occupation.

I. 14. ADVERTISEMENTS.—No advertisements, placards, or notices of any kind will be allowed on the hoarding or on any building or structure on or pertaining to the site, without the written permission of the contractor.

I. 15. SHORING-UP.—Wherever necessary, keep the adjoining premises [and all retaining walls, boundary walls and banks which may be affected by the works or the preliminary pulling down of old buildings] thoroughly and effectually shored up and made safe, so that they may suffer no injury from any cause arising out of the execution of this contract.

I. 16. MAKING GOOD NEW WORK TO OLD.—Carefully make good at all points, and in all trades, the new work to such parts of the existing buildings on or adjoining the site as are to remain. In the brickwork, cut proper chases in

short lengths, and bond the new walls to the old ones in the most efficient manner.

I. 17. MAKING GOOD ROADS AND PATHS.—Make good, or pay the proper authorities their charges for making good, all roads, pavements, and footpaths which may have been injured by cartage or traffic, or may have been taken up for or interfered with by any cause arising out of the present contract. Similarly make good, to the architect's satisfaction, and leave in perfect order, all paths, roads, and drives within the site set apart for the new building, and also all turf and flower-borders.

I. 18. SURPLUS EARTH AND RUBBISH, &c.—Remove from the site all surplus earth and rubbish, as they accrue during the progress of the works and immediately before the works are given up fit for occupation. Clean all the apartments and the windows at this period, and give up every part of the building sound and perfect.

I. 19. LATRINES FOR WORKMEN.—Provide and maintain in good order till the completion of the works sufficient latrines or earth-closets for the use of the workmen, placing them in an approved part of the site, and so managing them that no nuisance shall be caused thereby. Allow no nuisances to be committed against or in any part of the building, and completely remove the latrines and all earth or materials affected by them (making it good with fresh earth or materials) just before the building is given up for occupation.

I. 20. CLERK OF WORKS' OFFICE.—Provide and maintain on a part of the site approved by the architect a convenient and weatherproof office for the clerk of works, with glazed window, lock-up door, lock-up drawing desk, and stove and chimney, and provide fuel during the winter and at other times when required.

I. 21. SETTING-OUT THE WORK.—The contractor is to set out the work, both generally and in every detail, according to the drawings and the architect's instructions. He is to be responsible for the correctness of the setting-out in all trades, and is at once to correct all errors which may be pointed out by the architect.

I. 22. FACILITIES FOR EMPLOYING OTHER WORKMEN.—The contractor is to afford all reasonable facilities, while the contract works are in hand, for the employment by the contractor of other tradesmen and workmen to execute carving, decoration, gas-fitting, electric wiring, and lighting, heating, and other finishings and fittings, and is to allow such tradesmen and workmen the use of his ladders and scaffolds.

I. 23. SHEDS AND PROTECTION FROM WEATHER.—The contractor is to provide and maintain proper and sufficient sheds for the execution of the masonry and the cut and rubbed brickwork on the site, and is also to protect and keep under cover the lime, cement, and all other materials and goods liable to be injured by exposure.

I. 24. ATTENDANCE BY EACH TRADE ON OTHERS.—Each trade is to give all necessary attendance and assistance to every other trade, and is to provide everything required from it for the proper fixing and completion of work and fittings. This clause includes all necessary cutting away and making good of brickwork, concrete, walling, masonry, woodwork, plaster, and other materials, for the gas-fitter, the heating engineer, and the electrical engineer, by whomsoever they may be employed.

I. 25. FACILITIES FOR CARRYING ON BUSINESS DURING ALTERATIONS.—The contractor is so to arrange and conduct the works as not to interfere with the business carried on in the part of the premises which is to remain unaltered, and is to form convenient passages, properly protected, for the use of persons passing to and from the unaltered part.

I. 26. FANS AND PROTECTION TO PUBLIC THOROUGHFARE.—Provide and maintain over those parts of the street which adjoin the new frontages proper fans and other suitable protections for the public, and remove them and make good just before the building is given up for occupation.

I. 27. DEPTHS OF FOUNDATIONS.—The foundations are in all cases to go down to, and rest upon, a solid stratum approved by the architect, whether this stratum may be found at a lower or a higher level than that shown on the contract drawings. The contractor is to supply the architect, before each part of the foundation is covered up, with a note stating the actual depth below the ground-floor line to which such part has been taken down, and these greater or less depths, together with all extras or omissions in brickwork, wall-

ing, concrete, and other things which may arise out of them, shall be measured and valued, and added to or deducted from the amount of contract, as the case may be.

I. 28. PROVISIONS OF MONEY IN THE CONTRACT.—All provisions are to be expended for purposes connected with the building in any way which the architect may direct, and any parts of these not so expended will be deducted from the amount of contract when the accounts are made up. All sums provided for the purchase of goods are net prime cost; that is, they are the sums actually payable by the contractor after all trade discounts have been deducted from the nominal value of the goods. The contractor will in all cases have to allow, in addition to the sum provided for goods, the cost of packing, unpacking, carriage from [London], and storage of the goods till used.

I. 29. PROVISIONS OF MATERIALS AND LABOUR.—These are to be used in whatever parts of the work the architect may direct, and the value of any parts of them which may remain unused will be deducted from the amount of contract when the accounts are made up.

NOTES.

Clause 2. Many general rules, which are sometimes put in the "Preliminary and Sundry" part of the specification, come more properly in the "General Conditions of Contract," which are consequently referred to here.

Clause 6. Cases have occurred in which a contractor has asserted his right to use sea-water, no other being easily obtainable. The use of water discoloured by loam and clay is more frequent; and hence the words "clean and fresh."

Clause 7 is, of course, only to be used when the site has been built on before. The same may be said of some others. The user of an "adaptable" specification will pick out in each case the clauses which apply to the work he is then providing for.

Clauses 9 and 10 give two alternative ways of dealing with old materials where they exist.

Clause 16, of course, applies to cases of additions to older buildings.

Clause 25 is suitable for alterations to a shop or other place of business.

Clause 27 gives the architect the power, which he certainly ought to have, of deepening the foundations where this is unavoidable, and of saving his clients' money by keeping them shallower when this is safe. A recent decision of the Courts shows that such a clause is decidedly necessary.

SOME MINOR EXAMPLES OF THE FRENCH RENAISSANCE.*—V.

By G. A. T. MIDDLETON.

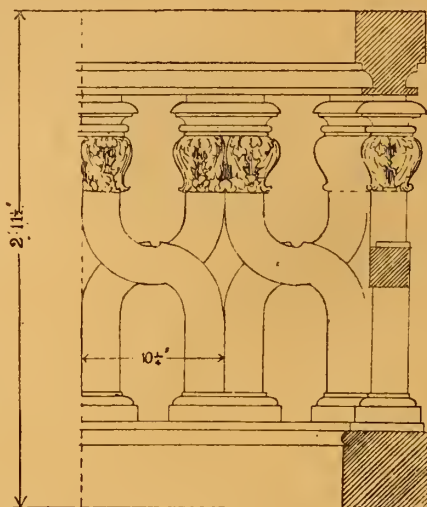
IN THE CLUNY MUSEUM, PARIS.

HOW full the Cluny Museum at Paris is of good things, ancient, Mediaeval, and Renaissance, is already well-known to the readers of the *BUILDING NEWS*; and the two small illustrations given herewith are merely samples possessing different and marked characteristics.

The balustrade is evidently somewhat late in date, with mouldings which are harsh in contrast, and which would now be considered bad, and yet, due to its general proportioning, the effect is fairly pleasing. In contradistinction to the indifferent contour of the mouldings may be taken the exact workmanship, especially of the rounded foliage, and the twist or section of the interlacing work—the latter a detail which might very well have been overlooked or overdone, in either case to the spoiling of the whole.

The bracket is just a small sample of the extremely spirited ironwork of the Late Renaissance, of which there are numerous large specimens. Absolute mechanical precision is not to be found in it; but every leaf and curve is instinct with artistic feeling, as if the very hammer and anvil were alive which fashioned them. The use made, even in this little bit, of the contrast between the bar and rod forms of the metal, with the junction covered and led up to by opening foliage, is most suggestive at a time when many designers are content to use either rod or bar entirely, and, when they employ both, rarely take the necessary pains to combine them artistically—designing, in fact, on paper, and in elevation, with but little thought of the effect when executed in the solid. Yet this little

bracket teaches that iron is a pliable substance, obtainable in more than one mercantile section, and capable only of its highest development when



Balustrade in Garden, Cluny Museum, Paris.



Iron Bracket in the Cluny Museum, Paris.

the possibility of its being wrought into almost any form is fully grasped and used with sense of fitness and of harmony.

BOOKS RECEIVED.

Constructural Iron and Steel Work. By FRANCIS CAMPIN, C.E., &c., with Illustrations (London: Crosby Eockwood and Son).—This is a small and elementary practical manual for architectural students and others, engaged in building, showing the application of iron and steel to buildings. Mr. Campin has confined himself to the ordinary elements of iron and steel construction, such as columns and stanchions, girders solid and lattice-webbed. The loads and stresses, floors of buildings, and how to calculate the loads on them and on the girders; weights of steelwork, &c., are discussed. Although many treatises have been written on the theory and strength of iron construction, very little of a practical kind has been given, and the student and young architect have been obliged to rely upon tables of manufacturers for the practical details of the work. Mr. Campin has explained the steps necessary in designing these various elements in a practical way. He takes the student through the elementary principles of load stresses, and how the resistance of certain sections are

calculated; how the rivets of a plate girder ought to be disposed to give the maximum strength. He conducts the pupil through the foundry and shops, and explains the processes carried on; the connections of the parts, and he finally leads him up through the processes of finding the loads and stresses in buildings, and how these are estimated and provided for. The chapter on the loads on floors and the general arrangement of buildings, or rather the structural ironwork, will be found of much service to those engaged in making drawings, and specifying for work of this description. The chapters on iron, and steel doors and traps, and on specifications and quantities, are very useful.—*Segmental and Elliptical Oblique or Skew Arches*, by JOSEPH BELL, County Surveyor and Bridge Master of Cumberland (London: E. and F. W. Spon) is a practical treatise "written at the request of a few of the author's personal friends, with a view to simplify the oblique bridge problem." Numerous accidents have occurred on the county bridges in consequence, it is said, of many of them being situated at the foot of steep hills, and built at right angles to the stream, irrespective of the line of roadway leading to these bridges. The author acknowledges his indebtedness to the late Peter Nicholson's work, and refers to Mr. Buck's treatise on the subject. Mr. Bell's work is more simple and practical than those; he puts into tabulated form the results of his calculations for 72 oblique bridges of spans ranging from 10ft. to 50ft., advancing by 5ft., and from 35° to 70° obliquity. Decimal multipliers enable the architect or engineer to find the corresponding dimensions for any span in the same degree of obliquity, thus saving labour and valuable time. The first chapter gives an example of projection and directions for making it, which is followed by instructions of how to make the templates for the drawings. These are illustrated by diagrams, and are clear and concise, without unnecessary verbiage. The practical builder and student will readily follow the directions as to how to draw the "heading joint lines" and "coursing joint lines." The construction of templates for the angle required, and how to work the springers and checks for twisting rules; setting out and erecting the bridge, are fully explained, and examples follow with tables of multipliers and other necessary data. The example of projection given, showing the mode of obtaining the templates for the intradosal and extradosal angles, twisting rules, &c., will be of great use to the student, and the plans, elevations, and sections of bridges given with specification, form of tender, &c., will furnish him and the practical builder with all the needful instruction in this branch of construction, and render the problem comparatively easy.

CHIPS.

The Scarborough Town Council have approved the estimate of the Marine Drive Committee for constructing a drive round the Castle Cliff at a cost of £70,000. The work will be under contract for completion by February 1, 1899.

The Corporation of Liverpool have received from the Local Government Board, the formal sanction to expend £13,000 upon the erection of dwellings for the labouring classes under Part III. of the Housing of the Working Classes Act, 1890. The city council have been recommended by the Insanitary Property Committee to place at the disposal of their committee £13,000 to enable them to carry out in the Arley-street neighbourhood the schemes of the city engineer and the deputy city surveyor for the construction of labourers' dwellings.

The aggregate of the business done at the Mart last week was £260,155—an amount which has only once been exceeded this year. The transactions have been varied in character, large residential properties, Indian tea estates, freehold ground-rents, and other investments all furnishing a share of the returns. The great estates which have been offered did not meet with success, the demand being limited to properties not exceeding from £30,000 to £40,000 in price.

The Baroness Llanover, who died on January 17, aged 94, has bequeathed to the British Museum the cabinet and stand now in the breakfast-room at Llanover, with ten large volumes containing the unique collection of plants and flowers from nature by the late Mary Granville (Mrs. Delaney), which George III. desired to see preserved as a standard work of art. The portrait of Mrs. Delaney, by John Opie, R.A., with the frame designed by Horace Walpole, goes to the National Portrait Gallery, as well as a portrait of Ann Granville (Mrs. d'Ewes), painted by Mrs. Delaney.

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ILLUSTRATIONS.

THE HALL OF THE DRAPERS' COMPANY.—REREDOS AND ALTAR IN ST. JOHN'S CHURCH, ALTONA.—A COUNTRY HOUSE.—LANCASHIRE AND YORKSHIRE BANK, DEWSBURY.—PROPOSED DESIGN FOR THE SURVEYORS' INSTITUTION.—DISCHARGED PRISONERS' AID SOCIETY'S PREMISES, GLASGOW.—ELIZABETHAN AND EARLY JACOBAN FURNITURE.

Our Illustrations.

CITY GUILDS: NO. XXIV.—THE HALL OF THE DRAPERS' COMPANY.

On the 10th of July we illustrated the Great Hall belonging to this famous and foremost Company, and we then printed a brief account of their buildings. To-day a view of the grand staircase leading to the Livery Hall and reception-rooms figures among our lithographic plates, from a photograph by Mr. Sandell, specially taken for the *BUILDING NEWS*.

REREDOS AND ALTAR, ST. JOHN'S CHURCH, ALTONA, NEAR HAMBURG.

PROFESSOR OTZEN'S work has on more than one occasion been brought before our readers, and in Berlin his designs are as famous as those of our own leading architects are in London. His North German churches, executed for the greater part in glazed coloured bricks, are among his more notable designs. Two churches were built from his plans in Altona, one dedicated to St. John, and one to St. Peter. The altar-piece, herewith illustrated, is from the first named of these churches, and our plate is reproduced from the architect's working detail, lent us for illustration. St. John's Church is in red brick, both inside as well as out. The fittings, including the altar, are executed in oak, with wrought-iron candlesticks and arch. It took five years to execute, and cost £18,000.

A COUNTRY HOUSE.

This design, by Mr. Kenneth W. Stuart Robinson, is noticeable mainly for an absence of undue straining after picturesque effect, and for a simple arrangement of the elevations. The plans show a larger house than might be supposed from the view given of the front elevation. There is an attic story over the back part of the house, and the ground floor being high above the ground level, the basement affords a considerable space for larder, store-rooms, cellars, &c.

NEW BANKING PREMISES FOR THE LANCASHIRE AND YORKSHIRE BANK, LIMITED.

THESE premises occupy a commanding corner of the market-place at Dewsbury. The ground floor is devoted to the bank and entrance to offices. The accommodation provided is a banking room, with its attendant, manager, and strong rooms. The first and second floors, which are approached by well-lighted stone staircases, are arranged for suites of offices, each floor being provided with its own lavatory and w.c. provision. The external walls and the ashlar dressings are executed in stone. The general woodwork of bank, including dadoes, is to be in fumigated oak, and the fittings are of dark Spanish mahogany.

The whole of the works are in the hands of local contractors; the architect being Mr. J. Lane Fox, of Bond-street, Dewsbury, under whose supervision the works are being carried out.

THE SURVEYORS' INSTITUTION, WESTMINSTER.

This design, by Mr. T. E. Colcutt, F.R.I.B.A., was submitted in the recent limited competition for the new buildings about to be erected in Great George-street, Westminster, for the new premises of the prosperous Surveyors' Institution. The plans which accompany the view explain the arrangements for the library, offices, arbitration-room, and lecture hall. The design of Mr. Alfred Waterhouse, R.A., was chosen, and this we hope to illustrate at an early date. We shall also publish Mr. Charles Barry's design in a week or two. The other competitors were Messrs. Henry Currey and G. T. Hine.

DISCHARGED PRISONERS' AID SOCIETY.

WE herewith give a perspective view from Cathedral-square of the new building for the Discharged Prisoners' Aid Society at Glasgow, which is almost ready for occupation. The building is erected on the east side of Cathedral-square, with a front to John Knox-street, and is built of red stone at a cost of about £3,000. The accommodation consists of a breakfast-hall and kitchen on the basement floor, level with John Knox-street; Superintendent's office on the ground floor, entered from Cathedral-square; and a dormitory, &c., and caretaker's premises on the upper floors. Messrs. Campbell Douglas and Morrison are the architects.

ELIZABETHAN AND EARLY JACOBAN FURNITURE.

The homogeneous character of these pieces of furniture, sketches of which are included amongst our illustrations this week, is obvious, and we therefore show them together for the sake of comparison. The oak Court Cupboard is a fine example of Elizabethan work; indeed, as its date (carved in the upper frieze) testifies, it was produced in the very year that Queen Bess died, and in which the 1st James ascended the throne. Much has been written about the uses of Court Cupboards, into which we need not enter here. Those who are interested in the subject will find in the *BUILDING NEWS* for May 13, 1892, and Nov. 23, 1894, further examples, accompanied by explanatory remarks. In the subject before us, the upper portion contains the Cupboard proper, with its single door and splayed sides. The door is elaborately carved, the execution of the female bust, with the ruff and puffed sleeves of the period, being exceedingly refined in character, showing the carver to have been an expert in his craft. The lower portion of the body of this piece of furniture consists merely of two drawers with quaint drop handles; between these drawers is a conventional flower inlaid in light wood—probably holly. Lines of check inlay, in the same wood, ornament the framing throughout. The scroll carving used singly as in the two friezes, and doubly as in the drawer fronts, is thoroughly typical of the period. The two twisted balusters supporting the angles at the top, which come to the front, are in keeping with the quiet unobtrusive character of the whole design, as likewise is the simple turning of the front-legs, side-bars, and stretcher. The total height is 4ft. 3in., the height to top of lower part being about 2ft. 6in., the length is 3ft. 9in., and the depth from front to back 1ft. 8in. The Swing Looking Glass is an early example of its kind, and bears, as will be seen, the same date as the Court Cupboard, and was probably the work of the same hand. Here too, check inlay is used in the sides of the richly-carved oak frame, and the reversed dentil and bead ornamentation on the connecting bar beneath the mirror, is the same as that occurring in the three mouldings of the Cupboard. The total dimensions of this Glass are 2ft. 4in. high, and 1ft. 10in. wide. These two preceding pieces are both contributed by the authorities at the S. K. M. to the Loan Exhibition at Bethnal Green. The Cabinet, which was recently in the possession of the late Sir Joseph Barnby, was sold at Christie's sale rooms, where our sketch was taken. Although possibly it may have been made in this country, it is undoubtedly of Flemish origin. It is not always easy to distinguish between Jacobean work and that of the Flemish Renaissance. Many of the features introduced into our woodwork were borrowed or adapted from Flemish examples; while both the Flemings and Dutch brought over their productions to the

English market in considerable quantities. The accommodation provided in this Cabinet, which is in oak, is very small, considering that it stands 5ft. 3in. high, with a width in the lower part of 2ft. 5in. A cupboard fitted with shelves, and a single drawer beneath, are the only receptacles contained therein. No advantage has been taken to utilise the space between the legs, occupied by the carved framing-piece, which latter might have formed the front of a good deep drawer. The bulbous legs are free from carving; but have an inlaid ebony band round same. Inlay of the same wood occurs in various parts of the cabinet, such as the plain space round panel of cupboard door, and the ornaments to the square parts of feet. The Table and Scholar's Seat from the Charterhouse School bear the heavier character which the Jacobean Furniture assumed, soon after the Stuarts succeeded the Tudor line. The table-legs are particularly massive. By drawing out the two under-leaves of the top, the centre falls down flush, thus increasing the length of the table nearly three times. Closed, as in the sketch, the dimensions of the top are 5ft. 2in. long, by 2ft. 11in. wide, and the height from floor is 2ft. 11in. These are also on loan at the Bethnal Green Museum.

CHIPS.

At Tuesday's meeting of the London County Council, it was agreed, after discussion, that a Bill or Bills should be introduced into Parliament next session for the purchase of the undertakings of the eight Metropolitan water companies. It was also decided, after some debate, that Parliamentary powers should be sought for widening the Strand by the removal of the block of buildings on the south side of Holywell-street.

The North-Eastern Railway Company are about to lay down an extra line from Elswick Station to Scotswood, and a loop line is also to be constructed from the Consett branch, on the south side of the Tyne, direct to Derwenthaugh. The contract has been let to Mr. John Scott, contractor, of Newcastle, and he has commenced operations this week.

A western wing has been added to Eddy's Hotel at the Lizard. The addition consists of a dining-hall, bar-room, smoking-room, entrance-hall, and offices on the ground floor, and on the first and second floors additional bedrooms. The contractors were Messrs. Moyle, of Chacewater, and Mitchell, of Leedstown, and the architect Mr. Sampson Hill, of Redruth.

Mr. Stewart Henbest Capper, M.A., architect, of Edinburgh, has been appointed to the chair of Architecture recently founded, through the munificence of Mr. William C. McDonald, at the McGill University, Montreal. Mr. Capper is a former "dux" of the Royal High School, and graduated M.A. with honours at Edinburgh University in 1880. In 1891 he was admitted by examination an Associate of the Royal Institute of British Architects, and in 1896 was appointed additional examiner in the department of archaeology and art for the M.A. degree at Edinburgh University.

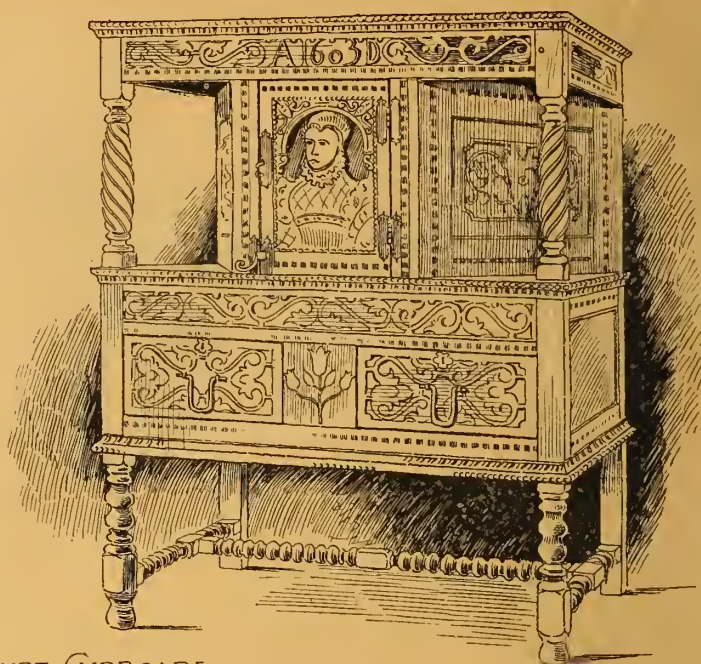
A new theatre is to be erected at Dover at a cost of nearly £20,000. The work is to be commenced forthwith, so that the building may be completed by the early part of next year. It is to be built on the site of the old Clarence Theatre—built in 1789—and some adjoining property.

The foundation-stone of a new church at Woodmansey, near Beverley, was laid on the 9th inst. The contractors for the church are Mr. Geo. Pape, of Beverley, for brick and wood work, and Mr. Sweeting, of Hull, for masonry. Mr. Alfred Beaumont, of Beverley, is the architect. The building will be in the Early Decorated style. It will consist of nave, chancel, and tower, with a porch to the nave. It will be built of red brick, with Whitby stone dressings, and will be fitted with open seats, which, like the roof, will be of pitch-pine. There will be seating accommodation for about 150 people. The cost will be upwards of £2,000.

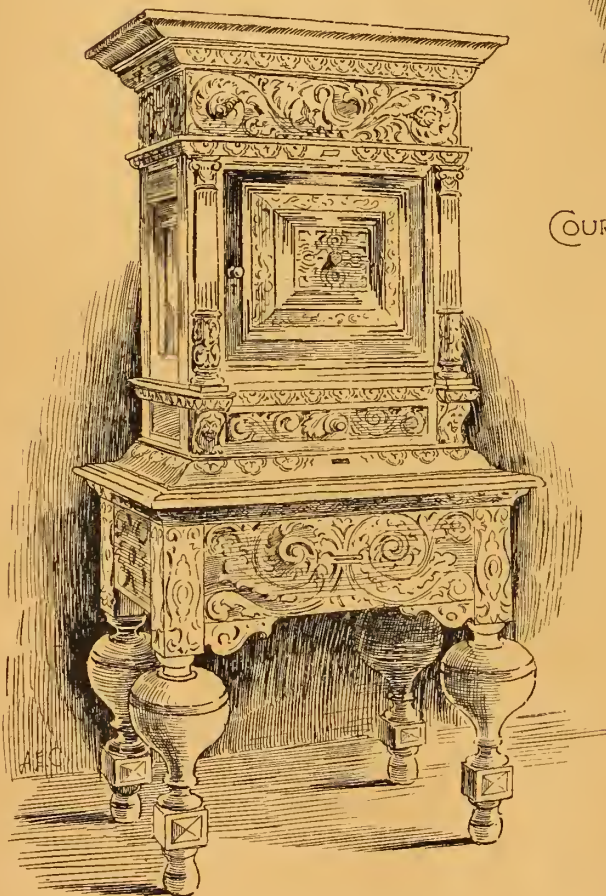
The Isle of Wight County Asylum at Whitecroft, which has been in course of erection for just over two years, is now nearing completion. Messrs. Garlick and Horton, of London, are the contractors, and their contract price was £47,290. A conspicuous feature is the clock and water-tower in the administrative block, with the male and female blocks on either side. The whole of the building is lighted by electricity. The private patients' block is in course of erection, and farm buildings, &c., have yet to be constructed.

Mr. Walter H. Brownlee, resident electrical engineer, Dundee, has resigned. On Friday the gas committee of Dundee Town Council appointed Mr. W. M. Tittensor his successor *ad interim*.

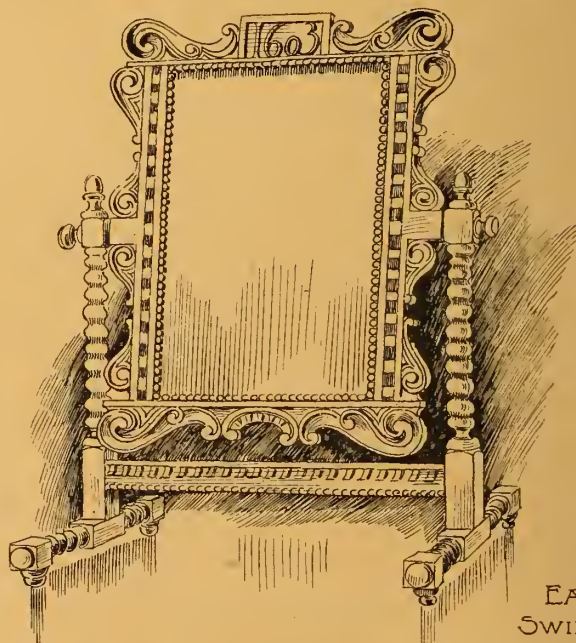
ELIZABETHAN AND
EARLY-JACOBEAN
FURNITURE



COURT-CUPBOARD

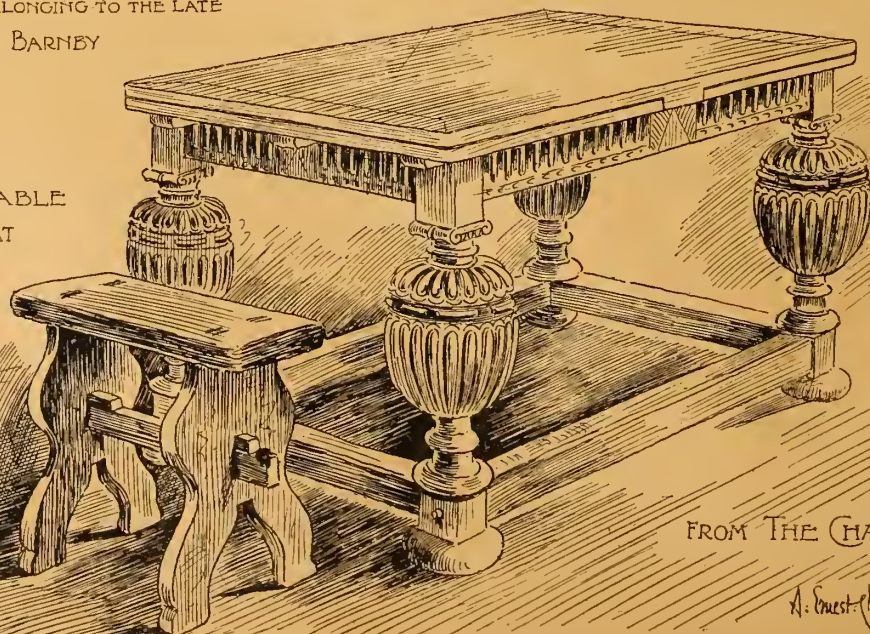


CABINET BELONGING TO THE LATE
SIR JOSEPH BARNEY



EARLY
SWING
LOOKING-GLASS

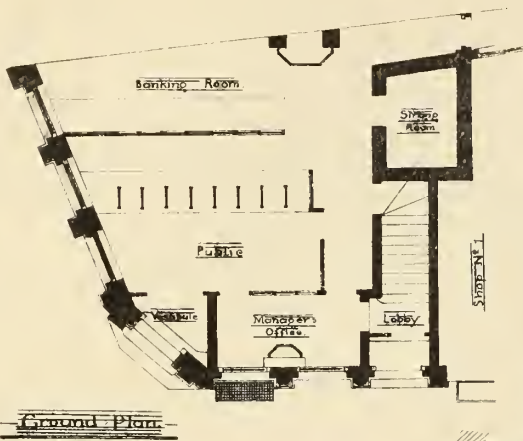
"DRAW-OUT" TABLE
OF SCHOLAR'S SEAT



FROM THE CHARTERHOUSE

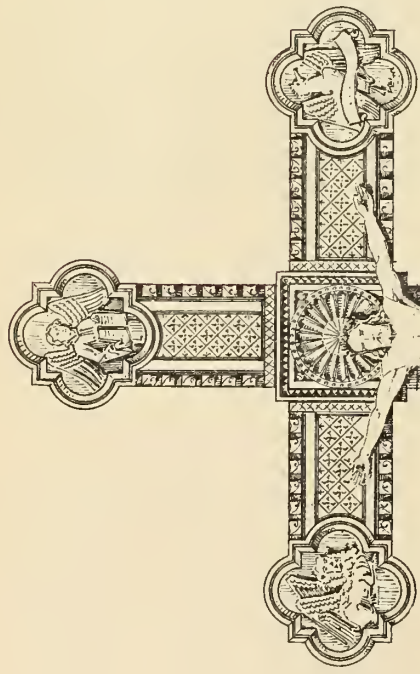
A. Ernest Chancelor, Sc.

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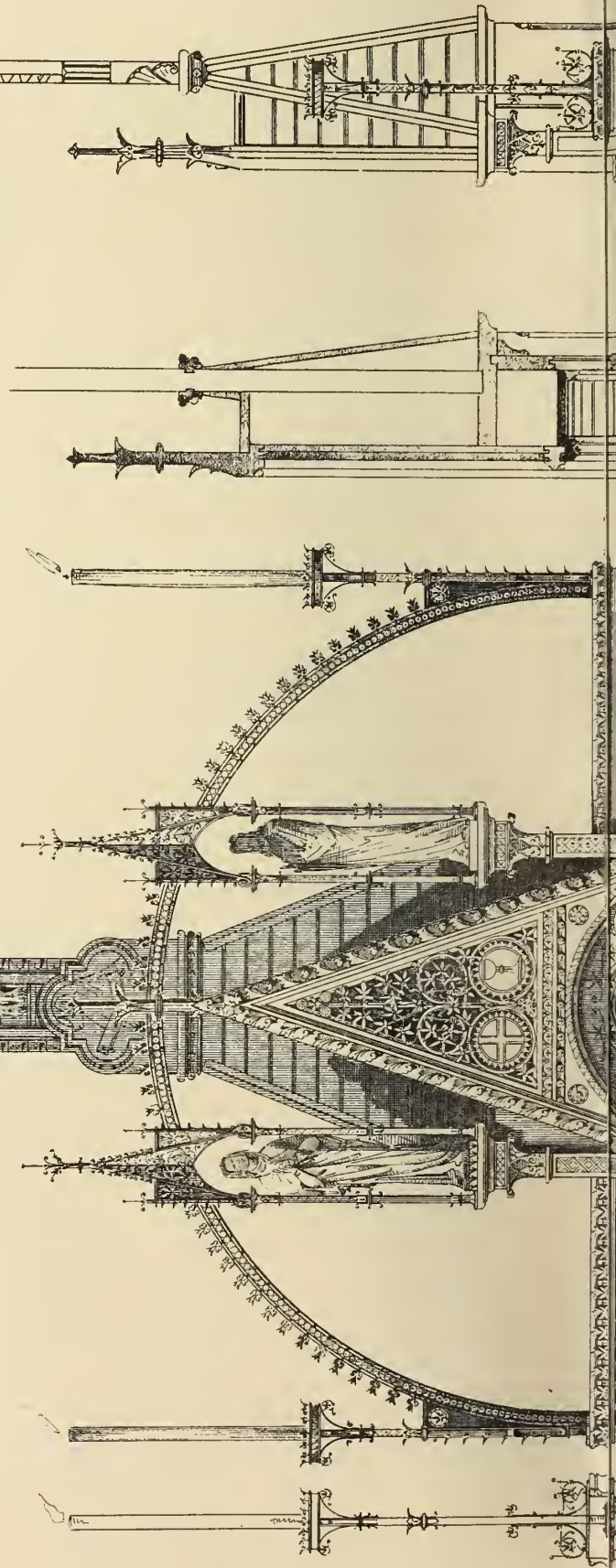
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*J. Lane Fox
Architect
Bond Street Dewsbury*

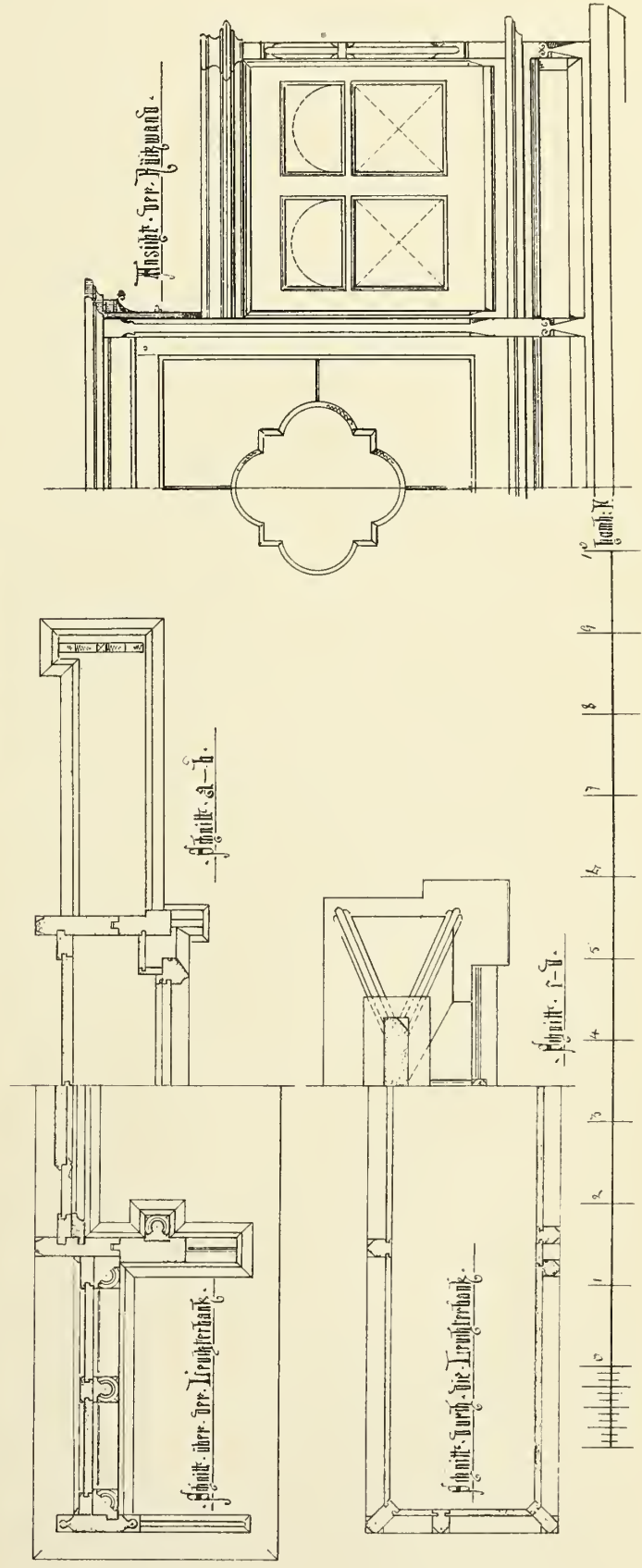
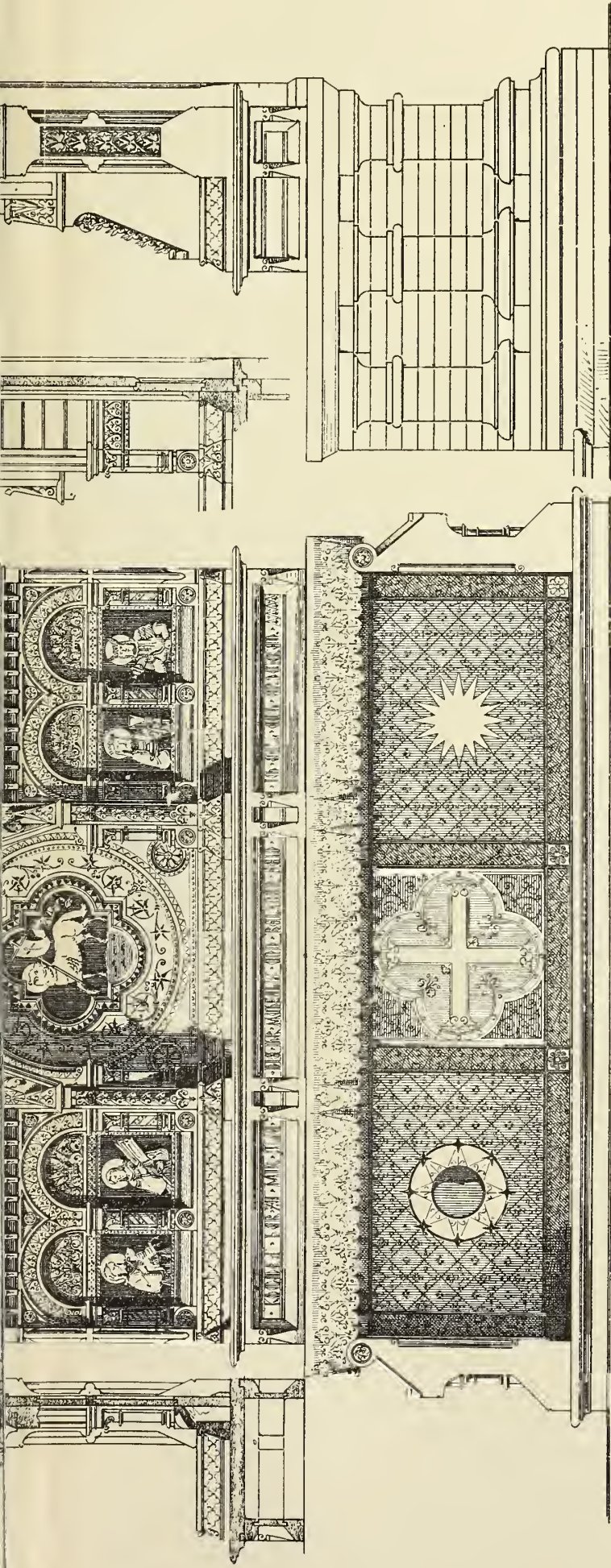




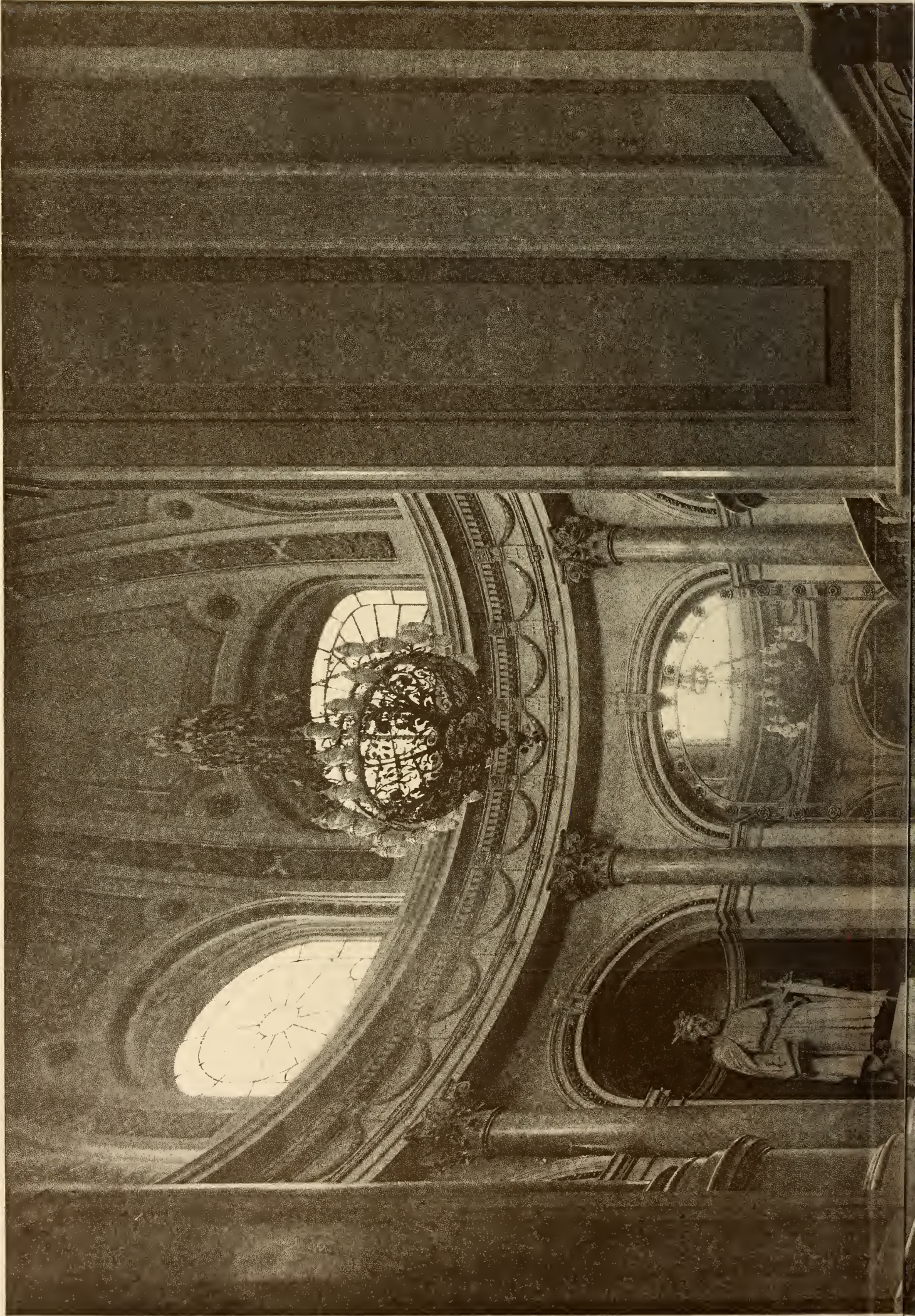
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THE BUILDING PEWS. JULY 24, 1896.



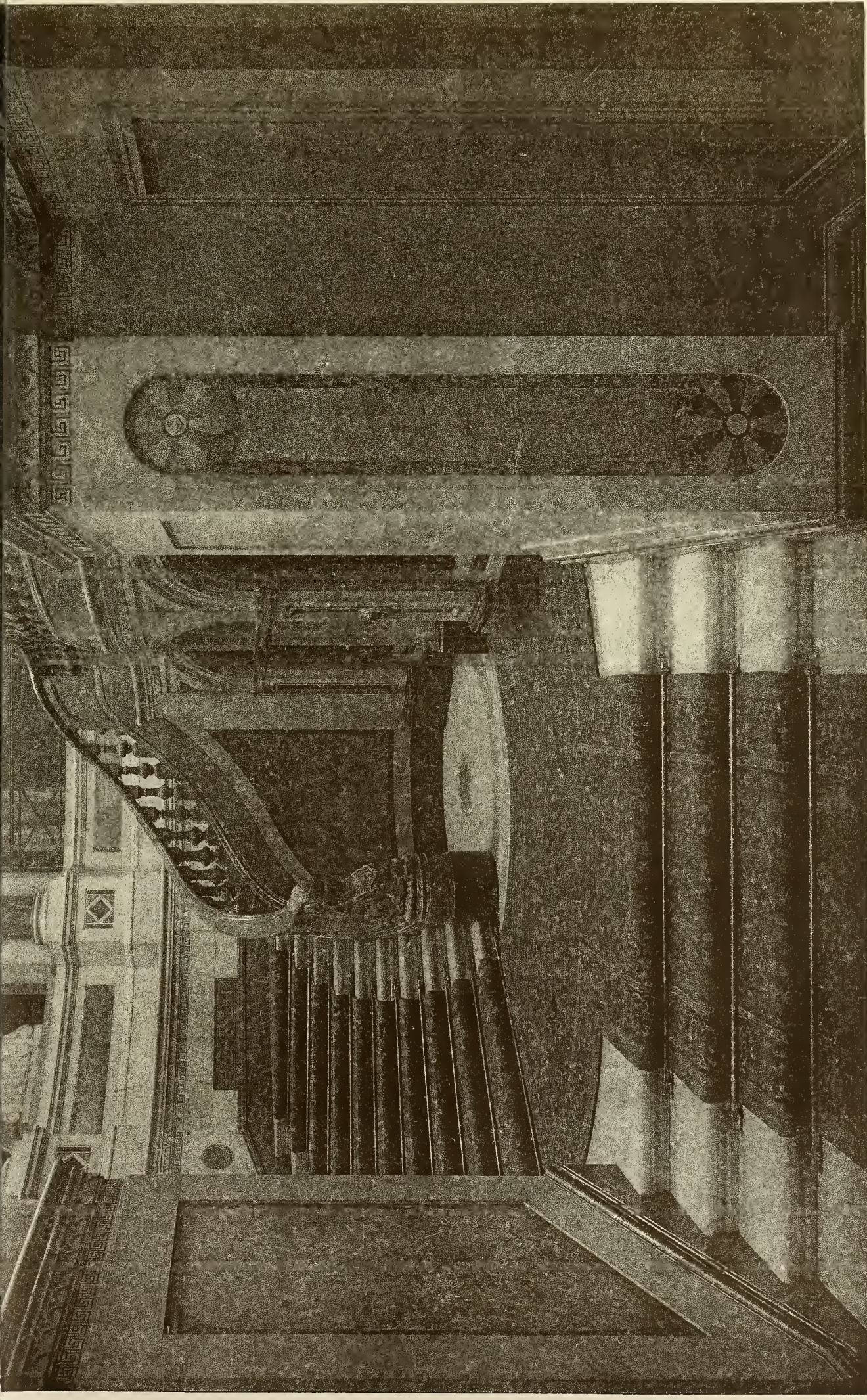
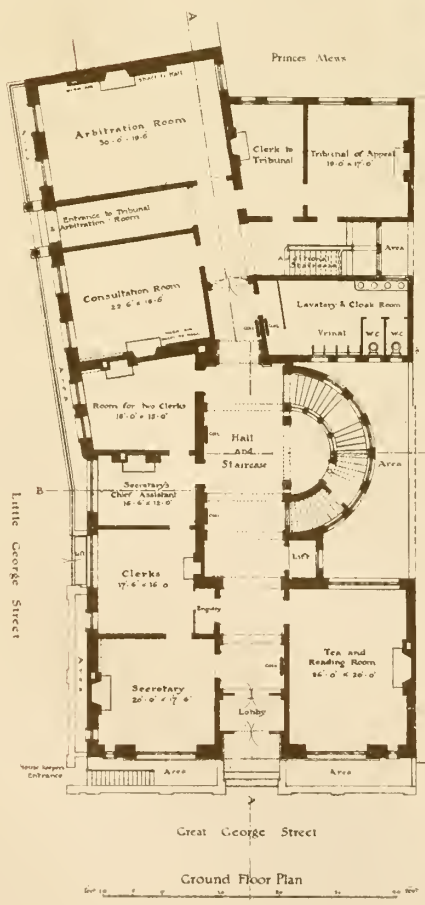
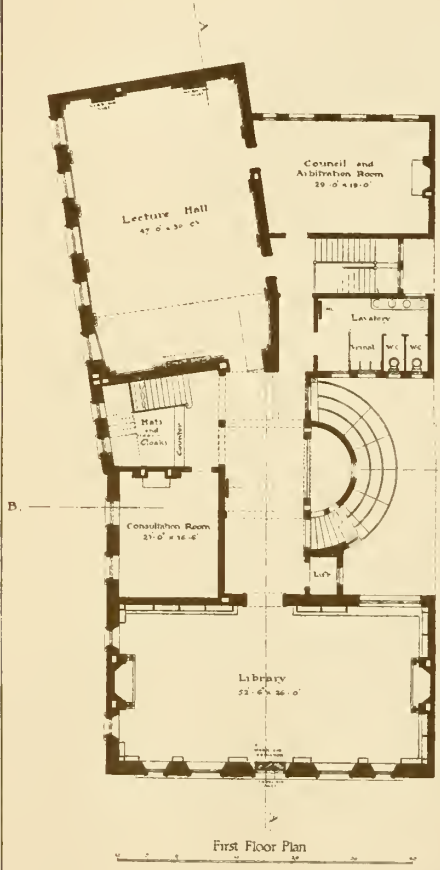


PHOTO-LINT, by James Allen Martin, 1895. F. - QUARTER - 100. W. 10.

THE CITY GUILDS No 24.

THE HALL OF THE DRAPERS COY. THE STAIRCASE. H. WILLIAMS ARCHT

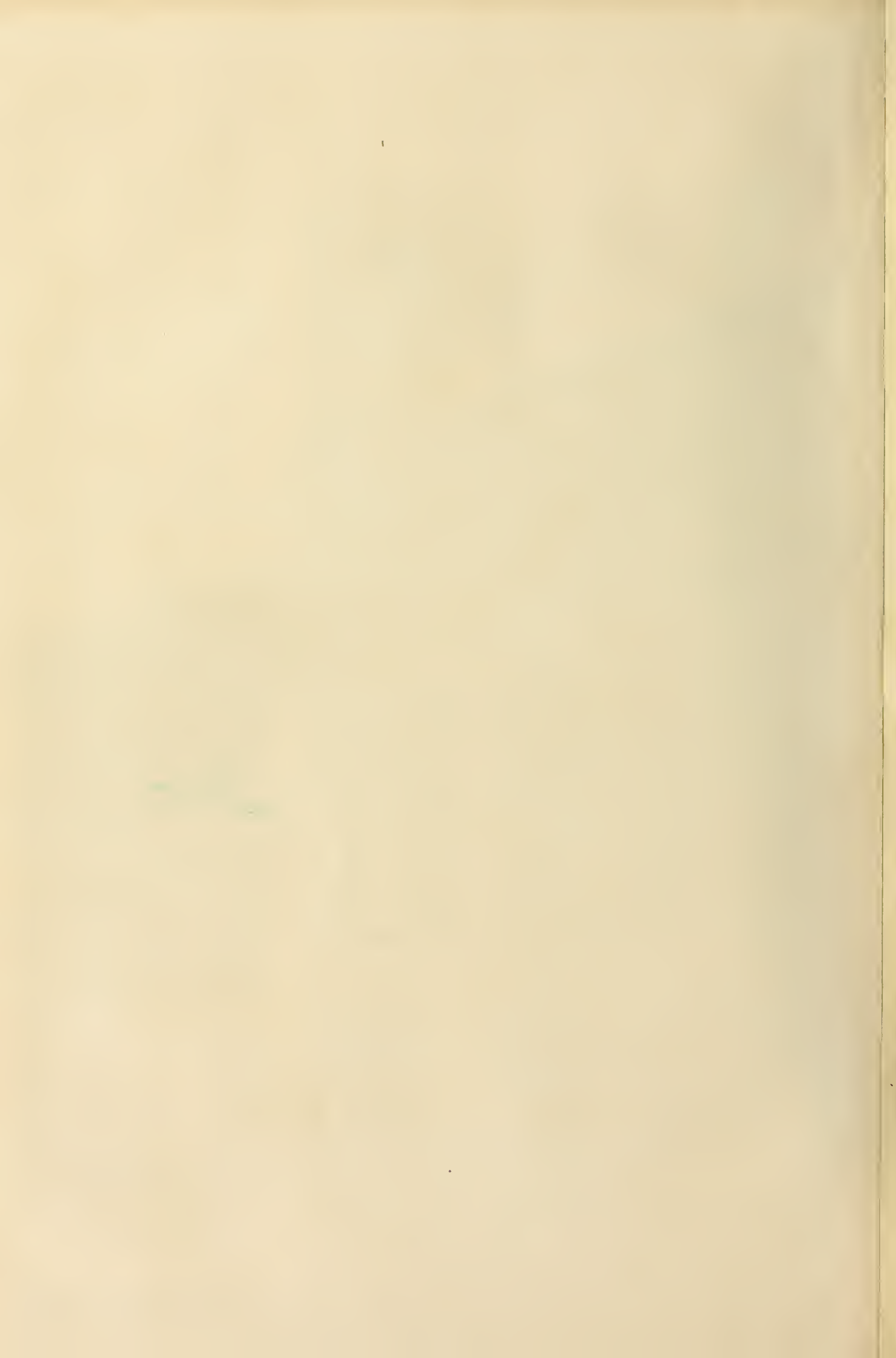
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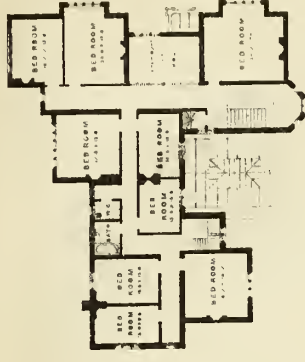
E. SURVEYORS' INSTITUTION. PROPOSED NEW BUILDINGS. DESIGN BY T. E. COLLCUTT, F.R.I.B.A. ARCHT.



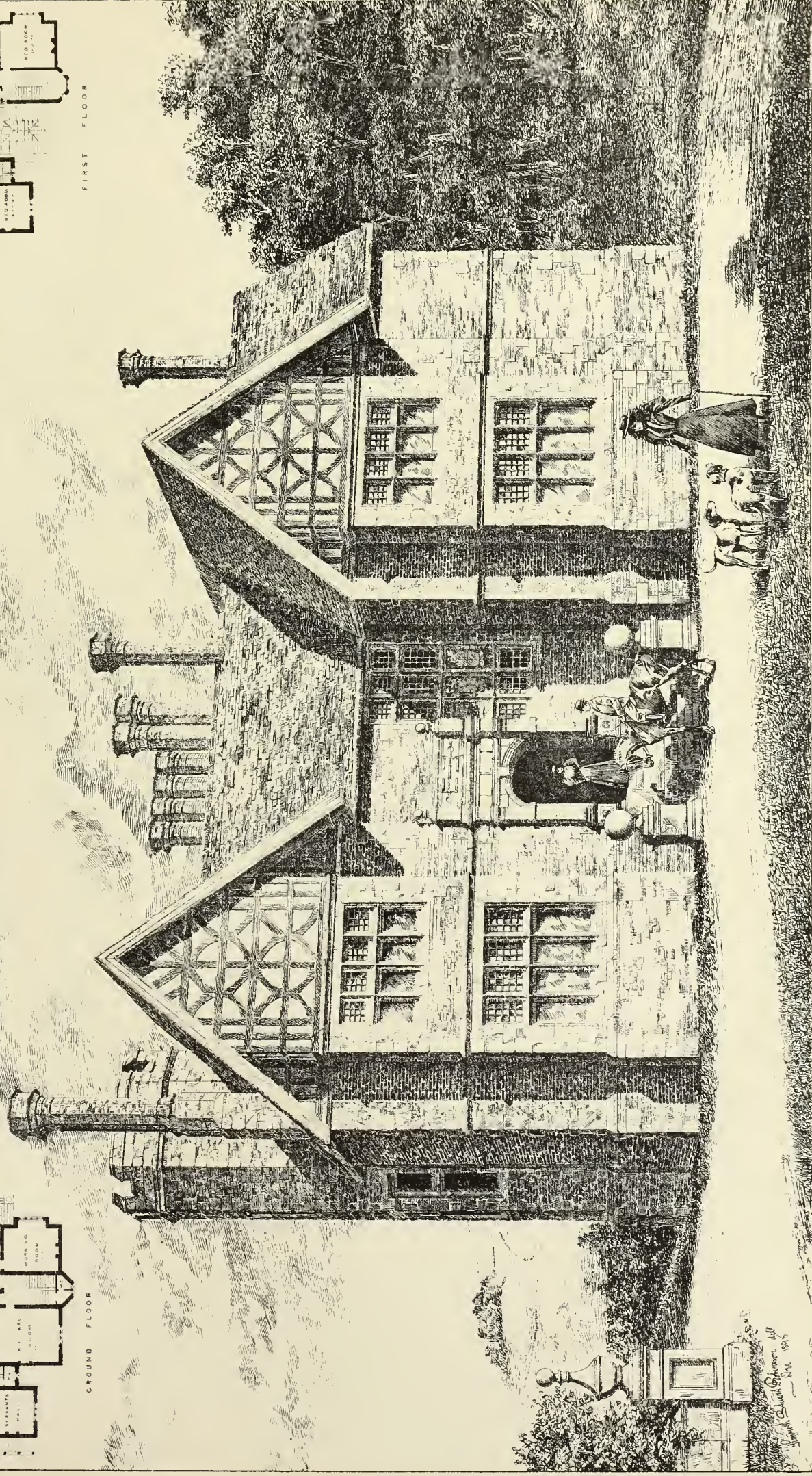




GROUND FLOOR

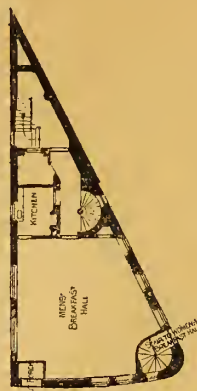
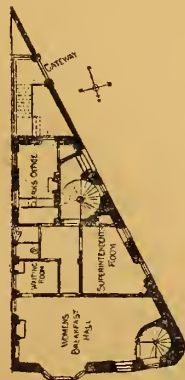


FIRST FLOOR



A COUNTRY HOUSE BY K.D. STUART-ROBINSON

DISCHARGED-PRISONERS' AID SOCIETY'S PREMISES, GLASGOW.
MESSRS CAMPBELL, DOUGLAS & MORRISON, ARCHTS.



Building Intelligence.

EDINBURGH.—Lady Stair's House, in the Lawn-market of Edinburgh, between Lady Stair's and Gladstone's Closets, was recently purchased by the Earl of Rosebery, and is to be restored by his lordship to as nearly as possible the condition in which it was when his collateral ancestress, Lady Stair, or Viscountess Primrose, lived there. It was here that the incident occurred on which the story of "Aunt Margaret's Mirror" is founded. According to an inscription on the stone lintel over the entrance, the house was built in 1622. The door enters upon a turnpike stair, which gives access to a vaulted basement, and immediately above that to a hall two stories in height, which contained a large stone mantel after the type of one at Craigmillar Castle. Fragments of it are still in evidence. This hall was reduced in height at a subsequent date by the insertion of a floor, the two east windows were bricked up across the middle, and the west window built up altogether. Entering from the hall were two rooms to the north, the upper one approached from a gallery at the second-floor level. There was a third story immediately under the roof. At some later period the house was extended northward, and as the ground inclined considerably, a still lower basement was formed, which contained the wine-cellar; the bins were formed of small Dutch bricks. This wing of the house was lately taken down, and a second wing to the south was removed a few months ago. When the James's Court block was erected some time in the 18th century, occasion was taken to add to the house two flats, each containing two panelled rooms. They were approached by inclosed bridges across Gladstone's Close. These rooms have been retained. Mr. G. S. Aitken, 49, Queen-street, Edinburgh, is the architect for the restoration.

EPSOM.—Lord Rosebery opens the Technical Institute and Art School, Epsom, to-day. The technical institute is entered through a vestibule. Only two class-rooms have at present been built; they are each about 32ft. by 18ft., and lighted by large three-light windows. Provision has been made for the erection of either one or more additional rooms at the back when required. Lavatory and w.c. accommodation is conveniently placed off the entrance hall. The art school is placed on the first floor, and is approached by an arched corridor and wide stone staircase. The accommodation consists of elementary and advanced class-rooms, each about 26ft. by 20ft., having waggon roofs with framed principals; modelling-room, 18ft. by 18ft.; and master's room. Lavatory and w.c. accommodation is provided on the ground floor, and space for storage over large lavatory. It being essential that there should be a room capable of seating about 300 people for lectures, the two large class-rooms are divided by a movable partition. The exterior is designed in the Renaissance style, with red brick and buff terracotta dressings to doors, windows, and string-courses. Mr. J. B. Potter, builder, of Sutton, has satisfactorily carried out the work, under the superintendence of Mr. J. Hatchard Smith, F.R.I.B.A., of 41, Moorgate Station-buildings, E.C.

PORTSMOUTH.—The Portsmouth Lunatic Asylum Committee have accepted the tender of Mr. J. W. Quick for the work of extension of the asylum at Milton. The amount of the contract is £9,468, and the work will include an extension of the main block on both sides, providing accommodation for 110 additional beds, besides day-rooms, &c. Ten tenders were sent in, the highest amount quoted being £11,684. The original estimate for the work was £8,000; but that amount has been increased owing to the requirements of the Lunacy Commissioners, who insist upon the use of glazed bricks (£450), the provision of improved ventilation (£350), and the plastering of the old walls (£350).

TEWKESBURY ABBEY.—The Dean of Gloucester has issued an appeal for funds for maintaining the fabric of the famous Abbey of Tewkesbury, perhaps the finest parish church in England. In a circular recently issued, the Abbey Restoration Committee state:—A sum of £10,000 is needed, to be thus employed—£1,000, of which from £2,000 to £3,000 will have to be immediately expended in repairing and in many places renewing the roofs of nave and transepts, that of the north transept, immediately over the great organ, being

now in a deplorable condition, and in arresting the decay rapidly going on in the stonework of the walls; the remainder to be invested so as to provide a permanent fabric fund, by means of which the whole building may be constantly attended to. £3,000 to be invested in order to maintain the spiritual work and services of the church.

WESTMINSTER.—The new premises housing the Institution of Civil Engineers in Great George-street, Westminster, were inaugurated by a conversazione on Wednesday evening in last week. They have been built from designs by Mr. Charles Barry, F.S.A., elder brother of the last occupant of the presidential chair at the Institution, and have cost £41,000 exclusive of internal decorations and fittings. The style adopted is Italian Renaissance. The façade is of Whitbed Portland stone, and its chief decorative features are seven portrait busts of distinguished engineers of the past—Telford, Brindley, Watt, Rennie, Stephenson, Brunel, and Smeaton. These are placed in circular niches along the expanded frieze, over a line of columns which divide the front into window bays. As the busts were all executed from casts in the possession of the Institution, all of them taken from life, the portraits are authentic. The sculptor is Mr. H. C. Fehr. From the inner hall the council-chamber and reading-room are entered. The main staircase, which runs up the whole height of the building, has its steps, landings, columns, and pilasters of solid marble. On the first floor are a main and a back library, the larger of the two being 67ft. by 30ft. and the other 40ft. by 24ft. Altogether the building will have accommodation for 56,000 volumes. On the same floor are also the lecture-theatre, 60ft. by 40ft., and the reading-room, 60ft. by 30ft. The walls of this theatre are divided into bays by pilasters, over each of which is a panel for the insertion of medallion portraits of any civil engineer whom the Institution may desire to honour. The ceiling is a large pendentive, treated in glass, and resting on a groined cove springing from the pilasters. Messrs. Mowlem and Co., of Westminster, were the contractors. The building throughout is fireproof, the floors being constructed on the system of Messrs. Mark Fawcett and Co., of Queen Anne's Gate, S.W.; Messrs. Burke and Co., of Newman-street, W., executed the marble and mosaic work, and Messrs. Jennings, of Lambeth, the sanitary fittings and plumbing. We illustrated the building in our issue of March 22, 1895.

CHIPS.

A gift of £2,000 has just been received by the Missions to Seamen for the erection of an institute, with a church overhead, for the sole use of sailors and fishermen of all creeds at Lowestoft. A suitable site near the fish-docks had already been purchased. Sir Arthur Blomfield and Sons are preparing plans for a building, the cost of which it is intended to keep within the £2,000.

At a General Assembly of Royal Academicians and Associates, held on Monday evening, Mr. Ernest Crofts, painter of historical and military incidents, generally drawn from the Civil War and Napoleonic periods, who has been an Associate since 1878, was elected an Academician.

An action, brought by the urban district council of Barnes against the Southwark and Vauxhall Water Company, was before the Queen's Bench Division on Monday. During the great frost last year the plaintiffs supplied horses and vans to deliver water to the defendants' consumers, and they now sued to recover the balance of the cost incurred. The water company contended that they were liable to pay only one-half the expense, and their counsel stated that the frost had cost the company over £30,000. The jury found a verdict for the plaintiffs, and Mr. Justice Lawrance gave judgment for the amount claimed.

The old Masonic Hall in Maple-street, Newcastle now disused in consequence of the erection of larger buildings in Pilgrim-street in the same city, is about to be converted into assembly and concert rooms, from plans by Mr. William Glover, of Newcastle.

An adjourned meeting of the urban council for Quarry Bank was held on Tuesday. Mr. W. Fiddian, surveyor, Stourbridge, attended with plans for the branch sewers to be connected with the main sewerage system of the Upper Stour Valley Sewerage Board. He explained that the total length of the sewers was 5 miles 173 yards. The estimated cost was £4,647. The plans and estimates were adopted, and the clerk was instructed to make application to the Local Government Board for power to borrow £5,000.

Engineering Notes.

BUXTON AND ASHBOURNE RAILWAY EXTENSION.—The second and last section of this line now under construction by the London and North-Western Railway Company, from Parsley Hay to Ashbourne, is approaching completion. The first section, that from Buxton to Parsley Hay (double line), has been open for passenger and goods traffic for some time. The overland route from Parsley Hay to Biggin Moor, a distance of five miles, has been laid. The heaviest cutting is beyond Parsley Hay station, where work is in progress, and at the south end there are three steam cranes in operation. At Hand Dale the route is carried by a stone viaduct over the main road from Ashbourne to Hartington. There will be a station at Hartington-road (about three miles from the latter village), Alsop, North Dovedale, and the line enters Ashbourne by a tunnel and terminates in a junction with the North Staffordshire system at the present station. The line is being constructed by Naylor Brothers, who completed the length from Buxton to Parsley Hay. Mr. William Hurst represents the London and North-Western Company. The work will be completed in two years' time.

COMPETITIONS.

SOUTHAMPTON.—At Wednesday's meeting of the town council it was announced that in the pending competition for a proposed isolation hospital, 22 architects have deposited the three guineas fee and have received the site plan. It was decided, in accordance with the request of several competitors, to grant an extension of time for one month.

ARCHITECTURAL & ARCHÆOLOGICAL SOCIETIES.

DURHAM AND NEWCASTLE ARCHÆOLOGICAL SOCIETY.—The members of this society visited Jedburgh Abbey on Friday. Among those present were Canon Greenwell, of Durham, the veteran archaeologist, and Mr. Hodges, architect. The latter read a paper on the history of the abbey. He held that Jedburgh Abbey was by far the finest of the four abbeys in the beautiful Borderland, and the most imposing in Scotland; while the nave, in his opinion, was the noblest specimen of Norman Transition work in the kingdom. He remarked that some of the mouldings in the nave are close akin to those in Hexham and Glastonbury, and thought it possible these three edifices belonged to the same period. Other places of interest in the town were visited.

Messrs. E. H. Shorland and Brother, of Manchester, have just supplied some more of their patent Manchester stoves, with descending smoke flues, to the fever hospital, Blackburn, those previously supplied having proved very satisfactory.

New Inland Revenue and Bankruptcy Offices are now being erected in Baldwin-street, Bristol. The plans for the building have been prepared by the staff of H.M. Office of Works in London; the contract has been let to Mr. G. H. Wilkins, of Bristol, and the undertaking will be carried out under the superintendence of her Majesty's Office of Works at Bristol. The new offices will have a frontage of 70ft. to Baldwin-street, and of 86ft. to a proposed new thoroughfare from Baldwin-street to March-street. The frontages are of Bath stone, and the building is severely plain in character. On the ground floor will be the public office for the Inland Revenue department, 40ft. by 27ft., and about 15ft. 6in. in height. The public office of the Official Receiver in Bankruptcy, on the same floor, will be 40ft. by 19ft., and 15ft. 6in. high.

The nave of the parish church of Beguildy, Radnorshire, was reopened after restoration last week, after having long been in ruins. The chancel was restored by the Ecclesiastical Commissioners in 1885. The present work has been carried out from plans by Mr. W. R. Bryden, F.R.I.B.A., of Buxton. The contract was taken by Mr. Bowen, of Bridgnorth. The church was Early English in style, and possessed a noble oak timber roof, and the architect, in the restoration, has been able to conserve a large proportion of the old principals, purlins, and other pieces. The masonry is of local stone, with Grinshill dressings, and the window heads follow the style of the old church. Brindle tiles have been substituted for the old stone roofing, and the floors are laid in tiles on concrete. The tower is not yet rebuilt, although included in the design. Its erection will cost an additional £1,000. The ancient road-screen, with its beautiful carving, has been preserved.

COUNTY LUNATIC ASYLUMS.—XLV.

By GEORGE H. BIBBY, F.R.I.B.A.

A DIFFICULTY with large county asylums is to decide upon the first item to be planned, and where the preliminary scheme and calculations may be best originated.

After a very lengthy experience, it is my opinion that the position of the administrative buildings should first be laid down upon the paper, beginning with those portions that form part of, or are connected with, the dining-halls, kitchens, serving rooms, and sculleries.

The next process would be to select upon the plan an advantageous position for the general stores department, and to secure thereto a suitable approach from the sources of supply, and also a convenient access from the kitchen, keeping in view the necessity of placing the general stores so that it may be approached as easily as possible from different wards of the asylum.

The above arrangements having been made in a preliminary sketch plan (to a small scale), it would usually be desirable to ascertain (roughly at first) the areas needed for each of the eight or ten blocks of buildings required for the patients and for the separate buildings for the male attendants and nurses. These might be arranged upon separate pieces of paper cut to the required sizes, and to be moved or adjusted in various positions by the planner until placed approximately in what appear to be suitable positions with regard to the kitchen and stores, &c.

When this has been arranged very probably a scheme for the whole of the connecting corridors would be suggested, and it is at this juncture that the general final arrangement of the plan would be most influenced.

It might then be advisable to begin the planning of the patients' wards. I have usually commenced with those for the sick and infirm, these being generally nearest to the administrative buildings, and somewhat larger in proportion than those for other patients. Each of the eight or ten blocks (four or five for each sex) should be planned separately, the upper floors—for convenience and expedition—being worked upon tracing paper over the ground-floor plan, each with its own sanitary annexes, staircases, and other adjuncts. If the architect's staff be sufficiently numerous, the blocks of buildings for the four or five different classes might be divided amongst three or four draughtsmen to work out.

So much having been attempted, it would probably be found that numerous difficulties in

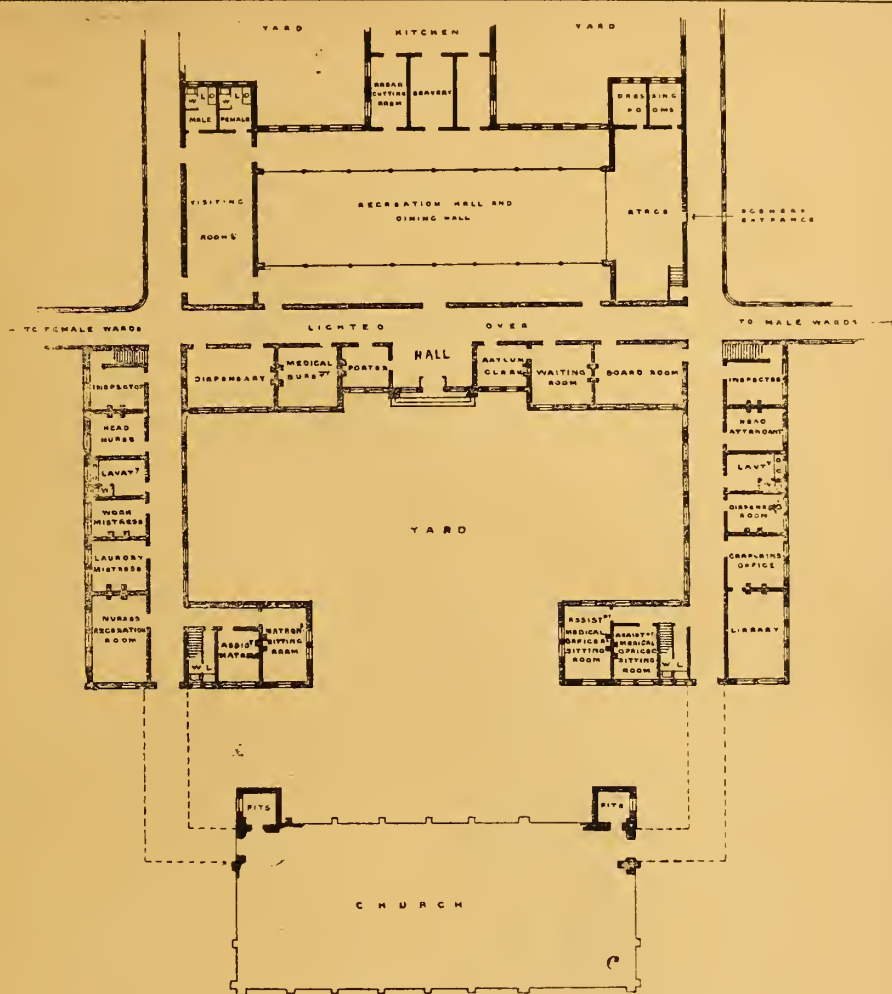


FIG. 65.

altering the parts already schemed, in order that the whole should be properly arranged with regard to the buildings planned previously, some of which in large asylums might be more than 1,500ft. apart.

looking portions that should be kept private. This difficulty may sometimes be avoided by such an arrangement as is shown on the ground plan of an entrance block of buildings, as shown on Fig. 65, which, however, would in some respects

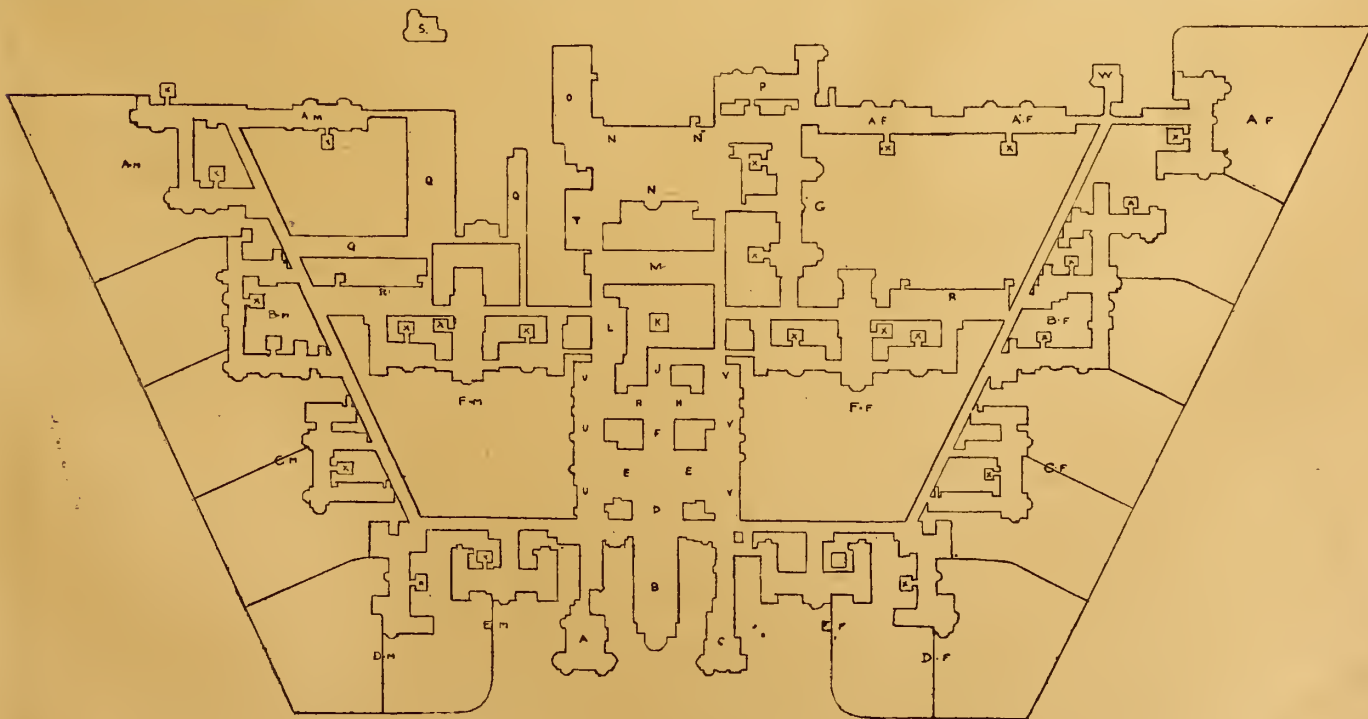


FIG. 66.

succession would be presented, not only in providing suitable positions for the laundry, workrooms, officials' residences, bath-houses, mortuary, church, board-room, offices, and boiler-house, &c., but also in altering or re-

When the internal arrangements have nearly all been apparently satisfactorily adjusted, it may be discovered that the external arrangements are unsatisfactory, that patients and attendants have their respective quarters with windows over-

have been better arranged had the apartments for the officials been placed next to the yard. The dotted lines indicate covered passages to the church, which passages would be so arranged as to permit of carriages being driven through to the

	PRIVATE (including all criminal patients).			PAUPER.			Total Number of Lunatics.
	M.	F.	Total.	M.	F.	Total.	
COUNTY AND BOROUGH ASYLUMS.....	514	615	1,129	26,688	32,544	59,232	60,361
REGISTERED HOSPITALS.....	995	1,340	2,335	24	35	59	2,394
(Excluding Idiot Establishments.)							
METROPOLITAN LICENSED HOUSES.....	667	816	1,483	269	331	600	2,083
(Excluding Idiot Establishments.)							
PROVINCIAL LICENSED HOUSES.....	567	766	1,333	105	116	221	1,554
(Excluding Idiot Establishments.)							
Total	2,743	3,537	6,280	27,086	33,026	60,112	66,392
NAVAL AND MILITARY HOSPITALS, AND							
INDIA ASYLUM.....	230	—	230	—	—	—	230
CRIMINAL ASYLUM.....	472	159	631	1	—	1	632
PRIVATE SINGLE PATIENTS.....	186	252	438	—	—	—	438
IDOT ESTABLISHMENTS.....	967	498	1,465	229	113	342	1,807
(Hospitals and Licensed Houses.)							
Grand Total	4,598	4,446	9,044	27,316	33,139	60,455	69,499

central yard and entrance-hall. The wings on either side of the entrance courtyard might have been advantageously arranged for nurses on one side, and male attendants on the other, instead of as shown.

In Fig. 66, which is an outline of the asylum at Claybury, is a striking example of the large number of buildings which have sometimes to be schemed upon a sheet of paper, and of the great difficulties to be met with in placing the blocks of buildings sufficiently apart from each other, without unduly extending the area of the ground covered by the whole of the asylum, or of locating departments out of touch with the administration buildings. If, as has been above suggested, the planner were to take the blocks of these buildings, cut them out in paper, and arrange and rearrange them (without previously knowing the form and direction given to the corridor scheme as a whole), it would probably be impracticable to readjust the pieces into a more satisfactory arrangement, so much does one portion affect another in such large schemes. In Fig. 66, the letters A M, B M, C M, D M, E M, F M show positions of the wards for male patients, while the letters A F, B F, C F, D F, E F, F F indicate those for females. The other departments are: A, entrance block; B, church; C, superintendent's house; D, visiting-room; E, recreation hall; F, servery; H, kitchen; L, bakery; M, storehouse; N, laundry; O, boilers and engines; R R, bathhouses; P, night nurses; Q, workrooms; S, steward's house; T, coalhouse; U, attendants' block; V, nurses' block; W, assistant medical officer's house; X X, sanitary annexes.

In large undertakings especially, there appears to be often an inclination upon the part of competing architects to submit alternative drawings for the whole or a portion of the scheme, and sometimes this has been done with the most fortunate results, the turning point being some acceptable suggestion contained upon a small flap, or "rider," added at the last moment, and possibly with much hesitation. I have known such an addition—the work, perhaps, of an hour or so—result in the architect securing a commission to erect an asylum to cost £200,000; but some architects have a prejudice against these alternative plans and flaps, and not without some show of reason, for it may be said that an architect in such matters should fully convince himself that he has discovered the best way of solving the problem he has attempted, and should not appear to throw any shadow of a doubt upon his own work, and that hesitation in arriving at a decision which is certainly suggested by the submission of alternative plans.

The materials for the history of the progress of asylum architecture are somewhat difficult of access; the works published upon the subject have chiefly been written by medical men, and never, I believe, by architects, and it is not, therefore, surprising that there should be a lack of books of an important character. The asylum system of the far past has left few records behind, while the real history of the modern asylum system is still imperfectly written. There is absolutely no independent architectural source of information in English literature, so far as I am aware, that deals more than slightly with the subject of asylum planning. What I have attempted in this series of papers is little more than an introduction to the systems of asylum planning as now practised, with some effort to invest the subject with interest, and relieve it of a little dryness by references to its history here and abroad.

The actual number of patients in England and

Wales, according to recent statistics, is given in the above table, and shows eight classes of asylums.

Taking the cost of the buildings at £150 per patient, the total amount would be about ten and a half millions sterling; but the amount has frequently reached the sum of £200 per patient or more, while £90 per patient has been, I believe, the lowest rate for the cost of any English asylum.

Therefore, if insanity had not existed in England and Wales, seventy thousand cottages might have been erected for the accommodation (at five persons per cottage) of three hundred and fifty thousand persons exclusively with the funds that have otherwise had to be expended upon asylums in this country.

[CONCLUDED.]

CHIPS.

New laundry buildings are about to be added to the workhouse of the Prescot union at Whiston, from plans by Mr. James Gandy, of St. Helen's, Lancs.

The Shifnal Rural District Council have instructed Mr. E. W. Ives, C.E., of Derby, to prepare a scheme of drainage and sewage disposal for their district.

The Oban Cottage Hospital, Oban, N.B., is being warmed and ventilated by means of Shorland's patent Manchester grates and Shorland's patent exhaust roof ventilators and special inlet tubes, the same being supplied by Messrs. E. H. Shorland and Brother, of Manchester.

After being closed three months for redecoration, St. Anthony's Roman Catholic church, Scotland-road, Liverpool, was reopened last week. The scheme of decoration of the interior is in harmony with the Gothic character of the building. The work, which cost about £400, has been carried out by Messrs. Jelly and Co., Slater-street, Liverpool.

The Franciscan Church, dedicated to St. Thomas of Canterbury, which has been raised at Woodford by the generosity of her Grace the Dowager Duchess of Newcastle, has been solemnly opened and consecrated. The new church, a copy of which is about to be erected at Stroud Green, is in the Early English style. It is by the same architect, the Very Rev. Canon Scoles.

The works committee of the Rochester City Corporation have approved the city surveyor's detailed estimate for the carrying out of the storm-water drainage of Rochester and Strood in accordance with plans already passed. The amount required will be £5,050.

The General Purposes Committee of the Metropolitan Asylums Board have carried a resolution for the purchase of 13½ acres, part of Westcroft Farm, Surrey, as a site for a convalescent fever hospital. Last year the value of the land was £62 per acre. It is now £100 per acre.

The new King Edward's High School for Girls, which has been built at the rear of The Hen and Chickens Restaurant, New-street, Birmingham, is approaching completion. It is Late Tudor in style, and is carried out in red brick with terracotta dressings. Mr. J. A. Chatwin, of Birmingham, is the architect, and the contract has been taken at about £24,000 by Messrs. Sapote and Sons, of the same city. Accommodation is provided for 300 pupils.

At Portsmouth on Tuesday the Recorder sentenced a carpenter, named Fraser Bruner Williams, to 21 days' imprisonment with hard labour, for following another carpenter, with a view to compelling him to abstain from acting as foreman of carpenters and joiners. The case arose out of the strike which has been in progress since May 1.

TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. All communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondents.]

It is particularly requested that all drawings and all communications respecting illustrations or literary matter should be addressed to the EDITOR of the BUILDING NEWS, 352, Strand, W.C., and not to members of the staff by name. Delay is not unfrequently otherwise caused. All drawings and other communications are sent at contributors' risks, and the Editor will not undertake to pay for, or be liable for, unsought contributions.

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NOTICE.

Bound copies of Vol. LXIX. are now ready, and should be ordered early (price Twelve Shillings each), as only a limited number are done up. A few bound volumes of Vols. XXXIX., XL., XLI., XLVI., XLIX., LI., LIII., LIV., LVIII., LIX., LX., LXI., LXII., LXIII., LXIV., LXV., LXVI., LXVII., LXVIII. may still be had, price Twelve Shillings; all the other bound volumes are out of print. Most of the back numbers of former volumes are, however, to be had singly. Subscribers requiring any back numbers to complete volume just ended should order at once, as many of them soon run out of print.

E. P. VILLIAMY. (The scheme of warming upper room you show us we have seen before. The suggestion is a good one for utilising the waste heat from the ground-floor fire; but it would not satisfy the demand of the ordinary occupant.)

RECEIVED.—F. J. Newton.—Town Clerk.—D. J. W.—C. R. and Co.—E. J.—South African.

Correspondence.

MODERN ARCHITECTURAL PRACTICE.

To the Editor of the BUILDING NEWS.

SIR,—Is not the solution of the difficulties surrounding modern architectural practice, so clearly and forcibly stated in your issue of June 26, rather to be found in the co-operation of skilled specialists in one firm than in the impossible struggle of a single man with the widely divergent questions which we encounter daily?

I have in mind a firm composed of three members, one of whom is the architect in the highest sense of the term—the artist-designer to whom are committed all questions of plan, arrangement, and exterior composition. The second member is a more practical constructor, skilled in the usual methods of building in masonry and woodwork, to whom is committed the charge of the subordinate working force of the office, together with the preparation of the working drawings, specifications, and contracts, and all related legal questions. The third member is an engineer who looks after iron and steel construction, electric lighting, sanitation, and kindred matters. I am not so well able to judge, of course, of the temper in England of the middle class *clientèle* to whom you allude; but in America certainly such a firm commands public confidence and receives commissions which justify such an arrangement, besides enlarging the field of its work somewhat beyond the ordinary limits of architectural practice.

One thing is of importance—namely, that

construction shall always, in every practical sense, be subordinated to design;—to which end the junior members should have had a sufficient architectural training to put them in sympathy with the paramount member, the designer.—I am, &c., C. FRANCIS OSBORNE.
Kidders Ferry, New York, July 11.

SURVEYORSHIP, LYMINGTON.

SIR,—My attention having been drawn to an error in your issue (*re* the above) of 17th inst., I consider it only right to correct the same. Mr. Pym Jones, of the Richmond Boro' Office, was the successful candidate, and myself next, out of about 60 applicants.—I am, &c.,

ED. VAN SCHEPDAEL.

Charles-road, Heckford Park,
Poole, Dorset, July 21.

SIR,—I note that in your issue of the 17th inst., one of the "Chips" reads as follows:—"Mr. E. van Schepdael, assistant borough surveyor of Poole, has been elected borough surveyor and inspector of nuisances to the town council of Lymington in succession to Mr. O. A. Bridges resigned. There were 58 candidates for the post." This is totally incorrect, as would be seen by reference to the *Lymington Chronicle* for the 16th inst. I was the candidate appointed (being at present an assistant in this office), Mr. van Schepdael, who was formerly assistant borough surveyor of Poole, where he now has a private practice, receiving five votes. There were 57 candidates, and the new borough surveyor is permitted private practice.—I am, &c.,

J. PYM JONES.

Borough Surveyor's Office, Town Hall,
Richmond, Surrey, July 22.

Intercommunication.

QUESTIONS.

[11530].—**Norwegian Timber Buildings.**—Can any reader tell me about these? I understand that the woodwork is prepared in Norway and sent over here quite ready for fixing. I presume they are warmer, and also dearer, than corrugated iron buildings. How can they be obtained?—CONSTANT READER.

[11531].—**Building Construction.**—What course of study should I adopt for the Honours Examination of the Science and Art Department?—MARCUS.

CHIPS.

A memorial window has been presented to the parish church, East Acton. The window is placed in the south aisle, and consists of three lights, in which the Parable of the Lilies is treated. The window has been executed by Messrs. Ward and Hughes, of Frith-street, Soho-square.

The town hall committee of the Cardiff Corporation decided, on Monday, to appoint Mr. George Thomas, M.S.A., of the firm of Messrs. Edwin Seward and Thomas, of that town, as expert to value the various freehold, leasehold, and other interests concerned in the site at Temperance-Town on which it is now suggested the new town hall might be built, the fee to be 65 guineas.

The Battenberg Memorial Chapel in Whippingham Church is being altered and beautified. A marble sarcophagus is to take the place of the present plain stone structure. The walls of the chapel are being adorned with marble and oak, and an open-work screen is to be erected between the columns of the chapel next the chancel.

A new Liberal Club was opened on Saturday last in Oswaldtwistle, Lancashire. The club has a frontage of 54ft. in Rhyddings-street, and contains on the ground floor reading and committee-rooms, assembly room, entrance-hall, and retiring-rooms; the first floor comprises the billiard-room, ladies' room, secretaries' room, bath and lavatories, and caretaker's rooms. The building is in Renaissance style, the front being of Ringby ashlar, and the cost £3,000. The contractors are all local men, and the architects Messrs. Haywood and Harrison, Accrington and Lytham.

The western portion of the new Glasgow Central Railway, extending from the Central Station to Maryhill, will be opened on Monday, August 3rd. With the completion of this section it will be possible to travel from Maryhill to Rutherglen, and a ten minutes' service will be maintained between the north-western and south-eastern suburbs. The line is altogether seven miles in length, its construction has occupied half a dozen years, and the cost has been one and a half millions. Mr. Charles Forman was the engineer, and Mr. D. A. Mathieson the resident engineer.

Legal.

HOUSE WARRANTY.

WARRANTIES as to drainage and the like, made either verbally or in writing in the course of negotiations for taking a house, which ultimately end in a lease being entered into between the parties, are of no value, and are not legally enforceable. Such, to put it shortly, is the result of the ruling of Mr. Justice Wright in the recent case of "Longman v. Blount" (*Times*, 12th July). The point is of much practical importance, and it is to be hoped that there may be an appeal, so that so unsettled a matter may be definitely decided. This dispute arose in regard to a house in Stoke Newington, and as to which, in November, 1893, while the parties were negotiating, the defendant had written that it was in a perfect sanitary condition. After this a lease was executed, and the plaintiff took possession. In February, 1895, he contracted typhoid fever, as was alleged, because of the bad state of the drains, and damages were now sued for in an action founded upon breach of this warranty. Evidence was given to show that when the attack of fever occurred the house was very insanitary.

But the Judge stopped the case, and directed the jury to return a verdict for the defendant, on the legal ground that the only contract between the parties was the lease itself, which contained no warranty. He held that in law the letter as to the sanitary state of the house could not be looked at to vary or add to what was in the lease, and so it could not be regarded as a warranty at all. It might have been given in evidence, in support of a charge of fraud or misrepresentation if any had been made against the defendant, which had not been done; and, indeed, if such a ground of claim had been brought forward, the plaintiff would have had to prove that the letters were false to the knowledge of the defendant, which he was not at all prepared to say. Had this case been one of yearly tenancy, then possibly the warranty could have been successfully sued upon. But being a letting on lease, the Court held that the lease alone could be looked at as constituting the contract between the parties, and so the warranty fell through. It seems to follow that the same ruling would apply to a case where there was any written agreement between the parties within which the warranty could have been included.

FRED. WETHERFIELD, Solicitor.

1, Gresham Buildings, Guildhall, E.C.

NOTE.—All questions for reply in this column must be headed "BUILDING NEWS," and must reach my offices, as above, by *Tuesday morning* to insure answer same week.

LEGAL INTELLIGENCE.

T. DREW BEAR, TOLPUTT, and BROWN v. THE ST. PANCRAS GUARDIANS and A. and C. HARSTON.—The hearing of this important case, the earlier stages of which we reported in our last issue, p. 98, was begun on July 14th at the Old Bankruptcy Court before Mr. Edward Ridley, Q.C., sitting as the Official Referee. It was, it will be remembered, brought by several builders' merchants, suing as trustees of creditors of William Brooks, of Folkestone, builder, against the Guardians of the Poor for St. Pancras, and their architects, Messrs. A. and C. Harston, for a balance of £24,226, or alternatively £24,265, alleged to be due on a building contract for the completion of St. Pancras Workhouse. Mr. Reginald Bray and Mr. A. A. Hudson appeared for the plaintiffs; Mr. English Harrison and Mr. Moyes for the defendant guardians; Mr. McIntyre and Mr. R. W. Turner for the defendant architects. The only witness examined last week was Thomas Lawrence Fearon, manager to William Brooks, the builder who carried out the contract as to which the present claim was made. Examined by Mr. Hudson on the Thursday, witness said the execution of the work was rendered more costly by the way in which Brooks obtained entry into various blocks at divers dates, and the modes in which the guardians again took possession of the buildings. As each block was completed witness and his men were immediately turned out, and in one case, that of block C, the materials were thrown out on to an adjoining site. This was on a Saturday afternoon at the end of 1892. In November of that year, an old part of H block, occupying a site on which new buildings were to be erected, was still being used as stores by witness. This seemed a constant source of annoyance to the clerk of works and the architects, as they complained that Brooks in his priced bill of quantities had provided a large

sum in the contract for stores which had not been used. At last, on receipt of a letter [produced] from Messrs. A. and C. Harston, witness did pull down the buildings in question. The effect of not getting possession of certain blocks of buildings as required was to impede the work and to delay its execution, while some contracts had to be made afresh at an increased value, and after dismissing good workmen, on account of the want of work for them, witness had a difficulty in getting equally skilled ones. The work, which should have been completed in fifteen months, was still unfinished in two-and-a-half years, which meant extra superintendence and establishment charges, plant, and interest on capital. At this point, Mr. English Harrison asked what the witnesses proposed to prove, as this was very vague. Mr. Bray said experts would eventually give the figures in greater detail. The Official Referee said if the architect did not know that to spread the work over a longer period would increase the outlay, he must be the only person in court who was not aware of the difference in cost that would be occasioned. Whether the plaintiffs had a right to recover such difference from the defendants was a different question. The witness, re-examined, proceeded to give in detail his estimates of increased cost in the several trades caused by the delay in building, stating that, after allowing credits for all materials taken over from Kirk and Randall, of Woolwich, the total due was £65,419, the amount claimed. Some of the delay arose from interference caused by the unpunctuality of contractors for special fittings, over which witness had no control, they being employed directly by the architect. Witness proceeded to give evidence of the alleged interference with foremen and bricklayers by Poole, the clerk of works. Cross-examined by Mr. English Harrison: Witness was son-in-law to William Brooks, and had been his manager for fifteen years. Witness took out the estimates for this undertaking, and arranged all the contracts and the credits with the bankers, and not Brooks. Brooks lived at Staplehurst, his business being at Folkestone, and only came up when witness wanted him. Witness admitted that in May, 1892, when the guardians had accepted Brooks's tender, Brooks wrote asking to withdraw from the undertaking, as his bankers refused to credit him with sufficient to meet so large a sum as that required; witness obtained credit from his bankers to the extent of a £5,000 overdraft, and withdrew the letter. Brooks was overdrawn to some extent—less than £1,000—at that time, but balances were due to him on other contracts. Witness considered that he was treated differently by the architects and clerk of works than he had expected throughout the contract. A great many letters from the witness to the architects asking for certificates and their replies, either granting them or pointing out that the work done was not sufficient to justify the advances asked for, were put in and were admitted by the witness. Possibly in one case witness asked for a certificate a week too soon. At that period, in December, 1893, Messrs. Harston replied, stating that in compliance with witness's request they were sending a further certificate for £2,000 to the clerk of the guardians, but that they had come to the conclusion that the contract value of the work done was short by some hundreds of £10,000, while the certificates issued came to £9,000, whereas 20 per cent. was to be retained. Witness was pressed as to whether this looked like unfair treatment, and replied that he thought Messrs. Harston drew a very fine line as to the value of the work; it was the architects' estimate of the value, and not the witness's. Witness thanked the architects on this and other occasions for their kindness, as he wanted to get certificates. The Official Referee, interposing, said this class of evidence would not affect his mind. What he should want to know about was how counsel for the defence accounted for the conduct of the clerk of works and the architects themselves. It would be useless to say to the contractor, "You have not done £9,000 worth of work," if they had stopped him from doing it. Witness, in further cross-examination, said that, in reply to a complaint of the clerk of works, Brooks received a letter from Messrs. Harston, stating that it was primarily the contractor's business to see that improper materials were not brought on the works, and if the contractor did not take the trouble to see, to examine the material himself, and reject that which was obviously not in accordance with the contract, it was somewhat unfair to blame Poole for doing so, seeing that it was the very essence of his duty. Brooks had to call a meeting of his creditors in April, 1893. The difficulties were surmounted, and a deed of inspectorship was signed, Messrs. T. Drew Bear, Tolputt, and Brown being appointed as inspectors to look after the execution of the contract.—The Official Referee: I do not understand how it is that so much of the material was said to be bad.—Mr. English Harrison: What we say is, that a great deal of this bad material is accounted for by the fact that there was not sufficient capital to buy proper material; and one of the reasons why what we allege to have been inferior materials were sent out was that they

were supplied in a haphazard way.—The witness: I contradict that most distinctly.—Mr. Harrison: Yes, but we say Brooks never had enough capital to carry on a work of this description.—The Official Referee said there might be another reason, and that Brooks might not have been paid the sums he expected.—Mr. Harrison: No; according to our view we had paid him up to the four-fifths stipulated by the contract. The amount actually expended was one of the things he should cross-examine upon. The witness was examined at great length as to the quality of the concrete, and as to whether Poole was justified in complaining of its character; but he did not admit that it was bad except in one small instance. As to the cast-iron girders, they were invoiced at £7 a ton all round, and those delivered were very good of their class. At this point the inquiry was adjourned over the Long Vacation until Nov. 14.

SEQUEL TO THE STRAND EXPLOSION.—At Bow-street, on Friday last, the owners of Nos. 26 and 27, New Church-court, Strand, were summoned under the Dangerous Structures Section of the London Building Act, 1894. Mr. J. W. Godfrey supported the summons, which was issued at the instance of the London County Council. The defendants were not represented. It was stated that the proceedings had reference to the site of houses partially destroyed by what was known as "The Strand Explosion," in October, 1895. The site had been surrounded by a hoarding; behind this hoarding a very large quantity of rubbish had been deposited. According to Mr. F. W. Porter, the district surveyor, the rubbish was as high as the first floor of the original buildings, and was forcing the hoarding in an outward direction; in fact, the hoarding was in a very dangerous condition, and immediate action should be taken. A gentleman from the office of Messrs. Bedford, Monier-Williams, and Co., solicitors, said he represented the gas company who are reinstating the adjoining premises, and he complained that the rubbish was pressing against the other houses, and was likely to do them an injury. Mr. Lushington ordered the rubbish to be removed within twelve hours.

A BOURNEMOUTH ARBITRATION AWARD.—The decision of the Official Referee (Mr. Edward Ridley, Q.C.), in the arbitration proceedings which took place in Bournemouth on the 3rd, 4th, and 5th of June, in connection with the action of "Murdoch and Cameron v. the Bournemouth Corporation," has just been made known. The plaintiffs are contractors, of London and Glasgow, and they sought to recover a sum of £1,824 in respect of balance of contract, &c., alleged to be due in the carrying out of the pier extension works. The Corporation counterclaimed £2,942 10s. for reconstruction of the work in question, value of labour and iron, &c. The Official Referee awarded the sum of £369 10s. to plaintiffs on their claim, and the sum of £1,800 to the defendants on their counterclaim, with costs to the defendants. Leave to appeal as to costs granted to plaintiffs' counsel.

AN AYRSHIRE ARBITRATION CASE.—Decision has been given in an arbitration as to the value of 5½ acres of land at Catrine proposed to be acquired by the Ayrshire County Council for the purpose of laying down a sewage farm to deal with the sewage of the village. The land in question is situated on the farm at Catrine Holm, and the proprietor is Mr. Arthur Campbell, Edinburgh. The County Council offered the proprietor £585, and he claimed £1,200 for the land required. As parties could not come to an arrangement, the case went to arbitration. The arbiters were Mr. William Beveridge, jun., of East Grange, Dunfermline, and Mr. Allan Stevenson, architect, Ayr, and the oversman Mr. G. Munro Thompson, W.S., Edinburgh. After hearing parties the arbiters failed to agree in their findings, and the oversman has awarded the proprietor £850. The County Council pay the expenses of the reference.

ARCHITECT'S CLAIM AGAINST EXECUTORS.—STOTT V. GREAVES AND ANOTHER.—The plaintiff in this case, heard at the Manchester Assizes on the 16th inst., Mr. Abraham H. Stott, lately an architect and civil engineer in Manchester and Oldham, sought to recover £191 from the executors of the late Mr. Hilton Greaves, of Oldham, for work done. The late Mr. Hilton Greaves, who was largely engaged in the cotton industry at Oldham, died in 1895. The plaintiff, while in business, had done a large amount of work for Mr. Greaves in connection with the erection of cotton mills. The case for the plaintiff was that after he had retired from business—which was now carried on by his sons—he was instructed by the late Mr. Greaves to inspect the work that was being done on the Manchester Ship Canal by the original contractor, and to report to him thereon. Mr. Stott made the inspections and reports as instructed, on various days from 1891 to 1894, and he claimed at the rate of three guineas a day, though his ordinary charge for such services was five guineas a day. The claim also included charges for surveying certain cotton mills and farms, the property of Mr. Greaves, and for a journey to Llanbedr Fair to purchase horses for Mr. Greaves. The defence was that no contracts in respect of the

charges mentioned were made with the late Mr. Greaves. The defendants denied liability, but they had paid £50 into court. The plaintiff and his son gave evidence in support of the claim, the plaintiff producing several memorandum books containing entries he had made in connection with the services he said he had rendered. In answer to defendants' counsel, the plaintiff said he had made an affidavit that these books were privileged, and could not be seen on behalf of the defendants, because he considered he had not been properly treated by them. A portion of his charges related to the preparation of plans for alterations at some mills belonging to the deceased gentleman. The Judge said the plaintiff, who had produced no accounts or contracts in support of his claim, had failed in his action. He gave judgment for defendants with costs, and directed the repayment to them of the £50 paid into court.

A BUILDING AGREEMENT.—In the Nisi Prius Court of the Manchester Assizes, on Friday, before Mr. Justice Cave, without a jury, the action of "Clifton v. Brown" was heard. This was an action to recover the sum of £164, alleged to be due under a covenant. The plaintiff is Mr. J. Talbot Clifton, a landowner at Lytham, and the defendant, Mr. Brown, is a builder and contractor. The dispute arose in connection with the letting of some land at Lytham for building purposes by the plaintiff to the defendant. The plaintiff contended that in the agreement under which the land was let there was a clause which gave him the right to charge the defendant with the cost of certain drainage works, &c. The defendant had paid into court the sum of £57, and the balance, £107, was the amount now claimed. The defence was, first, that the agreement under which the plaintiff sued did not apply to expenditure incurred before the date of the agreement, but only to expenditure incurred subsequently. Secondly, the defendant pleaded that the work, payment for which was now claimed, was not work done with reference to the agreement, and therefore he was not liable. There was no question as to the work done, the prices charged, or the measurements; the only question was as to whether the money was recoverable under the agreement. His lordship gave judgment for the plaintiff without costs.

PAVING APPORTIONMENT APPEAL.—WILLEDEN LOCAL BOARD V. WRIGHT.—In the Court of Appeal the Master of the Rolls and Lord Justice A. L. Smith gave judgment on Tuesday in this appeal from an order of Mr. Baron Pollock. The appellants, the Willesden Local Board, acting under section 150 of the Public Health Act, 1875, served notices on the respondent and the other owners of premises fronting on a certain street, requiring them to execute certain paving works, and on the owners making default the appellants themselves executed the works and apportioned the expenses among the owners. The respondent having disputed the apportionment made against him, the matter was referred to arbitration. The arbitrator made an award by which he adjudged that the contribution payable by the respondent was the sum of £175. The appellants took out a summons to enforce the award under section 12 of the Arbitration Act, 1889. The Master at Chambers held that there was no jurisdiction to enforce the award in the Queen's Bench Division, the only remedy open to the appellants being by summary proceedings before justices as provided by the Public Health Act. Mr. Baron Pollock having affirmed the decision of the Master, the appellants brought this appeal. The Court dismissed the appeal. The Master of the Rolls said that the Master and the Judge were right in saying that they could not make an order to enforce this award, because in his opinion it was not an award under the Arbitration Act at all. In the case of "West v. Downman," which was under the Public Health Act, 1845, this Court acted on the principle that where an Act creates a new liability and at the same time provides a remedy, such remedy is the only remedy. It might be that an Act provided alternative remedies, and in such a case the rule would be modified so as merely to limit the person aggrieved to one or other of those remedies. In the present case it was necessary to look at the whole of the Public Health Act, 1875. Section 150, which created the liability, gave a remedy—viz., by summary proceedings before justices. Was there any other remedy? Reference was made to section 261, which said that where an amount less than £50 was claimed, proceedings might be taken at the option of the local authority in the County Court. That, however, was not altering the liability; it was merely altering the tribunal. At any rate, that section clearly gave no right to take proceedings in the High Court. Then there was section 257, which said that expenses incurred under the Act might be made a charge on the premises in respect of which they were incurred. But that section gave no new right against the person who was owner of the premises at the time when the work was done. Then there was section 180, subsection 14, which said that any submission to arbitration under the Act might be made a rule of court on the application of any party thereto. That did not,

however, by necessary implication give the power sought to be extracted from it. They were, therefore, left to section 150. The arbitration clause in that section did not apply to the fixing of liability, but merely to the fixing of amount. The meaning of the decision in "West v. Downman" was that where the amount claimed was over £50 the only remedy was to go before a magistrate. The only remedy open to the appellants in this case was to have taken summary proceedings before a magistrate, and, inasmuch as they had not done so within six months, they had lost their remedy altogether. In his opinion the application to enforce the award had been rightly refused, the award being one which was not enforceable, so far as liability was concerned. Lord Justice A. L. Smith delivered judgment to the like effect.

LOCAL AUTHORITIES' POWERS TO REJECT PLANS.—THE QUEEN V. TYNEMOUTH RURAL DISTRICT COUNCIL.—This appeal, on which judgment was pronounced on Tuesday by the Master of the Rolls and Lord Justice A. L. Smith, was made from an order of the Divisional Court (the Lord Chief Justice and Mr. Justice Wills), that a mandamus should issue directing the Tynemouth Rural District Council to approve and pass certain plans for buildings on Lord Hastings's estate. Lord Hastings was the owner of property in the Tynemouth Rural District, in Northumberland near the sea, and he desired to erect blocks of houses comprising several streets in a place which was then open country. He submitted to the district council plans of the proposed buildings and streets, the plans showing that the drains from each house ended in the soil in the middle of the street, and showing no sewer in the streets, and no cesspool or other receptacle for drainage. The district council declined to approve of the plans on the ground that they showed no system of drainage as required by their by-laws. The Court granted a mandamus as above. The Lord Chief Justice, in giving judgment, said that on the correspondence it appeared that Lord Hastings was willing to make the street sewers, if the district council made the outfall sewer. The district council appealed. The Court dismissed the appeal. The Master of the Rolls said that in his opinion the judgment was right. All that the district council were asked to do was to approve of the plans. They were not asked to make a sewer or to execute any works. The district council had power to make by-laws as to what the plans should contain. The plans must show what buildings were intended to be erected, the line of the buildings—that is, the line of the proposed streets, and the intended system of draining the houses. The plans showed all these things. They showed how the houses were to be drained—viz., by drains from each house into what was evidently intended to be a sewer running down the length of the street. They showed all that the by-laws said that they should show. The plans did not contravene any by-law. The district council, however, refused to approve of the plans, on the ground substantially that the plans did not show what was to be the outfall of the sewer after it left the street, and it was clear that they would not approve of the plans unless Lord Hastings would make the outfall sewer. The Lord Chief Justice said that at this stage there was nothing to entitle them to deal with the plans in that way. It was said that the district council were asked to make an outfall sewer when the houses might never be occupied. They were not asked to do anything of the sort. They need not make an outfall sewer until the houses were going to be occupied. His Lordship would say nothing as to the sewers down the street; but, at any rate, the district council could then be called upon to make the outfall sewer. No by-law justified the district council in taking up the position that they would not approve of the plans until Lord Hastings showed on the plan that he intended to make the outfall sewer at his own expense. The mandamus was, therefore, rightly issued. Lord Justice A. L. Smith delivered judgment to the same effect.

An inquiry was held at St. Mary's Hall, Coventry, on Tuesday by Mr. George W. Willocks, Local Government inspector, relative to an application by the corporation to borrow £13,000 for extension of the electric-lighting works, and to cover excess of expenditure upon the present works.

The Llandilo Urban District Council, at their special meeting on Wednesday, the 21st instant, appointed Mr. David Jenkins, their surveyor, to carry out the Llandyfau scheme of water supply to the town. The probable outlay will be about £3,000.

The Duke of Cambridge unveiled, on Tuesday night, the bronze statue of the Queen, by the late C. B. Birch, A.R.A., which Sir Alfred Seale Haslam has presented to the Corporation of London. The statue is erected at the north end of Blackfriars Bridge, at the junction of Queen Victoria-street and the Victoria Embankment. The pedestal is of red Peterhead granite, and the statue itself represents the Queen in her regal robes, and bearing the crown and sceptre.

WATER SUPPLY AND SANITARY MATTERS.

BRIGHOUSE.—The first sod was cut and the first stone laid of the Brighouse Sewage Works on Saturday afternoon. The total cost is estimated at about £95,000, and the scheme is undertaken solely by the Brighouse Corporation. It will be carried out according to plans prepared and designed by Mr. Alfred M. Fowler, sanitary engineer, of Manchester and Westminster, who designed the Knostrop Works at Leeds. It is intended to treat all the sewage in the natural watershed of the Brighouse portion of the Calder Valley, including in addition to the borough, the districts of Southowram, Clifton, Hartshead, Hipperholme, Lightcliffe, a portion of the North Bierley area, Wyke, Bailiffe Bridge, and other adjoining districts. Inquiries are also being made with a view to the sewage from the borough of Halifax being dealt with at the Brighouse works. The proposed works are situate at Cooper Bridge, about two miles from the boundary of the Brighouse borough. Here 50 acres of land have been purchased for £15,000. The area is bounded all along one side by the main line of the Lancashire and Yorkshire Railway, and on the other side by the river Calder, into which the sewage effluent will be turned after it has been cleansed and purified. The principal contract—that for the construction of the main sewers and the outfall sewer—has been let to Mr. Geo. Taylor, of Blackburn, for the sum of £43,065 7s. 6d. It is estimated that the works will take about two years to complete.

BOWNESS RESERVOIR.—The work of enlarging the reservoir, which was commenced last autumn, is now practically completed. The overflow level has been raised between 6ft. and 7ft., and the surface area when the reservoir is full, will be about five acres. The alterations have more than doubled the storage capacity. No excavations have been made except to obtain building material, the chief item in the contract being the strengthening and raising of the old embankment. This has been made 6ft. 6in. higher, and is faced on the water side with blocks of Applethwaite stone set in concrete, and topped with a coping of red sandstone. Dubbs-road, which used to run by the edge of the old reservoir, has been carried higher up the hill. The original course will be submerged in a similar way to the old road by the side of Thirlmere. The old outlet pipe has been replaced by one of much larger dimensions. The engineers for the undertaking were Messrs. Newton and Son, of Manchester, who superintended the original construction of the reservoir, and the contractors for the recent improvements were Messrs. Moorson and Co., also of Manchester.

EDINBURGH.—**THE TALLA WATER SCHEME.**—The Works Committee of the Edinburgh and District Water Trust met on Monday to receive the report from the engineer (Mr. Wilson) on the tenders for contract No. 2 of the Talla scheme. Thirteen offers were lodged, the highest of which amounted to £100,847. The lowest was by Mr. John Best, Leith, but the engineer reported in respect to his tender that two of the general items had not been filled up in the schedule. He had seen Mr. Best, and the explanation had been made that the omission was a clerk's. A sum of £4,000 was in consequence added to the estimate, which then became £67,638. The Works Committee directed its acceptance. The next lowest offer was £70,376, and several were at or near £80,000.

A handsome mural monument has just been set up in Park Presbyterian Church, Canonbury, in memory of the late Rev. Dr. Edmund, who for 33 years was minister of the church. It is executed in marble and alabaster. The sculptor was Mr. Forsyth, of Finchley-road.

A large block of new buildings, consisting of a range of shops with four stories of dwelling-rooms above, is at present in course of erection at the west side of Home-street, and extending from the corner of Gilmore-place to Thornybank, Edinburgh. The ground, known as Lochrin, was recently acquired by a syndicate, the purchase price being over £34,000, and the value of the property to be erected will not fall short of £100,000. The architects for the work are Messrs. Dunn and Findlay, 35, Frederick-street, Edinburgh.

The seventh annual excursion of the York Master Builders' Association took place on Tuesday and Wednesday in last week, when Bangor, North Wales, was visited. The Railway Hotel at that city was the headquarters of the party, who were driven over to Beaumaris. On Wednesday they went to Port Dinorwic, where they were invited by the Hon. W. W. Vivian, agent and manager to Mr. Asheton Smith, owner of Dinorwic Slate Works and of the extensive slate quarries at Llanberis, to go over the same. Among those present were Mr. J. Biscomb, chairman of the association; Mr. Ankers, vice-chairman; Mr. Parker, treasurer; and Messrs. Sharpe and T. Rawling, secretaries. Subsequently the party were shown over the quay and shipping docks at Port Dinorwic.

Our Office Table.

THE Council of the Surveyors' Institution, being about to commence the construction of new and enlarged premises in Great George-street, the Institution will be removed to temporary premises in Savoy-street, Victoria Embankment, on the 17th August next. Ample accommodation will be provided for arbitrations and consultations similar to those which have been held for the last twenty-five years at the Institution's house in Great George-street, and may be secured by applying to the Secretary, by letter addressed "The Surveyors' Institution (Temporary Premises), Savoy-street, Victoria Embankment, W.C." The entrance to the arbitration rooms will be from Savoy-hill (on the east side of the Savoy Hotel). It is hoped that the new premises of the Institution in Great George-street will be ready for occupation in about twenty months from the present time.

At the meeting of the West Sussex County Council, to be held at Horsham to-day (Friday), the Roads and Bridges Committee will report that they have received 127 applications for the post of county surveyor, and, having interviewed six selected candidates, they have appointed Mr. W. B. Purser, of 7, Clarendon-terrace, Swinton, near Manchester. The new county surveyor is to have a salary of £240 per annum with expenses, including an allowance of 25s. per week for a clerk, and he is to reside at Horsham. He will succeed to Mr. Adcock's duties on September 29 next. Mr. W. Turgis Haines will be appointed as county treasurer at a salary of £250 per annum, with an allowance of £100 per annum for clerk and office, in succession to Mr. Thomas Greene, retired, who has held the appointment for 53 years.

COMPARISONS are sometimes odious; but there cannot be any doubt that those who know how the streets of Paris and Vienna are kept must be painfully surprised at the neglect and disgraceful condition of the streets of the boasted "richest city." Lieut.-Col. Dawson, in a letter to the *Times*, refers to our talk of cleanliness, and contrasts the state of the London with the Paris streets. In the latter "the principal thoroughfares are flooded from the Seine" every morning at an early hour, and the refuse is removed at once, instead of remaining in the gutters and roadways till it is desiccated and reduced to a fine powder, damped, and again blown about till it finds its way "down the throats and nostrils of the passers-by." The unpleasant smells of this dried and pulverised manure are highly offensive to some people, not to say our Continental visitors. Col. Dawson observes that the London ratepayer is rated much higher than the Parisian.

A DEFINITE scheme for the erection of a high level roadway across the Old Haymarket at Liverpool has at length been adopted by the corporation committee, which for several months past has been considering the practicability of various proposals in this direction. The project is one which first engaged the attention of the council nearly half a century ago, and has been brought forward on many subsequent occasions, provoking always keen controversy. The projected route, as devised by the city engineer, Mr. Boulnois, commences at the northern end of St. George's Hall, and runs as a high-level roadway, 60ft. in width, to the junction of Dale-street and Manchester-street, opposite Hatton-garden, being carried over the Old Haymarket by a bridge in one span of 100ft. The scheme embraces enlargement of the St. John's-gardens and alteration of the existing approach to the Free Public Library and Museum, which is to be entered from the low-level, the steps on each side being for this purpose extended. A new 60ft. low-level roadway will run on the same gradient as William Brown-street, and in line with Dale-street. The net cost of carrying out the scheme, making allowance for the sale of the surplus land, is estimated at about £140,000.

PRELIMINARY steps are being taken by a committee of the Edinburgh Town Council towards the acceptance of the gift of £100,000 for a new town-hall offered by Mr. Usher. The committee have resolved that the information in regard to the various suggested sites should be put in tabulated form, with the view subsequently of selecting a number likely to meet the requirements as to space, &c. In the mean time the committee aim

at a building capable of accommodating 4,000 to 4,500 people; and the town clerk was instructed to prepare a schedule of questions to be forwarded to celebrated speakers and vocalists as to their practical experience, from an acoustic point of view, of large halls in various parts of this country and the Continent. On the whole of the necessary statistics being obtained the committee will meet again and take further action as to the site of the new hall. In view of the city requiring compulsory power to acquire a site, it will be necessary to come to a decision regarding a particular site by the middle of November, in order that the Parliamentary notices might be prepared.

THE Streets Committee of the City Commissioners of Sewers have recently embarked upon a series of experiments in electric and incandescent gas-lighting in some of the minor streets in the City, with the view of determining the best system of illumination to be generally utilised in the future. In Wood-street, incandescent gas-lamps have been erected. In Watling-street, Old Change, Friday-street, Bread-street, and Bow-lane the electric light has been used, arc and glow lamps being employed. For the sake of comparison some of these have been fixed on brackets, while in other instances the lamps have been suspended above the centre of the roadway. The Streets Committee of the Commission will present a report to the members of that body in the near future recommending what they consider to be the best form of illuminant. When this question has been definitely settled the Commission will proceed to light by some other means than the present the minor streets of the City.

MESSRS. WRIGHT SUTCLIFFE AND SON are introducing an improved combination kitchen and scullery sink, with indiarubber drainers. The drainer is not made of the same material as the other parts, as heretofore, but is constructed by means of a strong corrugated piece of indiarubber (specially moulded for this purpose) being firmly attached to the sink. By this arrangement, owing to the non-slipping and pliable properties of the drainer, a great saving in the breakage of and damage to crockery, glass, &c., is effected—an advantage which will be greatly appreciated by heads of families, hotel proprietors, restaurateurs, caterers, those in charge of public institutions, and others. The sink, made in best fireclay, splendidly enamelled, cannot get out of order, and is unsurpassed for durability and cleanliness.

CHIPS.

The whole of the work in connection with a new Catholic Church to be built at Kirbymoorside, Yorks, for the Rev. J. A. Turner, O.S.B., from designs by Mr. Bernard Smith, of Gray's Inn-square, London, has been intrusted to Mr. Anthony Lyons, builder and contractor, of Norton, Malton, Yorks.

A new infectious diseases hospital was formally opened at Newport, Mon., on Friday. There are five blocks, including the administrative department, fever pavilions, mortuary, laundry, &c. The hospital is a mile and a quarter from the town, and is nicely situated. It occupies five and a half acres of ground, purchased for £2,573. The cost of the building and furnishing was about £14,000.

A refuse destructor and electric-light station are being built by the Shoreditch vestry. The chimney-shaft has almost reached its destined height of 150ft., and close by the same firm have made ready the brickwork for the boilers and cells.

A latten brass tablet, on a black marble slab, to the memory of the late Lieut. W. Banks-Wright, has been erected on the north wall of the Cathedral Church of St. Nicholas, Newcastle-on-Tyne.

The wards at Walsall Hospital, provided at a cost of £5,000, were opened by the Earl of Dartmouth on Thursday in last week.

The new children's branch of the Metropolitan Convalescent Institution at Broadstairs will be opened for the reception of patients to-day (Friday). It stands in five acres of ground close to the sea-shore, has accommodation for 100 children, and contains special wards for surgical cases. It has been erected and furnished at a cost of about £19,000.

The new Welsh Church at Flint, which is to be dedicated to St. Catherine, has been consecrated by the Bishop of St. Asaph. The church, which is situated at the top of the town, has been built by Mr. Matthew S. Rogers, of Flint. The church, which has cost upwards of £2,000, will be used exclusively for Welsh services.

MEETINGS FOR THE ENSUING WEEK.

SATURDAY (to-morrow).—Society of Architects. Visit to the churches of Old and New Shoreham. Train from Victoria Station 10.40 a.m. Devon and Exeter Architectural Society (Plymouth, Devonport, and Stonehouse Branch). Excursion to Buckland Abbey, July 25th, leaving Plymouth Station (G.W.R.) 1.50 p.m.

CHIPS.

The town council of Douglas, Isle of Man, resolved on Friday to invite competitive plans for the municipal offices, and that three prizes of £40, £20, and £10 respectively be offered for the best three plans. The total cost of the buildings is not to exceed £10,000, and they are to be erected in Ridgeway-street.

Estate duty has been paid on £318,402 16s. 2d. as the value of the personal estate of Mr. Edward Armitage, R.A., of 3, Hall-road, St. John's Wood, who died at Mount Edgecumbe House, Tunbridge Wells, on May 24 last, aged 79 years.

Tenders for the new municipal buildings to be erected at Llandudno were opened by the finance committee of the Urban District Council on Friday. Seven tenders were sent in, the highest being £17,285 and the lowest £13,300.

Mr. W. S. Simpson, the surveyor of the urban district of Blaydon-on-Tyne, died on Friday. A few years ago he went from Lanchester to take the position of surveyor at Blaydon, and had efficiently discharged the duties of the office.

Mr. George W. Willcocks, M.Inst.C.E., Local Government Inspector, held an inquiry at St. Mary's Hall, Coventry, on Tuesday, into the application of the corporation of that city for a loan of £13,000 for electric-lighting purposes.

Foundation-stones of new Wesleyan day and Sunday schools and a mission hall at Nutgrove, St. Helen's, Lancs, were laid on Friday. The plans for the new premises have been prepared by Mr. Frank Biram, of Windle Chambers, St. Helen's. The large hall will accommodate about 300 persons, in addition to which are three classrooms, with cloakrooms, lavatories, and heating apparatus.

Mr. Cecil H. Smith has been appointed to be assistant keeper of the Department of Greek and Roman Antiquities in the British Museum. During last winter Mr. Smith undertook the duties of director of the British School of Archeology at Athens, resuming his work at the Museum early this summer.

A statue of Robert Burns was unveiled on Saturday at Irvine, and the Poet Laureate, Mr. Alfred Austin, delivered the inaugural address. The statue is the work of Mr. Pittendrigh Macgillivray, Edinburgh.

It was reported to the corporation of Launceston at their last meeting that the entire cost of the new water supply for the town just provided from Carne Down has been £10,874.

The terracotta fountain presented to the corporation of St. Helen's by Sir Henry Doulton, and erected in Victoria Park, St. Helen's, was formally opened last week.

The new water supply for Tunbridge Wells from the boring at Pembury was formally inaugurated last week. The boring was commenced two years ago on land belonging to the Tunbridge Wells corporation, and the engine-house and reservoir adjoin. The works have been carried out under the superintendence of Mr. Mellor, the borough engineer.

Memorial stones of the new Wesleyan chapel were laid at Headless Cross, near Redditch, on Friday. The old chapel, erected in 1873, was totally destroyed by the gale of March 24, 1896. The new church is from the design of Mr. Ewen Harper, Colmore-row, Birmingham, and is Tudor in style, built of red brick, with stone dressings. The plan provides for a nave, with lean-to aisles and clerestory and chancel. There will be seating accommodation for about 400. Messrs. Surman and Sons, Redditch, are the contractors, the estimated cost being £2,499.

At last week's meeting of the London County Council the Building Act Committee reported that Mr. H. J. Hansom, district surveyor for North Battersea (who had held his office since 1867), had neglected for a considerable time past to supply the statutory returns, required to be made within seven days after the 1st of each month by each district surveyor, of the business done and the fees received by him during the previous month in that capacity. The committee recommended that Mr. Hansom be suspended for one month from duty as district surveyor for North Battersea, and that it be intimated to him that in the opinion of the Council he should resign his appointment within that period; that Mr. J. A. J. Woodward, district surveyor for Central Lambeth and part of Battersea, be appointed until further order to discharge the duties of district surveyor for North Battersea. The recommendations were agreed to.

Trade News.

WAGES MOVEMENTS.

BRIDGWATER.—The bricklayers' strike is over, the men having decided to return to work forthwith at the old rates of wages. At the magisterial sitting on Friday two men were fined £10 each, and one man was fined £5, for intimidating workmen at the brickyard. A number of cases against other men have been adjourned.

EDINBURGH AND LEITH.—A meeting of Edinburgh and Leith masons was held on Friday night in the Free Tron Hall, Edinburgh.—Mr. A. Auchterlonie presiding—to consider the recommendations of their committee, who had met in conference with a committee of employers on the previous night to adjust the working rules for the ensuing year. The recommendations of the committee were agreed to, and were as follows:—That the standard rate of wages be 9d. instead of 8½d. per hour; that any combination of workmen leaving, for an increase of wages, an employer who may be paying the uniform rate, shall be considered to have violated the working rules, and be dealt with by the operatives' association; that all imported material shall be wrought at the standard rate recognised in Edinburgh and Leith; and that the working rules shall come into force in June.

A Local Government Board inquiry was held on Tuesday week at Denholme by Colonel J. O. Hasted, C.E., in regard to the application of the Denholme district council to borrow £4,500 for providing sewage works and sewerage for their district.

The newly-erected Roman Catholic church of St. Thomas of Canterbury, in Granville-road, Sevenoaks, was opened on Wednesday week. When completed the building will comprise a nave, two small transepts, and a large chancel terminating in a semicircular apse, and having an organ chamber on one side. In the centre of the church, between the nave and chancel, is a turret, terminated by a spire of oak shingle. The style is Norman of simple and severe character, the interior of the building being faced with rough cast, with stone dressings for windows, &c. The roofs are covered with red tiles. The portion of the church at present built is temporarily closed by a brick wall 35ft. short of the length which it will eventually have when the plan is completed. The architect was Mr. Frederick A. Walters, F.S.A., of Westminster, the building being erected by Mr. E. Bevan, of Sevenoaks, under his direction.

The Douglas (Isle of Man) Southern Electric Tramway was opened on Friday. The length of line at present constructed is 2½ miles. The gauge is 4ft. 8½in., and the rails and sleepers are of steel. All the ends of the rails at the joints have been connected together with Chicago rail bonds, so as to make a good electrical continuity. At present it is a single line, with eight passing places. Features of the line are that there is hardly any straight line in it, and not a level spot on the whole road, but the worst gradient is only 1 in 16. There are three bridges of 120ft., 240ft., and 110ft. span respectively. The line will be worked on the overhead system of trolley wires. The work has been carried out by the General Traction Company, Limited, Westminster, under the superintendence of Mr. H. Lavington Fletcher, assisted by Mr. George C. Pritt. The contract for the construction of the bridges has been executed by Messrs. Heenan and Froude, of Manchester.

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TENDERS.

* * * Correspondents would in all cases oblige by giving the addresses of the parties tendering—at any rate, of the accepted tender: it adds to the value of the information.

BALHAM.—For erecting a shop in the High-road, Balham, for Mr. Whellens. Messrs. Dale and Gadsdon, 8, Union-court, Old Broad-street, E.C., architects:—
Holloway £1,670 0 0
Hoare 1,582 0 0
Johnson 1,575 0 0
Wallis (accepted) 1,457 0 0
Beare 1,410 0 0
Irwin 1,399 0 0

BATH.—For iron fencing, gates, &c., to Henrietta Park, Bathwick, Bath, for the Pleasure Grounds Committee of the Bath City Council, under the superintendence of Mr. Edwin S. Payton, 3, Wood-street, Bath, architect and surveyor:—
Woodbridge £77 18 9 ... £5 0 0
Pursey 68 10 0 ... 5 0 0
Ellett and Sons 60 0 0 ... 5 0 0
Ellet, J. 55 5 0 ... 4 0 0
Mariner and Co. 45 0 0 ... —

A.—Allowance for old iron fences.
(All of Bath.)

BELOREVIA.—For annexe to the Hans-place Hotel, Belgrave, London, S.W. Messrs. Read and Macdonald, 4A, Cork-street, Bond-street, W., architects:—
Stephens, Bastow, and Co., Ltd., Bristol £40,000 0 0
(Accepted.)

BIRMINGHAM.—For enlargement of Highfield-road Schools, for the Birmingham School Board. Messrs. Martin and Chamberlain, architects:—
Whitehouse, B. (accepted) £7,900 0 0
(Revised tender.)

BIRMINGHAM.—For new sauce-works, for Messrs. Holbrooks, Ltd. Mr. J. T. Meredith, Kidderminster, architect:—

	Nett total.	Old bricks.
Webb, W. and J. ...	£11,209 0 0	£185
Bowen, J. ...	10,677 0 0	180
Dorse, H., and Co. ...	10,550 0 0	200
Smith, J. W. ...	10,468 0 0	215
Harley, J., and Son ...	10,368 0 0	200
Robinson, W. ...	10,322 0 0	210
Whitehouse, B. ...	10,174 0 0	215
Seamark, W. S. ...	10,150 0 0	159
Goodwin, G. ...	10,107 0 0	91
Smith, H. ...	9,979 0 0	200
Law, G. ...	9,467 6 3	200
Vale, T. ...	9,432 0 0	193
Thompson, R. ...	9,409 10 0	200
Lovatt, H. ...	9,146 0 0	220
Horton, C. A. ...	8,820 0 0	215
Hughes, R. M. ...	8,717 0 0	195
Webb, G. ...	8,633 0 0	147
Trentham, G. ...	8,303 0 0	200
Smith and Pitts ...	8,030 0 0	190
Johnson, T., Birmingham*	7,500 0 0	—

* Accepted.

BISHOPSGATE.—For erecting a warehouse at Cock-hill, Bishopsgate, for Mr. W. Newman. Messrs. Dale and Gadsdon, 8, Union-court, Old Broad-street, E.C., architects:—

Brady	£873 0 0
Heaps	793 0 0
Hoare and Son	779 0 0
Irwin (accepted)	750 0 0

BOSTON, LINCOLNSHIRE.—For heating apparatus at the Park-road board schools:—
Holland Bros., Boston (accepted) £197 10 0

BROMPTON.—For alterations to the Montpelier p.h., Rutland-street, Brompton-road. Mr. Henry J. Hollingsworth, 20, Old Cavendish-street, W., architect:—
Hayden, J. H. £1,287 0 0
Oldrey, H. B., and Sons 910 0 0
Oborne, T. C., and Co. (accepted) 837 0 0

CHICHESTER.—For the execution of street improvements in the area newly added to the city, for the corporation:—
Light, W. R., and Son, Portsmouth £3,553 0 0
(Accepted.)

[Three other tenders received, £4,500, £4,250, and £3,500 respectively.]

CLERKENWELL.—For the erection of a gas-meter testing station in Rosebery-avenue, for the London County Council:—
Green, T. L. (accepted) £6,257 0 0

CODICOTE, HERTS.—For the reconstruction of the highway bridge in Compton's Close, Codicote:—
Bates, G. H. (accepted).

CROYDON.—For erecting a villa at Croydon, for Mr. R. D. Wood. Messrs. Dale and Gadsdon, 8, Union-court, Old Broad-street, E.C., architects:—
Horrocks £2,390 0 0
Marriage 2,310 0 0
Hoare and Son (accepted) 2,272 0 0

CROYDON.—For the erection of fifteen cottages on the Morland-road Estate, Croydon. Messrs. Dale and Gadsdon, 8, Union-court, Old Broad-street, E.C., architects:—
Boat (accepted) £3,450 0 0

DURHAM.—For additions to house, No. 37, South-street. Mr. H. T. Graddon, Durham, architect:—
Gibson, C. W., Durham (accepted) £29 0 0

THE BUILDING NEWS

AND ENGINEERING JOURNAL.

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FRIDAY, JULY 31, 1896.

INFLUENCE OF TEMPERATURE IN OUR BUILDINGS.

CLIMATIC conditions have largely contributed to the architectural evolution of every country. Throughout India and the East under tropical conditions we have a class of structures which are typified in the flat-roofed dwellings of the Upper Indus. The dwellings of the Aryas so graphically described in Viollet le Duc's "Habitations of Man" in the imaginary dialogue between Doxius and Epergos recur to us, as the early types of buildings exposed to the extreme conditions of temperature. These were of unbaked bricks, pisé, and cane, with roofs of unhewn timber; others occupied by the Yellow Race had roofs of bamboo, bent and covered with reeds and layers of earth to keep out the heat, while the window openings were of trellis-work—elements which we see perpetuated in the later buildings of these races. Or if we take the description of the Hindoo palace, we have the great hall receiving light and air from terraces on either side which cover the apartments, the timber corbellings of the hall forming shelters over the terraces. Heat and cold have been great factors in the moulding of architecture and style: they have determined the form of roofs, of fenestration, and of features which no other influence could have effected. Has the modern architect paid sufficient attention to them as modifiable conditions? In his eclectic preferences, his selections from foreign styles, he has often forgotten the climate—those extremes of temperature for which the British Isles are credited. It is useless for him to "kick against the pricks," to resist those subtle and potent agencies ever at work, which must fatally determine any preference he may have not adapted to the climate—a result which overtook the short-lived Athenian and Italian revivals.

With a temperature ranging somewhere between 80° and 90° in the shade, converting our rooms into veritable hot-air and vapour baths, the ordinary dweller in our towns must have been inquiring of late as to any means of excluding heat, and of rendering our buildings and houses more habitable. The resources of the modern citizen are few. He is content to shut out the sun's rays by sun-blinds of various materials or shutters—to put an awning over his front door—to open the cold-air inlets of his ventilators—to keep his windows partly open—to betake himself to the shelter of shady nooks or refreshing trees—to cool the atmosphere of his rooms by sprays of iced or perfumed water—to indulge in bathing and cool drinks. But while he excludes the sun's rays, he at the same time shuts out his views, and his means for cooling the air, which is hotter outside than inside his house, are exceedingly difficult to carry out.

Many have asked if a modern building is capable of excluding heat to an appreciable degree, or if architects are conversant with any effectual methods on the subject? Our old houses and churches are certainly cooler than the new ones. Of this there cannot be any doubt, and why this should be so it is not difficult to explain. We hear of people who are living in new houses complain of the heat of their rooms—that they are cold in winter and hot in summer; they tell you the sun's rays seem to pierce them, and that the very walls and windows let in the heat. The allegation is too true to be denied; the thin walls of the modern-built house and

the quality of the bricks and roof-coverings are favourable to the heat passing through. The flimsiness of the modern wall is answerable largely for this rapid transmission of heat and cold. The older houses are built with thicker walls—at least half a brick more than the average modern house—the walls are better bonded and more compact, the mortar is harder, and they are often "battened" inside, and less transmissible to heat and cold. And how much more solid is the old roof, with its stouter rafters, its boarding, and its tiled coverings, than the flimsy roof of to-day, with its heat-conducting slate surface. On the whole, it must be acknowledged the impeachment of the modern building in these particulars is well founded. Architects have not done much to render them proof against these attacks of excessive heat or cold; economy, cheap materials, and modern ideas of elegance and lightness have all been prejudicial to the resistance of the structure to the weather, and of contributing to rob the modern house of its comfort and equable temperature. Anything which reduces the substance of the shell of a building, or which increases the size of its openings, must of necessity render it less habitable under great extremes of temperature. If we could all live in buildings of asbestos or slag wool, or even of wood and mud, some compensation for this thinness might be obtained; but our prevalent building materials, our brick, slate, and glass, are all more or less conductors of heat—they, indeed, form a considerable part of the outer casing of our buildings. But if we cannot build solid and thick walls as of yore, we can make them impervious to heat by other means. We can build them hollow, with a cavity of 2in. or 3in., the outer thickness throwing off the sun's rays, and the cavity or air-space rendering the inner thickness of wall comparatively cool. Architects have a prejudice against the hollow wall: it does not impart the solidity they desire, the openings are not so easily made, and there is a loss of strength or bond—good reasons as far as they go for preferring the thick, solid wall. Again, the London Building Act and provincial by-laws have favoured the solid wall for obvious reasons, and so it has come about that solid brick of minimum thickness is adopted, without the advantage of the old-fashioned plan of battening the inside, which materially aided the non-transmission of heat and cold. We might enter into a disquisition on the various methods of constructing hollow walls, and of the materials introduced, such as external slabbing and tile-work, internal lathing, like the "expanded metal," filling the cavity with slag-wool, or other non-conducting substances; but it is enough to draw attention to the fact that all such modes are looked upon with disapproval, or are considered innovations by a large number of the profession.

Another reason why our modern buildings suffer from an excessive heat is the increase of window openings. They are larger, and more numerous than those seen in the older dwellings. The Tudors possessed, it is true, large mullioned windows, but the glass was thicker, and not so easily penetrated by the sun's heat. In later times, especially during the Georgian era, the window space was small compared with the amount of wall area. Hospitable as our forefathers were, their hospitality was at least in an inverse ratio to the size of their windows, and it was left for a more showy age of plate-glass, and so-called "art" crazes, to make up for real urbanity by the extent of their window openings. What with the Blusters and Showgoods of modern society, the tendency has been to introduce more glass into our houses and shops. Mrs. Brown has a great idea of display, and insists on a house with large windows, and if it is a corner house she prefers both sides to have

windows, even if thereby wall-space and comfort are sacrificed. The ordinary "jerry" builder knows this feeling and takes care to satisfy it when he builds. He puts in a large square or octagon-ended bay on one side and a plain window or two in the return front. There is a lead, or more probably zinc, flat over the bay, which gets intensely hot under the rays of a noon-day sun. The upper rooms or bedrooms have also plenty of glass windows. With such a surface of glass, how can cool summer rooms be maintained? It is next to an impossibility. The transmissive power of glass compared with other materials is large; its absorbing and radiating powers which are equal rendering it one of the most heat-transmitting substances. The ordinary Mrs. Grundy draws down her Venetians or blinds, but with little effect when they are inside the glass, as they get hot too, and it is always better, of course, to place the blind or screen outside the window, so that the glass may not receive the direct rays—a lesson which some people are long in learning. The want of attention to aspect in the planning of some houses is another mistake. Windows are placed on the south and western sides when cooler positions are available. We often find dining and drawing-rooms made unbearably hot by large windows, which let the sun in during the hottest hours of the day. In some public offices the clerks and officials suffer much from heat, and several public libraries are rendered too warm during the summer months for comfortable reading. Large side windows or skylights and flat roofs are often the only modes of lighting warehouses, workshops, technical school classrooms and laboratories, and free libraries, and if these openings occur on the sunny sides of the buildings, the rooms are oppressive and uninhabitable, as no ventilation or change of atmosphere can be effected without draught. In these circumstances, the architect can avail himself of external blinds, screens, double windows, and roofs, so as to cut off the sun's rays as much as possible from the interior—preventive measures which are seldom adopted, however, to the extent they deserve. The extraordinary extremes of our climate, it will be said, render it impossible to adopt features which are used in tropical countries that will equally serve the exigencies of an Arctic season. No doubt. We may adopt Indian verandahs and felt roofs, the overhanging eaves and wooden roofs of Burmah and Japan, which would be quite unsuited for our winter; we may combine these tropical Asiatic features with the high roofs and large windows of Northern Europe, and produce a kind of hybrid. Extremes meet, as they have in some of our architectural styles, which are elastic enough to be employed anywhere between the Arctic Circle and the Tropic of Cancer. Even the verandah, so essential an addition to the Indian building, is equally serviceable for one in these latitudes, if it were not for our greater need of light, which often renders that feature an obstruction; but with respect to materials and the building of our walls and roofs, the same principles hold good for both extremes of temperature. Protection from both heat and cold is assured by the use as far as possible of non-conducting materials, such as slag-wool, felt, or by the intervention of an air space in our walls and roof. In a few recent buildings the cornice—so valuable a feature in the South and akin to the verandah—has been curtailed to give more light, but we doubt whether any great advantage is thereby secured. As a shade to the walls, both from intense sunshine and a shelter from rain, it has undoubtedly use as a protection.

We hear of complaints also from householders of the difficulty of drawing cold water from the taps during the late hot weather; the same people may suffer from frozen pipes in the winter. The inconvenience

of the former arises from the plan of placing hot-water pipes close to the cold-water supply and service pipes; the remedy for which is simply to protect each set of pipes separately, so that the heat may not be abstracted from the cold, and vice versa. Another class of complaints come from people who frequent close and stuffy concert-rooms or churches. The windows are opened, and the consequences are cold draughts of air upon crowded assemblies moistened by perspiration. All this might be avoided by proper ventilation, by securing a change of air through inlets properly placed, distributing evenly and tempered streams of air; but nothing seems to assuage the suffering of certain people but large doses of cold air delivered in copious streams in a heated and unventilated room. The door or window on one side becomes the natural inlet, and a blow-through of blast-like strength to the opposite openings is a natural consequence. When pneumatic laws and physics generally are better understood by Mr. Smith and Mrs. Jones, we may possibly see buildings erected with a little more regard to these and other matters to which we have drawn attention.

REJECTION OF PLANS BY LOCAL AUTHORITIES.

COMPLIANCE with the technical details of the law is a sorry experience among many. Those who are engaged in the administration of Acts of Parliament have long discovered how in exacting the letter of the law they run the risk of defeating the real purpose they have in view. Many of those building cases which come before the magistrate or the courts of law aptly exemplify the precept. Architects and builders in most places have to submit to the by-laws made by urban authorities, who possess power, under section 157 of the Public Health Act of 1875, to make such by-laws with respect to several matters, the level and construction of new streets and the sewerage; the structure of walls, foundations, roofs, &c., of new buildings; with respect to space about buildings to secure a free circulation of air; and with respect to the drainage of buildings, &c. The authorities, in carrying out these matters, are empowered to serve notices, to require the deposit of plans and sections to remove or pull down and to inspect premises. As to the question of notices and deposit of plans, owners of property and local authorities are often at variance. A person begins to lay the foundation of a building without giving a sufficient notice or depositing the required plans, and subjects himself to a penalty. These by-laws are frequently unreasonable, as when a month's notice is required, accompanied by plans—a condition which seriously delays the owner's building; or when some trivial objection is taken to a proposed building because the plans are not exactly what the Act requires. With regard to a month's notice, it has been held (*Hattersley v. Burr*) that under such a by-law a builder might be delayed two months. It has also been held that if an owner gave notice of his intention to build, and submitted plans and sections with the board, he might at once commence to build subject to the right of the board to alter or pull it down if not in conformity with the by-laws—a decision which seems reasonable enough to those who have good intentions of following the law. Another decision has held that a by-law requiring a person to give a fourteen days' notice of his intention to build and to deliver plans and sections to the board's surveyor, was reasonable and valid, and that anyone infringing it should be liable to a penalty. In any case, this by-law as to notices should be framed with reason and discretion, having reference to the circumstances of each locality.

On the question of submission of plans and their rejection a great deal may be said. The local surveyor has often a thankless office. He is blamed for requiring minute compliance with the by-laws; held responsible if he does not exact obedience; often charged with favouritism by some, and equally denounced for his red-tape by others. He must not exercise any discretionary powers, or he is regarded as an unjust official. Sometimes he is at fault. We have known the surveyor complacently follow the injunctions of the legal adviser or clerk to the board in matters which are strictly within his own jurisdiction, with the result that when a dispute arises the clerk puts all the blame on the surveyor for exacting too much or not using a little more discretion. Sometimes, also, he allows the committee to decide upon a technical point, which submission may cost him the sacrifice of much peace of mind. Of course, partiality and favouritism are glaring faults visited by their own retribution, and must sooner or later bring their reward. On what principle local authorities sometimes act it is hard to say; but as long as they keep within the letter of the Act they can do many incomprehensible things without much trouble. The case heard the other day, in which the Tynemouth Rural District Council appealed from the decision of the Divisional Court, and which appeal was dismissed, has some interest for our readers, inasmuch as it shows the danger of any authority rejecting plans which are clearly within the by-laws, and showed all that was necessary. From the statements published in the report of the case, it was sought to pass certain plans for building on Lord Hastings's estate. The plans showed blocks of houses, including several streets. These plans were submitted to the district council, and they showed that the drains from each house ended in the soil in the middle of the street, but no sewer was shown. The council declined to pass the plans on this ground: that they provided no system of drainage as required by their by-laws. The Court granted a mandamus, and in giving judgment, the Lord Chief Justice said that it appeared that Lord Hastings was willing to make the street sewers if the district council made the outfall sewer. The Master of the Rolls, in dismissing the appeal, confirmed the judgment. The district council were asked to approve of the plans; they were not asked to make a sewer. The plans were required to show what buildings were to be erected, the line of streets, and the intended system of draining, and they showed all these things. The by-laws were, in fact, all complied with; but the district board refused to approve the plans, because they did not show what was to be the outfall of the sewer after it had left the street. The council were not asked to make an outfall sewer, which need not be made till the houses were occupied. It was obvious that the district council had to provide a system of outfall sewerage, and had exceeded their duty in refusing approval, as there was nothing in the plans that contravened any of the by-laws. On these grounds the Court held that the rule must be made absolute. The moral is clear. If a set of plans deposited contain all that are required by the by-laws they cannot be rejected. An architect prepares plans for a building estate which show separate drains from each house leading into the sites of new streets. He cannot do more. He is not compelled to show any outfall sewer for these drains, which is clearly the duty of the authority to provide. The rejection of the plans in this case shows with what pertinacity some boards cling to what they consider their rightful demands—how they manage sometimes to exceed the requirements of the law. No doubt it will be said their action was on the safe side—they wanted to be satisfied that the drainage was not to be left in the streets,

and they looked for a disclosure of the whole scheme which they themselves were responsible for.

NATIONAL COMPETITION WORKS AT SOUTH KENSINGTON.

ALTHOUGH there were rather fewer works sent in by the School of Art students this year than last (45,220 as against 47,978) the awards have been more numerous, and the exhibition opened last Monday at South Kensington is consequently of a higher standard and correspondingly increased interest. Beyond this satisfactory circumstance, the Retrospective gathering of students' prize works for the last 12 years, shown in the adjoining iron building, very materially augments the value of the exhibition, enabling the visitor to renew acquaintance with several old friends, and also, which is of more value still, to pass in review the style and manners marking the change of fashion in drawing and design observable during the decade in question. Last year there were 4,044 works selected for the National Competition, and this year there were 4,398 so chosen, with the result that 11 gold medals, 87 silver medals, and 250 bronze medals have been awarded, besides 438 book prizes. With such an array of prize work it was obviously impossible to display more than a leading proportion of the individual examples. It is, however, to be remarked that some of the minor prize work is much more interesting and satisfactory than some of the more ambitious productions which have obtained gold and silver medal awards. This comes about inevitably, for it will be clear to anyone who has given a second thought to the subject, that certain works must be awarded either gold or silver prizes or nothing; and, besides, skill in execution and perseverance in labour has to be taken into account, as well as original conception and ability of design. On the other hand, sketches and proposals made in an elementary way are generally more suggestive and fresh in idea, though they can hardly claim recognition in competition for the higher class of prizes. These are the reasons which account for a degree of disappointment unavoidable in all competitions of students' work to a greater or less degree. The examiners appointed to make the awards of prizes for works submitted for National Competition were Messrs. Maurice B. Adams, F.R.I.B.A.; Prof. Geo. Aitchison, A.R.A.; H. H. Armstead, R.A.; E. F. Brewtnall, R.W.S.; T. Brock, R.A.; A. F. Brophy, Alan S. Cole, Hon. John Collier, E. Crofts, R.A.; Lewis F. Day, W. De Morgan, G. J. Frampton, A.R.A.; Arthur Hacker, A.R.A.; H. Graham Harris, M.I.C.E.; Erat Harrison, T. G. Jackson, A.R.A.; Goscombe John, G. D. Leslie, R.A.; W. R. Lethaby, Seymour Lucas, A.R.A.; J. J. Stevenson, Hamo Thornycroft, R.A.; R. H. A. Willis, W. F. Yeames, R.A., with T. Armstrong, Director of Art, making a list sufficient to serve as a guarantee of capable and unquestioned selection.

Among the architectural works displayed—and these, of course, attract our foremost attention—we agree with the examiners that there are no instances of remarkable excellence; but the average character of the exhibits is very creditable. The metal-work section is redeemed from failure by the gold and silversmiths' work, which displays a less commonplace character and more freshness and invention. The decorative designs for mural execution call for notice; but the stencil designs are often too ambitious, and efforts are made to overcome difficulties for which the stencil-cutting is not adapted. One gold medal only is given to the Architectural section. This is for a Triumphal Arch design, submitted by Mr. Peter S. MacLauchlan, of Glasgow; but the figure-drawing is indifferent, and too few details are given. There is more freshness and spirit in Mr. Wm. Haywood's slightly-rendered designs for the

Fittings and Furnishings of a Church, which are free and clever. It has been pointed out, that although a silver medal is given for these, the author has not quite realised the difference of scale and treatment between stone and wood detail, and, moreover, the subsele in his stalls could not be sat upon because of the projecting book-board above. The same student has some admirably careful drawings on view from Ford's Hospital, Coventry, shown in delicate outline, and more sketches from Evesham, for which set he wins another silver medal. The picturesque design submitted by Mr. H. T. Buckland, also of the Municipal School of Art, Birmingham, for a Cottage Hospital, deserves its medal, and if we may judge by the photograph attached to the strainer, the author has studied his proposals in the round by making a clay model, which is always a good thing to do. The Wayside Inn, by Mr. E. F. Reynolds, from the same place, is reserved in manner and sympathetically designed, with rough-cast plastering to the upper stages rising on a stone base tastefully handled. Mr. John D. Walker pleases us by his sketches of old buildings gracefully executed in pencil, though we are bound to admit that for practical purposes they are, at the best, of little use to the student, who should never neglect to draw and measure detail. The series of designs for Coal-boxes and Scuttles in metal, by Mr. A. H. Baxter, are as workmanlike as they are original, and the examiners do well to remark that this is the sort of drawings which should be seen in greater numbers. The silver medal design, too, by Mr. P. W. Smith, of Manchester, for a Lock-plate and Handle, is delicately modelled and refined in design. There is freshness also in Mr. Herbert Richter's Drawing-room Cabinet from Bath; but the tricky drawing by which it is shown in no way improves the design. Mr. Maxwell O. Ayrtton, of Chester, sends a rather good Jacobean sort of Staircase, for which he takes a bronze medal. The balusters are shaped with grotesque heads in silhouette, rather coarse, and too tall for comfortable use. The Sundial design, by Mr. A. T. Roberts, of Leicester, is a worthy contribution of good outline, and delicate detail with figure-work rather successfully introduced. Mr. P. W. Smith, before named, is a really capable student. His bronze medal studies of Animals (260), and his designs for Hinges and a Knocker in cast bronze (261) show considerable invention. Miss Bertha Goff, of Holloway, has an outline design in flat tints of a Poppy composition, which calls for remark by reason of its arrangement and drawing. Mr. Edward M. Southgate, of Cambridge, exhibits an untitled water-colour view of a nice old Staircase, and Mr. Charles B. Pearson takes a bronze medal deservedly for the measured drawings of a Staircase at Lancaster, now in a house about to be pulled down. The frightful design for a Chancel-screen by Mr. Charles J. Menart, of Glasgow, shows the sort of thing to be avoided. We suppose the book prize given it is in recognition of the enormous amount of misdirected labour expended on the drawing. On the principle mentioned at the outset, he deserved a medal or nothing—the last alternative would have been appropriate. The Casket design by Mr. Omar Ramsden, of Sheffield, recalls Mr. Alfred Gilbert's methods. Mr. Alfred Jones is successful with his Book illustration, and we can speak highly of Mr. Herbert C. Oakley's designs for Metal-work (awarded a silver medal), also the design for an Overmantel by Mr. Joseph Ogden takes a like prize deservedly, although the architectural part of his work is distinctly indifferent. The design for a Wall Fountain by Mr. J. G. Hardy, of the South Kensington Training School, is fresh and spiritedly conceived, and Miss Florence H. Steele sends a well-designed Finger-plate, taking therewith a bronze medal. Mr.

Wm. J. Symes is successful among those who measured up a part of the river front of Somerset House, and his drawing is tinted in sepia. St. Mary's, Banbury, is measured by Mr. P. E. Galpin, who wins a silver medal; while Mr. Benj. Bower, of Birmingham, is equally distinguished for some pencil elevations of the staircase to the Chapter-house of Wells Cathedral. Mr. Lucas sends St. Columb's Cathedral, Londonderry, and Mr. Soutar is also given a bronze medal for some poor delineations of Dairsie Church, and some crisp outlines of Holyrood Abbey by Mr. R. H. Baxter hang near. The Magazine Gate at Leicester is measured up by Mr. A. R. Widdowson. Mr. J. A. Swan's capital studies from Belgium, including "The Skipper's House, Ghent," are honestly deserving of the silver medal awarded him. The Limoges Cathedral stone Rood-screen is well drawn in sepia by Mr. Roland D. Rawcliffe (809), and Mr. Swanwick makes a carefully-measured detail of the Chancel-screen in St. John's Church, Leeds, a famous piece of Jacobean detail, well known to the student of the English Renaissance.

THE ROYAL INSTITUTE OF BRITISH ARCHITECTS.

STRONG words were used and feeling ran high at the meeting of the Royal Institute of British Architects on Monday last, when the new president, Mr. George Aitchison, A.R.A., occupied the chair. The proceedings soon became irritatingly irrelevant, and quite beyond the control of the chairman, whose incapacity for such a position, into which he has been elevated by the powers that be, was at once manifest to the onlookers. Mr. James Brooks speedily lost patience with the turn things were taking, so with a *sotto voce* expression of opinion to this effect, he strode out of the assembly. Mr. Williams, who once again prominently associated himself with the attack levelled seemingly against the council, is by no means a convincing or effective speaker, and although his aim is not very clear, no room remained for doubt as to the purport of his charges, that certain holders of the Fellowship at the Institute were in the habit of accepting surreptitious commissions. This produced a climax. When challenged, no individual instances, however, were forthcoming, and the meeting was left in the dark, unable to verify the accuracy of these pleasingly unpleasant "suggestions," which more than one speaker denounced with warmth and verbosity. The whole question of this sort of dress rehearsal held on Monday presumably had reference to the modifications proposed by the council for the election of architects as Fellows. The method of black-balling introduced by a clique of Associates under the influence of Mr. Beresford Pite a short time ago was declared by Mr. Arthur Cates to have done the Institute more harm than anything else, seeing that men of repute and standing in their profession would not consent to be knocked over in this irresponsible fashion, and that perhaps merely to exclude from election some individual whose name chanced to appear in the same list. Colonel Edis favoured the meeting, and Mr. Brydon approvingly commended some parts of Mr. Williams' indictment, though his reason for this course became scarcely quite evident, while Mr. Woodward is said to have enlivened the business. Mr. Aston Webb, with dignity and decorum, was put forward to advocate the proposals of the council, and it is a pity he did not occupy the chair. The prosperity of the Institute could scarcely be in better hands; but Mr. Webb was hardly assuring, and the deficit, both in the number of Fellows and in the balance-sheet, still remains. That some members of the Institute do take money from persons whose goods they specify surely can hardly be doubted, and those who are in practice outside the Institute have been associated none the less with payments of this kind. Manufacturers know very well that unless liberal discounts are allowed their goods do not get used, and some makers who refuse to put in margins of this kind find it impossible to insure their productions being specified by certain architects, although their articles are of undoubted excellence as specialities. Unless the manufacturers combine to expose this sort of thing, it will continue. At present no maker seemingly feels justified in

risking a customer by exposing his methods of blackmail. This is one reason why it is so difficult to prove a case sufficient to serve the purposes of defence in an action in a court of law, and no one realises the difficulty more than the council at the Institute. All the candidates for election as Fellows put forward at the above meeting were duly elected. We gave the list on July 10th.

ADAPTABLE SPECIFICATIONS.—II.*

AFTER "Preliminary, Sundry, and General" Clauses (dealt with in the BUILDING NEWS for July 24), come those which relate to Excavating and Foundations. It may be useful to preface this section of the specification by some statements and figures relating to its subject.

EXCAVATING AND FOUNDATIONS: REMARKS AND MEMORANDA.

The ideal of a foundation is, that every part of the area on which it rests should be equally firm, and that every square foot of the foundation should press on this area with the same force. Like other ideals, this one is seldom quite attainable in practice. One part of a building site is often a little harder or a little softer than another; and, again, one part of the work may be much more heavily weighed than adjoining parts are. Variations in the soil can be dealt with by familiar expedients. Soft spots, where they are small, are dug out till a sounder surface is reached, and the extra depth is then filled in with concrete or walling. Where this is impracticable, other means are resorted to—one of them being the spreading out of the foundations in proportion to the local weakness of the ground. An exceptionally hard spot is as dangerous as a soft one. Whether it results from the outcrop of a ridge or pinnacle of rock in the midst of an area which generally consists of clay, from the presence of large boulders, or from the existence of old walls or roads, it should, if possible, be removed. The building, if it sinks at all, should sink equally at all points, or cracks and settlements will result. In clay, loam, and similar soils, it is sure, if heavy, to sink a little. But this does no harm if the sinking is uniform, and to make it so the pressure per square foot must be uniform also. This result is commonly aimed at by spreading out the footings and the concrete where the weight on them is greater. This, however, is not always enough. There are cases in which it needs to be supplemented by reducing other footings to less than the usual widths, when the weight on them is relatively very small. Building acts and by-laws commonly prevent this; but if it were skillfully managed, we should not expect, as almost "the regular thing," to see vertical cracks and fractured arches wherever a low and light building is carried up with and bonded to a heavy one.

Where the foundation is of rock, the textbooks say that it only needs squaring and levelling. Rocks, however, vary much, both in their strength, their cohesiveness, and the angle at which they lie. That, *e.g.*, on which the cathedral of St. John, New York, is now being built seems to be unfortunate in all these respects. Large pits for the pier footings have consequently been quarried in it, going down to a more solid stratum. The surfaces thus reached have been dressed and cleaned from loose fragments with wire brushes and hose. Each pit has been filled with concrete composed of one part of cement, two of sharp sand, and three of gravel, formed into layers 10 in. thick, and rammed till the layer was reduced to 8 in. After each layer has set it has been covered with a bed of cement and sand (one part to two) on which the next layer has been deposited, and so on to the top. The pressure which these concrete blocks will transmit to the rock they rest on, will, in the case of the central tower piers, be about 10 tons per superficial foot.

Foundations in chalk are often very good and uniform. They need to be protected from surface-water, which softens them. Gravel, if hard, thick, and compact, makes an excellent foundation. Unfortunately, it often occurs in thin, irregular patches, resting on clay. Where this is probable, and a heavy structure is to be erected, it is well to make a number of trial borings on the site, from 20 ft. to 40 ft. or 50 ft. deep, preserving the cores which are brought up, so as to learn what it is that really underlies the

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apparently sound stratum which is first arrived at. Clay varies greatly in quality. Where it is firm and full of pebbles it is usually at its best. Where it is smooth and shaly, as, for instance, in parts of the Epping Forest district, it is almost at its worst. Mere exposure to dry air for a few days will then reduce it to a laminated state, and make it crumble off in flakes; while rain softens it and makes it slide away bodily. Nearly all clays are affected by atmospheric changes. They shrink in dry weather and swell in wet, so that the walls which rest on them are in danger of a constant up-and-down movement which gradually ruins them. The remedy for this is to take the footings down deeply, to a stratum which remains slightly and constantly moist. A wide layer of concrete will assist in retaining this moisture. Coarse, sharp sand, if it cannot escape laterally, may afford almost as secure a bearing surface as gravel. Fine, soft sand is worse, and running sand, like peat and mud, offers an engineering problem to be carefully thought out and dealt with individually in each separate case as it arises.

A well-known cause of failure is the formation of cellars, deep sewers, railway cuttings, and similar excavations near to the foundations of a building; and another, in the case of water-bearing soils, is the draining away or pumping-up of the water they contain. An architect cannot always guard against future injury to his own building from such causes, though the law will provide his client with a remedy; but he will naturally guard against doing harm in this way to his neighbours. Where the necessity occurs, therefore, he will provide for the underpinning of adjacent premises.

EXCAVATORS' MEMORANDA.

1 cubic yard of gravel or earth is equal, when dug, to 27 heaped bushels.

1 cubic yard of sand is equal to 18 heaped bushels.

1 cubic yard of concrete requires 34ft. cube of materials, or 29ft. cube of ballast and three bushels of lime.

A wheelbarrow holds $\frac{1}{10}$ th of a cube yard.

A "run" is 22 linear yards.

13½ cube feet of chalk weigh a ton.

17½ " " clay " "

19 " " gravel " "

21 " " river sand " "

21½ " " pit sand " "

21 " " loam " "

23½ " " shingle " "

3 bushels of blue lias lime = 1 bag.

2 " " grey-stone lime = 1 bag.

32 " " lime = 1 load.

36 " " ground lime = 1 ton.

A labourer will break up about 3½ yards of old bricks in a day into sizes to pass through a 3in. ring.

The natural slope or angle of repose of gravel is, on the average, at about 40° with the horizon.

The natural slope or angle of repose of sand is, on the average, from 38° to 22° with the horizon.

The natural slope or angle of repose of garden mould is, on the average about 30° with the horizon.

The natural slope or angle of repose of dry clay is, on the average, about 45° with the horizon.

The natural slope or angle of repose of wet clay is, on the average, about 16° with the horizon.

Concrete is best made either with Portland cement or with hydraulic lines. The Dorking or "grey-stone" lime commonly used in London is obtained from the lower chalk beds at Dorking, Lewes, Petersfield, &c., and is feebly hydraulic. The Warwickshire blue lias lime is superior to it in this respect, as is also the Aberthaw lime, much used in South Wales. The following is the essential part of the London County Council's present specification (1896) for Portland cement, a tolerably safe one to adopt:—

"The whole of the cement is to be highly-burnt pure Portland cement of the best quality, free from lime, slag, dust, or other foreign material mixed with it after the cement has left the kiln. The cement, neat, must not set in less than 30 minutes. It is to be ground so fine that the residue on a sieve of 5,800 meshes to the square inch (equal to about 76 per lineal inch) shall not exceed 10 per cent. of the whole by weight.

"The cement, when tested next, is to be mixed with about 17 to 20 per cent. of water, and shall then be capable of sustaining a tensile strain of 400lb. per square inch, seven days after being made into briquettes, during the last six days of which the briquettes have been immersed in water. At the expiration of 28 days the briquettes shall be capable of bearing a tensile strain of 550lb. per square inch, having been immersed in water during the last 27 days.

"The cement, when tested with sand, is to be gauged with three times its weight of dry sand, which has passed through a sieve of 400, and been retained upon one of 900 meshes to the square inch. The cement and sand having been well mixed dry, about 10 per cent. of their weight of water is to be added, and briquettes formed in moulds of one inch sectional area at the weakest parts. The briquettes having in the mean time been kept in a damp atmosphere, are to be put into water 24 hours after they have been made, and shall remain in water 27 days more, when . . . they must bear without breaking a weight of 200lb. per square inch. The strain is to be applied in all cases at the rate of 200lb. per minute. The specific gravity of the cement is not to be less than 3.10."

It is often specified that the cement must not weigh less than 110lb. per superficial striked bushel. A "standard" sand which will meet the requirements of the above specification is found at Leighton Buzzard.

A rough test for some of the defects to which cement is liable is to make up into a lump with a proper amount of water, and divide it into two portions, each about as wide as the top of a teacup, but thin at the edges. Each should be on a piece of glass. After 24 hours, keep one under water, and let the other remain dry. If the dry one crumbles, or the wet one cracks and curls, the cement is not to be trusted.

Safe Loads for Foundations.—Some writers try to calculate from the natural slope, or "angle of repose" of different kinds of ground, how much pressure per square foot each kind will safely bear. Assuming the safe load in this case to be one-third of the ultimate strength, they arrive at the result that hard dry clay will safely bear about 3 tons to the square foot, and soft wet clay scarcely half a ton. Gravel, by the same rule, is inferior in strength to hard dry clay, and can only be trusted to about 2 tons; while compact earth, in theory, is superior to it, and would carry safely 4 tons or more to the foot. These results are hardly in conformity with experience. The trustworthiness of a foundation depends on many things beside the "angle of repose" of its constituents. Practice shows that firm, compact clay, not dry, but kept evenly moist and unaffected by atmospheric changes, will safely bear, for many years, at least 2 tons to the square foot. Compact gravel, according to the general belief, will support more; but earth, whether "firm" or not, would not usually be trusted with more than a ton, or at the utmost, a ton and a half on the same area.

PART II.—EXCAVATING AND FOUNDATIONS.

II. 1. SURFACE DIGGING.—Carefully take off the surface of the site, within and around the buildings, to the levels shown on the drawings.

II. 2. REMOVING CONTAMINATED SOIL.—Dig out and entirely remove from the premises the whole of any soil, within or under the buildings, which is contaminated by faecal matter, by drainings from stables or cattle-sheds, and the like, or by animal refuse of any kind. Fill in with clean sound earth the cavities so formed, and well ram this earth, layer by layer, as it is put in.

II. 3. TRIAL BORINGS.—Provide the sum of pounds for work to be done in making trial borings at such parts of the site as the architect may direct, and preserve the cores which are extracted from them.

II. 4. CELLARS, WALL TRENCHES, &c.—Do all the excavation shown or implied by the drawings, for cellars, areas, wall trenches, drains, and all other works required in the carrying out of the contract, for which excavations are needed, and keep all the excavations free from water.

II. 5. DIGGING SAND OR GRAVEL.—If sand or gravel, such as in the architect's judgment, is suitable for the purposes of this contract, should be found on the building site in places from which the architect considers that they may be removed without injury to the work, the contractor may dig them so far only as they can be used for the purposes of this contract; but he is not to remove them from the site, or to sell them.

II. 6. DIGGING SAND OR GRAVEL.—The contractor will not be allowed to dig on the site for sand, gravel, or other materials, though if any which, in the architect's opinion, are suitable for the purposes of the contract should occur in the necessary excavations for cellars, wall-trenches, &c., the contractor will be allowed to use them

for the purposes of the contract, as far as they will go.

II. 7. RETURNING AND RAMMING SOIL.—After the walls have been carried up to the ground level, and approved, and after the drains have been inspected by the architect and passed, the wall-trenches and drain-trenches respectively are to be carefully filled in with clean soil and well rammed.

II. 8. UNDERPINNING WALLS.—Underpin, in short lengths and with the greatest care, all existing walls adjoining or within —ft. of any new walls or excavations which go down below them. The underpinning is to be carried down to the base of the new foundations. It is to be of [hard, sound stock bricks set in Portland cement, with two parts sand to one of cement, and each brick is to be soaked in water before being used]. The walls underpinned are, wherever practicable, to have the same number and projection of footings which they have at present, and the same thickness of concrete as that below the new walls they adjoin; but the concrete below the underpinning is to be in all cases formed with cement.

II. 9. PORTLAND CEMENT.—The Portland cement in all work done under the present contract is to be such as will pass in all respects the test required by the London County Council in their rules which were in force in July, 1896.

II. 10. CEMENT CONCRETE.—This concrete is to be formed of six parts of clean sharp ballast, containing only a small proportion of sand, to one part of Portland cement, thoroughly mixed while dry, then uniformly moistened with a proper proportion of water, deposited in the trenches, and immediately rammed down and levelled.

II. 11. LIME CONCRETE.—This is to be formed with five parts of clean sharp ballast, containing only a small proportion of sand, thoroughly mixed dry with one part of [Dorking ground stone lime], wetted with a proper proportion of water, deposited in the trenches, and immediately rammed down and levelled.

II. 12. BRICKBATS IN CONCRETE.—Hard, clean brickbats approved by the architect, and broken up so as to pass through a 3in. ring may be substituted for half the ballast in the concrete, provided that they are evenly mixed with the ballast and the lime.

II. 13. BURNT BALLAST CONCRETE.—The concrete to be formed of 5 parts of thoroughly burnt clay, free from coal and soft pieces, and in sizes which would pass through a 3in. ring, but without more than one-fifth of small stuff or powder, mixed dry with one part of [Dorking ground stone lime], then wetted with a proper quantity of water, and deposited in the trenches, and immediately rammed down and levelled.

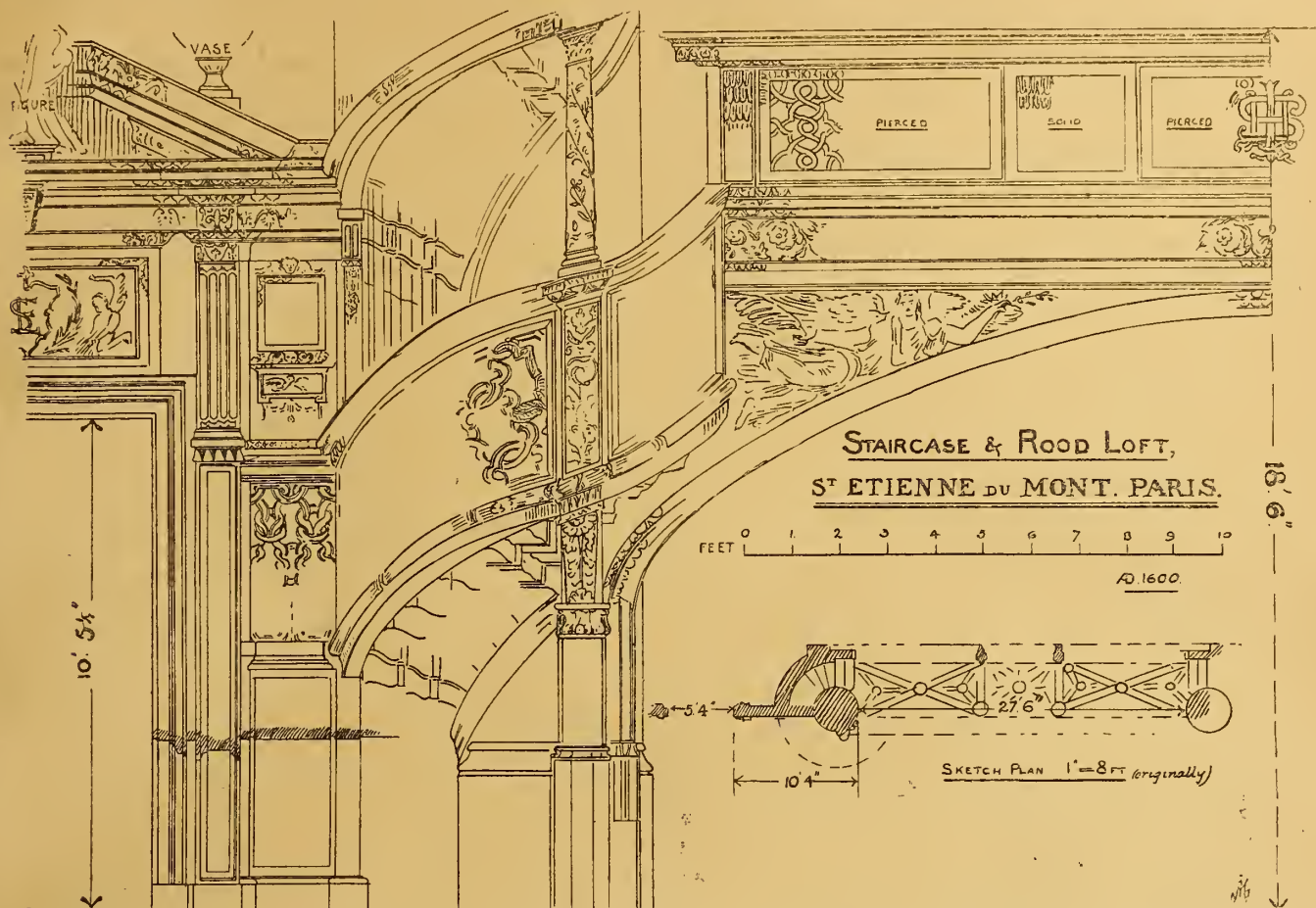
II. 14. BRICKS IN FOUNDATIONS.—To be hard, sound, and square, not soft or "shuffy," and not misshapen, cracked, or "clinkered."

II. 15. MORTAR IN FOUNDATIONS.—To be formed of one part of [Dorking stone lime], well mixed with three parts of clean sharp sand, free from loam, salt, or other impurities, and with a sufficiency of water. It is to be used as thick as may be, the bricks being previously well wetted. Both the beds and the vertical joints are to be thoroughly well flushed up, and the mortar to be used fresh.

II. 16. GROUTING.—Bring the walls to a level every foot in height, and well grout them with fresh mortar mixed with water to the consistency of cream.

II. 17. CONCRETE OVER INTERNAL AREA OF BUILDING.—Cover the ground, over the whole internal space of the building, at the levels shown on the drawings, with an even layer of Portland cement concrete, 6in. thick, floated with neat cement on the top.

III. 18. BRICK FOOTINGS AND CONCRETE.—All footings not otherwise shown or described are to be formed in regular courses, each course projecting 2½in. on each side of the wall beyond the course above it. There is to be one course of such footings for each half-brick in the thickness of that part of the wall which is just above the top of the footings; consequently the bottom footing will in all cases be twice as wide as the thickness of the wall. The concrete is to project 6in. on each side beyond the bottom course of footings, and where not otherwise shown is to be [2ft.] deep. Projecting buttresses, piers, chimney-breasts, &c., will have additional footings, one course for each additional half-brick in the projection. The bottom of these additional footings will be on the same level as the bottom of the ordinary footings of the wall to which the



projections are attached, and the concrete is to be widened out 6in. beyond them on each side.

III. 19. FOOTINGS TO NAVE PIERS.—These stone piers are to rest on 6in. tooled York landings $\frac{1}{4} \times \frac{1}{4}$. Under the landings is to be a brick-in-cement pier with [seven] courses of brick footings all round it, each 3in. deep with 2½in. projection, and under these [five] double courses of footings, each 6in. deep with 2½in. projection. The whole are to be of hard stocks in cement. Below the bottom footing is to be a solid mass of lime concrete projecting 9in. all round beyond the bottom footing, and...feet thick.

III. 20. RUBBLE FOOTINGS.—These footings to be built of broad flat rubble stones well bonded together. The total depth of the footings from top to bottom is to be at least equal to the thickness of the wall above them, and their width at the bottom is to be half as much again as the thickness of the wall above. Thus if the wall is 3ft. thick, the total depth of the footings will likewise be 3ft., and their width at the bottom will be 4ft. 6in. The concrete is in all cases to project 9in. on each side beyond the bottom footing, and is to be...feet deep.

NOTES.

Clauses 5 and 6 give alternative ways of dealing with the sand and gravel-digging question when it arises.

In Clauses II. 13 and 15 the particular kind of lime intended to be used will have to be filled in. As to Clause 13, suitable clay, burnt for the purpose of making ballast, answers well for comparatively light buildings, provided always that the burning has been thorough and complete. But if this ballast contains any considerable quantity of raw or half-burnt stuff, the foundations may fail, even after 20 years or more.

Inverts.—As these require care in the matter of abutment, &c., they are not specified; but it is presumed that they are shown on the drawings.

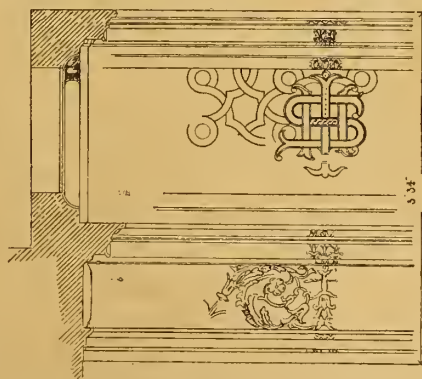
SOME MINOR EXAMPLES OF THE FRENCH RENAISSANCE.*—VI.

By G. A. T. MIDDLETON.

THE ROOD-SCREEN, ST. ETIENNE DU MONT, PARIS.

UNLIKE that of its contemporary, St. Eustache, the interior of St. Etienne du

Mont, situated close to the Pantheon at Paris, is decidedly satisfactory. The chancel is sufficiently early to retain the pointed arch, but not so the nave; while all round there runs a species of triforium gallery at little more than half the height to the springing of the nave arcade, somewhat similarly to that in Rouen Cathedral. It is to reach this, as well as to serve the rood, that the winding staircase is needed, which is shown in the accompanying drawing as working round one of the nave piers. The whole screen and staircase is a wonderful specimen of constructive masonry, bearing the date of 1600 A.D., upon the



Detail of Parapet, Rood Loft, St. Etienne du Mont, Paris.

soffit of the keystone; but it is neither so well-proportioned nor so spontaneous in design as most of the work of some half-century earlier; the deterioration being particularly noticeable in the formality of line, and in the straggling figure carving—and also in the mechanical precision of the detail. There is, consequently but little of value to be got from a study of it compared with many a less elaborate but earlier example; though the three different forms of intertwining balustrades are noticeable, and the many variants of familiar ornaments, such as the leaf-and-dart, are suggestive that they are still capable of much original and good treatment yet. Thus while the mere copyist would do but harm, he who goes for suggestion only may do much good to himself

by a study of this screen. For example, the way in which some of the enrichments, as those of the frieze, are carved in relief upon the face of the stone, while others, such as those upon the coronæ, themselves retain the surface of the enriched member, and are shown in relief by the cutting away of the interspaces, while a true traditional method of work, is worth noting for retention; while, on the other hand, the necessity for a drip under each cornice in a piece of church furniture is by no means obvious, and would certainly not have been found a few decades previously.

PUBLIC HEALTH CONGRESS IN GLASGOW.

THE annual congress of the British Institute of Public Health has been held in Glasgow on four days, closing on Tuesday. About seven hundred delegates, representing all parts of the kingdom, attended, the President being Dr. W. R. Smith, medical officer to the London School Board. At the inaugural meeting, held in the University Hall on the Thursday, Sir James Bell, the Lord Provost of Glasgow, described the progress made by Glasgow during the last 50 years in respect of its sanitary arrangements, one result of which had been that the death-rate had been reduced from 56 per thousand of the population in 1847 to 23 per thousand in 1893. Much still remained to be done, and the corporation had just obtained power from Parliament for an extension of sewerage works, with a view to the purification of the Clyde. The cost of this section of the scheme would be over £600,000.

THE SMOKE NUISANCE, AND ITS REMEDY.

Professor William Ramsay, University College, London, delivered an address, in the course of which he showed the beneficial action of sunlight on the health of the community. It had been satisfactorily shown that the violet rays destroyed bacteria, and he urged the importance of smoke-consumption in large cities, as there could be no doubt that the prevalence of smoke directly contributed to disease. Smoke deposited in our houses, on our clothes, and on our persons, "blacks" necessitating a great expenditure of labour and of soap. It condensed atmospheric vapour, causing fog and rain, and rendered our

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climate colder, and made our lives more or less unhappy and uncomfortable. It shut out sunlight, and thus increased the growth and tended towards the multiplication of bacteria. Much was done nowadays to promote the smokeless burning of coal in our factories by mechanical stokers; but little inducement could be held out to the manufacturer in endeavouring to persuade him that a saving could be effected by burning fuel without smoke. His remedy for the evil of smoke was for people to burn coke, which gave out, weight for weight, a greater amount of heat than coal, and emitted no smoke. In Paris it was the universal fuel; but it was there burned in stoves, where the glow could be seen only through windows of mica. Paris was a larger city than Glasgow, and yet it was clean and bright, where Glasgow was dark and dirty, and the difference was almost entirely due to the fuel burned. The question was: How could legislation be brought so to bear as to produce the required result?

Mr. Fletcher, late Her Majesty's inspector under the Alkali Acts, speaking at the Chemical section, stated that it was perfectly possible to prevent black smoke from issuing from factory chimneys, and he advocated the taking of the administration of the Smoke Prevention Acts into the hands of a central authority with a staff of Government inspectors.

Dr. J. B. Russell, medical officer of health for Glasgow, opened the section of Preventive Medicine.

CENTRAL SUPERVISION OF LOCAL AUTHORITIES.

At Friday's sitting of the Congress, Mr. Crawford, Chairman of the Health Committee of Glasgow, delivered an address, in which he urged that general legislation ought to be founded upon local enactments. Whence did the Government get the Infectious Diseases Prevention and other Acts? The clauses were collected from the local Acts obtained by the great municipalities. Parliament had gone far astray in its factory legislation. A hopeless muddle existed between the functions of the Home Secretary's department and those of the local sanitary authorities, and the result would be that the Factory and Workshops Acts would largely fail to effect their purpose. All these Acts, in so far as they cut away from the local health authorities the responsibility for sanitary and other conditions, were bad in principle. Great communities should be granted larger powers of self-government and fuller liberty of action; but the Department should be armed with strong powers of compulsion.

HOUSING OF THE POOR.

Baillie Chisholm, Chairman of the Glasgow Improvement Committee, spoke upon "The Municipality and the Housing of the Poor." The solution of the question, he argued, was not to be found in the extension of charity, nor was it to be found in the better administration of the Poor Laws, nor of any imaginable Poor Laws. It lay more in the direction of removing the causes that produced and maintained poverty, than in mitigating it when once it had been produced.

INFECTION AND CONTAGION.

Dr. James B. Russell, speaking in the Preventive Medicine sections, said they could have an infectious spindrift from the spray falling over a weir; but the instances were rare when microbes could be delivered from a liquid. Microbes submerged were imprisoned; but they were most numerous in populous places and in overcrowded rooms. In the case of infection, contagion from the breath was rare and accidental. Contagion could only be caught by the infected patient coughing or sneezing. When the air was infected it had been made so by the formation of dust, not directly through the medium of the breath.

Professor W. R. Smith, of London, speaking on the subject of the influence in elementary schools, and upon the spread of diphtheria, said schools played but a very small part in the spread of diphtheria.

HOUSE DRAINAGE.

Dr. J. Priestly, of Lambeth, read on Monday a paper on "House Draining: its Principles and the Necessity for Uniform Rules in regard thereto." He held that house drainage should be under the control of one responsible officer. What happened at present was that the district surveyor and the building inspector superintended the building of new houses, and when once such a house was inhabited and any infectious disease

broke out, it became necessary to again inspect the house by the medical officer and the sanitary inspectors, and the ratepayers had to bear the expense. The superintendence of such drainage ought to be in the hands of one responsible officer, and that officer should be the medical officer of health. Mr. G. Thomson thought the medical officer had plenty of work already. They ought to raise the status of the sanitary inspectors and district surveyors, so that they should be well up in sanitary and structural work. Dr. Ainley, of Halifax, said that interceptors, in his experience, were nothing better than small cesspools, and he had come to the conclusion it was best to have the manhole between the house and the main drain, and have no interceptor. He held that the sewage should go straight away to the drains, and every house should have a separate drain from the house to the main sewer. Baillie Young, of Aberdeen, held that the surveyor was the man to look after the construction of drains, as he was aware of the street levels. Dr. Marden maintained that there should be a separate drain for each house. No neighbour had a right to force a nuisance upon another. Dr. Wilson, of Newington, said it was only three or four years ago that any attempt was made to put into force the sanitary principles so well laid down some twenty-five years since. It was the medical officers of London who called the local authorities' attention to the adoption of these wants. Even now many of the surveyors were not doing their duty with regard to the regulations laid down. They found some cases where the sink waste-pipe was emptying itself into the soil-pipe, and where the sink-pipe was made to do service for the rainwater-pipe. That was a wrong condition of things. Mr. Newman, of Ryde, was of the opinion that it was an unwise thing to take the superintendence of the structural work out of the hands of the surveyor and place it in the hands of the medical officers' subordinates. Dr. Priestly, in replying, said it was not to be understood that he wished to have anything to do with the structural work of the house; but if the sanitary inspector was responsible for seeing that old drains were made right, then, to be consistent, he should see that the new drains were properly made.

VALUE OF SANITARY CERTIFICATES.

Dr. W. G. Willoughby, Eastbourne, read a paper on "The Sanitary Certification of Premises." There was, he said, a demand for such certificates; but the certificates were of small value, and gave a false sense of security because they were only granted by so-called experts, and not by sanitary officials. It was a mistake to think that a new house was sanitariously safe. The sanitary officials should control the issuing of these certificates. Sir Henry Littlejohn said that it was hard for those who kept lodgers to have to pay, in addition to the already heavy taxes, a guinea to the Sanitary Protection Society in order to get from them a certificate as to the sanitary condition of the house. Such a certificate should be applied for to the medical officer and burgh surveyor. Dr. Russell, Glasgow, maintained that every new house ought to be certified as sanitariously sound. As to occupied houses in Glasgow, the key to the position was to follow the incidence of disease and complaint. Those persons who wished to be luxurious in their sanitation should pay for that luxury.

FREE WATER SUPPLY.

Dr. T. G. Nasmyth, Fifeshire, read a paper on "Many Points connected with Special Water Supply Districts," and said that water, being as essential for life as air, should be as free of cost as the former. It should not be supplied at a rate per gallon at all. The cost should be borne by the owners of houses, as no house was fit for human habitation that had not a good supply of water. All water schemes and water supplies for towns and communities should be carried out by the State and under its control, and the cost be borne by the owners of houses. If the State undertook this duty, the cost of obtaining land and carrying out schemes would be reduced to a minimum, and the burden of owners of houses would be a light one.

DISINFECTANTS.

Dr. Wolf Defries (London) read a paper on "Disinfectants: Facts and Fancies Relating Thereto." He mentioned the fallacy which seemed to be prevalent that such articles as mattresses could be disinfected by hot air. A disinfectant spray had been devised, by which it

was quite possible to spray wall-paper of an inferior quality without injuring it.

THE CHEMISTRY AND ENGINEERING SECTION.

On Monday a paper on "Glasgow Sewage Works," prepared by Mr. Gustav V. Alsing, the engineer, was read by Mr. Thomson, the local secretary. The paper fully described the River Purification Works at Dalmarnock.

Other papers included "Hospital Machinery," by Mr. W. A. Bryson, Glasgow; and "A Note on the Valuation of the Disinfectant," by Mr. G. C. Moor.

The closing meetings of the Congress were held on Tuesday. In the municipal section the following resolution was adopted:—"That the information put before this section shows that the undue emission of smoke from the chimneys of mills and factories can be prevented by careful firing or mechanical stokers and without causing extra expenditure to the owners, and it is desirable that the authorities in cities and burghs should enforce the smoke-prevention clauses in their local Acts more stringently than they have hitherto done." In the preventive medical section the following resolution was adopted:—"That the cremation of the dead, especially in the case of infectious disease, is a rational and very desirable hygienic process, and the Congress urge upon the British Institute of Public Health to use all proper means of urging upon the Government the desirability of promoting a measure enabling sanitary authorities, if they so desire, to build crematories, and conduct them under proper supervision." These and other resolutions were afterwards submitted to a full meeting of the Congress and affirmed. The proceedings then terminated.

BUILDERS' BENEVOLENT INSTITUTION.

ANNUAL MEETING.

THE forty-ninth annual meeting of this Institution was held on Thursday, July 23rd, at the offices, 35, Southampton-row, Bloomsbury. Mr. J. T. Bolding presided, supported by Messrs. Thomas Stirling, G. J. Lough, R. Perkins, Henry Holloway, and other friends of the charity.

Major Brutton (secretary) read the annual report, in which the committee congratulated the subscribers upon the income from all sources having been sufficient to meet the expenditure of the year. This was greatly due to the active exertions of the President, Mr. John Mowlem Burt, in his advocacy of the merits of the Institution. The committee trusted that the subscribers would continue to do all in their power to support the charity, as it was only by united help that it could be supported. The committee alluded with much regret to the death of Mr. Charles Lucas, one of the trustees, who, both individually and as a member of the firm of Messrs. Lucas Bros., was a munificent contributor to the Institution. He was president in 1855, thus showing the number of years he had been associated with the charity. The name would happily not be separated from the Institution, as Mr. Arthur Lucas had consented to be a trustee. During the past year four pensioners had been elected, and there had been nine deaths from amongst the pensioners. The committee had the satisfaction of announcing that Mr. Henry Holloway, of the firm of Messrs. Holloway Bros., had consented to be President for the ensuing year, and that the annual dinner would be held at the Carpenters' Hall, London-wall, on Thursday, December 3rd.

The chairman proposed the adoption of the report and balance-sheet, which was seconded by Mr. R. Perkins, and unanimously agreed to.

On the motion of Mr. Thomas Stirling, seconded by the chairman, a cordial vote of thanks was passed to Mr. J. Mowlem Burt for his exertions on behalf of the Institution.

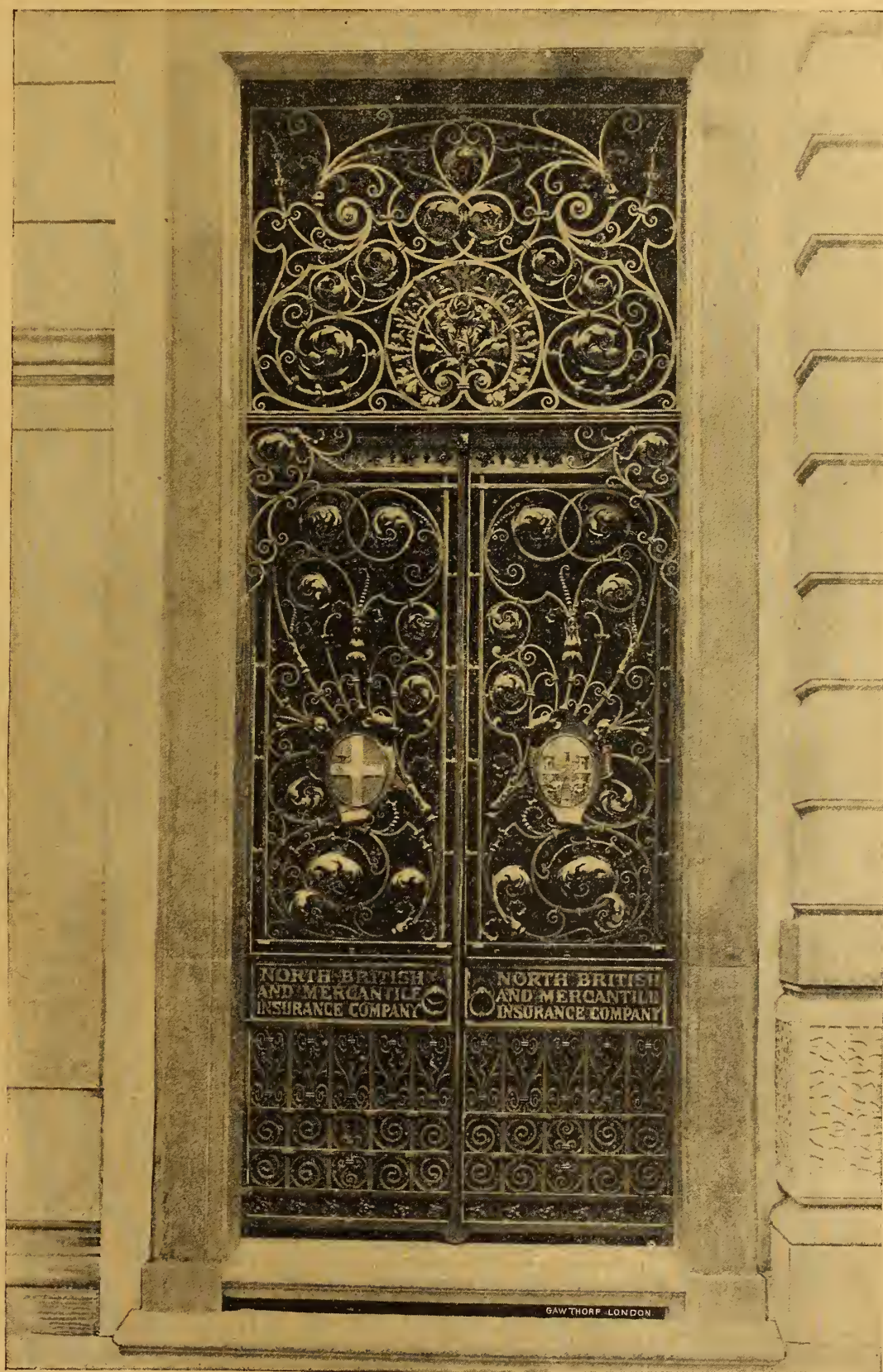
Votes of thanks were also passed to the vice-presidents, the auditors, and the committee, the retiring members of which were re-elected, with the addition of Mr. J. Mowlem Burt and Mr. E. B. New.

On the motion of the chairman, seconded by Mr. Lough, Mr. Henry Holloway was elected President for the coming year.

Mr. Holloway replied, and promised to do his best for the good of the charity.

A vote of thanks to the chairman closed the proceedings.

It is proposed to borrow £25,630 for a smallpox hospital and extensions to the Sanatorium at Middlesbrough.



ENTRANCE GATES IN THREAD-NEEDLE STREET.

THE ancient bank known as Presscott, Dimsdale, and Co., 62, Threadneedle-street, having been pulled down, and the space utilised as additions to the Sun and the North British and Mercantile Insurance Company's offices, the latter have erected a large pair of entrance gates, &c., of which we give an illustration, showing the advance of this class of work over the cast productions of the past. They were designed and wrought at the forges of Messrs. Gawthorp and Son, 16, Long Acre.

A new theatre is about to be erected in Clarendon-road, Southsea, the builder being Mr. J. C. Bacon.

THE TIMBERS OF AUSTRALASIA.—XII.

THE SOFT WOODS: I.—ENDOGENOUS OR PINE TIMBERS—NEW ZEALAND KAURI.

I PASS now to the consideration of the Australasian pine timbers, all of which of course belong to the Class *Endogens*. Pines of various kinds and of differing degrees of value exist, sometimes in very large quantities, throughout the Australasian Continent and Tasmania. In New South Wales alone, though the annual consumption of pine, prior to the commercial depression, was from fifteen to twenty millions of feet, it is estimated that there are hundreds of millions of feet still standing. In the interior plains the pine scrub covers hundreds of miles, and in one particular district, that of

the Lachlan, there are 180,000 acres covered with the black cypress pine (*Callistris calcarata*, formerly called *Frenela Endlicheri*). But the southern home of the pine is *par excellence* New Zealand, a country possessing some of the characteristics both of Norway and Switzerland, and whose unrivalled kauri is alone sufficient to have made her famous among the users of superior timbers. The alpine island colony is particularly rich in pine woods. Dr. Hooker, in his "Handbook of the New Zealand Flora," completed at Kew Gardens in 1864, enumerates five timber-furnishing genera of the Natural Order *Coniferae*—namely, the *Dacrydium*, *Dammara*, *Libocedrus*, *Phyllocladus*, and *Podocarpus*; and Professor Kirk, in describing in his "Forest Flora," published five-and-twenty years later, the twenty species

which these genera collectively afford, specifies at least a dozen pines possessed of more than average value. Of these, the totara (*Podocarpus totara*), the matai (*P. spicata*), the rimu (*Dacrydium cupressinum*), the tahikatea (*Podocarpus daeryoides*), and some others, together with the maire-rau-nui (*Olea Cunninghamhamii*—Nat. Or. *Jasminaceae*) and puriri (*Vitex littoralis*—Nat. Or. *Verbenaceae*), stand second in value only to the unapproachable kauri, to which they bear somewhat the same relation as the karri, tuart, and white gum of Western Australia bear to the no less famous jarrah.

The New Zealand kauri (*Dammara*, formerly *Agathis*, *Australis*) is the monarch of the forests of that colony, almost rivalling the giant Sequoias of North America in its extreme height and circumference, and far excelling them in the value of its timber. The interior of a great kauri forest affords one of the most impressive scenes in the Australasian colonies. On all sides rise the smooth, grey trunks, like massive columns, perfectly straight and symmetrical, to a height of 80ft. or 100ft. without a branch, and with a diameter of from 4ft. to 12ft. and upwards, the ashy hue of the bark often producing a strange, weird, undefined effect of haze found in no other forest, and the broad, green, leathery leaves presenting an appearance totally different from that of the needle-like foliage of the northern pine-trees. Occasionally the kauri attains to a prodigious size; stem circumferences of 48ft., 66ft., and even 72ft. are authoritatively recorded, and in some of the forests clumps of trees that would furnish logs from 50ft. to 60ft. long, and from 48in. to 60in. square, are not uncommon. The distribution of the tree is confined entirely to the Province of Auckland, in the North Island, between the North Cape and 38° south latitude, and chiefly in the eastern portion, in some parts of which it occurs in vast abundance. The timber varies in colour, from a very pale buff to brown; it is straight in the grain, even, compact, firm, clean, silky, and of great strength, toughness, elasticity, and durability. It is adapted for a greater variety of uses, not only than any other New Zealand timber, but, I believe, than any other pine in the world; and it probably derives its unrivalled qualities in a large degree from the great age of the trees, which Professor Kirk estimates at from 300 to 4,000 years. There are four varieties of the wood given by Mr. E. Bartley, past-president of the New Zealand Institute, though two (if not all three) of the coloured varieties, Mr. Kirk points out, are obtainable from the same trunk, according as the deep-hued heartwood or the light wood nearest to the sapwood is employed. Mr. Bartley's varieties, however, are:—

1. *Red kauri*, which is close-grained, resinous, and durable, the best general building timber, and suitable for beams, joists, and heavy framework, but somewhat liable to cast and twist, shrinking longitudinally as well as transversely.

2. *White kauri*, yellowish-white, and straight in the grain, extremely tough, and bearing a greater strain than the red, though less durable; it neither warps nor shrinks longitudinally if fairly seasoned before being worked up. It is a splendid timber for mouldings and joiners' work generally, and is also largely used by boat-builders.

3. *Black kauri*, probably the heartwood charged excessively with resin; it is of a deep brown colour, very hard, dense, heavy, and difficult to work. This, however, is compensated for by its extreme durability.

4. *Soft kauri*, probably produced by local variations in the soil, as is often the case with the pines of the Northern Hemisphere, especially the Baltic red deal. It is of a pale dun colour, straight in the grain, rather soft, and of light specific gravity; it never warps, twists, or shrinks longitudinally*—the one defect most to be guarded against in kauri—even when exposed to the weather; it is excellent for joiners' work and mouldings, but should not be used for beams or heavy framing.

Taken altogether in its various forms, kauri is not only admirably adapted, but is largely

used, wherever its qualities are understood and appreciated, for railway-sleepers, bridges, wharves, and constructive works generally; for telegraph-posts and the masts and deck-flanking of ships, for the latter of which it is unsurpassed, owing (among other qualities) to its regularity of grain, smoothness of surface, freedom from large knots, and great durability; for general building purposes—viz., ground-plates, beams, rafters, joists, flooring, framing, and weather-boarding, open roof-work, church seating, dadoing, paneling, doors, sashes, mouldings, and all kinds of joiners' work; furnishing fixtures, such as bank counters; cabinetmakers' work, whether for veneering or otherwise, and decorative fittings of all kinds. In Sydney, one firm of cabinetmakers alone uses a million feet of kauri annually, a perfect imitation of American walnut being produced by staining, while of late years the wood has proved to be one of the very best for the staves of meat and tallow casks, and especially of wine-vats. In the timber growing in rocky situations, large portions of the trees frequently acquire a feathered, wavy, or mottled character, in which the markings are oftentimes extremely beautiful, and somewhat resemble those of bird's-eye maple; this "mottled kauri" is highly prized, especially for veneers, and the supply is seldom equal to the demand, though the wood fetches rarely less than £3 per 100 superficial feet of lin. thickness, as compared with an average of perhaps 10s. per 100ft. for ordinary hewn plain kauri. Then a remarkable decorative wood, somewhat resembling British pollard oak, is obtained by utilising the enormous knots which are sometimes found in the upper portion of the trunk, above the springing of the first branches. There is a very fine specimen of this product—polished—in the Sydney Technological Museum. And, again, a peculiarity of kauri (in common with some other New Zealand timbers) is the occurrence of great "burrs" upon the bark, which present (of course on a smaller scale, but still sufficiently large for many ornamental purposes) the peculiar figure of the knots, a phenomenon more generally associated with pollard and root woods. Whatever may be thought of the more extended employment of kauri in the Old World for constructive works, there can be no question whatever as to its beauty and value for ornamental purposes. Compared with other commercial pine timbers, plain kauri, however, is more silky than Canadian yellow pine, stronger and more durable than the best red deal of the White Sea and the Baltic, tougher and more elastic than American spruce, and more easily worked and less brittle than the Californian red wood. As Professor Kirk asseverates, "it undoubtedly combines a larger number of good qualities in a higher degree of perfection than any other pine timber in general use."

As regards the relative strength of kauri compared with other pines, there exist, fortunately, some very valuable tables, furnished by Mr. T. Laslett, Timber Inspector to the British Admiralty, in his "Timber and Timber Trees," from which I extract the two sets of figures given below. Mr. Laslett had the advantage of becoming acquainted with kauri in its native forests, and in his experiments to ascertain the transverse and tensile strength of different pines English oak was taken as the standard, and was valued, in each case, as 1·000. Subjoined are the results of his experiments with kauri as compared with other pines:—

Transverse Strength.—Scantlings 2in. by 2in. by 84in., carried on supports 72in. apart, and tested hydraulically in the middle.

Description of Timber.	Relative strength.	Breaking weight in lbs. per sq.in.
Pitch-pine	1·109	262
Dantzic fir	1·087	219
Kauri	·892	204
Canada spruce	·831	168
Canada red pine	·810	163
Russian larch	·776	157
Riga fir	·741	150
Canada yellow pine	·665	134

Tensile strength.—Scantlings 2in. square and 30in. long, tested by hydraulic machinery.

Description of Timber.	Relative strength.	Breaking weight in lbs. per sq.in.
Pitch pine	·616	4,666
Kauri	·600	4,543
Russian larch	·555	4,203
Riga fir	·535	4,051
Canada spruce	·520	3,934
Dantzic fir	·427	3,231
Canada red pine	·357	2,705
Canada yellow pine	·267	2,027

It will be seen from the above that kauri is excelled in transverse strength only by the

American pitch-pine and Dantzic fir, and in tensile strength by pitch-pine alone—a timber not particularly suitable for general building purposes; while in tensile strength Dantzic is vastly inferior to kauri, as it is likewise in point of durability when exposed.

The authoritative testimony as to the superlative value of kauri is overwhelming. Among other experts, Mr. Bartley, speaking with a quarter of a century's experience of it as an architect, in a paper read before his Institute, declares that "if treated with the necessary knowledge required for all timbers (such as ventilation, &c.), it must be placed in the front rank of all known pines," and further:—"The Supreme Court in Auckland was built in 1867. The ground floor inside doors (of kauri) are 4in. thick; all the mouldings are worked out of the solid, the lock-rail is 16in. wide, and the doors are varnished; and to-day the joints and mitres are perfectly close." While a distinguished London architect, visiting him in Auckland, observed:—"If we could get timber like that in England, there would be no other timber used for church work." Mr. Allison Smith, Locomotive Superintendent of the Railway Department of Victoria, in his evidence before the Forest Commission of that colony, stated that "in Victoria you are bringing inferior timbers all the way from the Baltic, when you can get New Zealand timbers close at hand and of better quality. . . . The great value of the kauri pine is that it grows 18ft. long and perfectly straight; the trees are as much as 8ft. in thickness in the trunk, and there is not a single knot to be found in the timber at all"; and finally, "it is the most useful timber I have ever come across anywhere."* And Messrs. Ransome and Co., of Stanley Works, King's-road, Chelsea, London, in their report on the practical tests of colonial timbers in connection with the Indian and Colonial Exhibition, assert that kauri "is undoubtedly the best of all soft woods . . . the practical men who witnessed the trials agreed that the wood was perfect."

The trade in kauri is by far the largest done in any single timber in the whole of Australasia, and is conducted with remarkable enterprise and skill, the kauri saw-mills being a long way the best in New Zealand, and not surpassed by any south of the Equator. It is principally, though by no means exclusively, in the hands of the Kauri Timber Company, Limited, whose head office is in Melbourne, but which has branch offices with splendid water frontages in Sydney and Auckland, and agencies in London and Glasgow. This important company was formed in 1888 with a capital of £1,200,000, to specially develop and extend the kauri industry, the exports of which timber from Auckland alone in the previous year had amounted to 30,230,100ft., valued at £124,347, as compared with 1,404,300ft. of other timbers, valued at £4,475, shipped from all the other ports in the colony. The company purchased 28 different mills, situated in Auckland and various places on the east and west coasts of the northern province, with an aggregate cutting capacity of 2,000,000ft. per week, and they acquired 163,000 acres of freehold land and 265,000 acres of leasehold, estimated to contain altogether 1,700,000,000ft. of standing kauri; while during the present year they have added to their estate 25,000,000ft. on the Thames river for the purposes of local supply solely. The timber is shipped principally from Kairapa Harbour, on the western coast, into which flow many of the rivers, the banks of which furnish a large proportion of the supplies. For England, the Cape, and other countries foreign to Australasia, the timber is at present shipped mainly in logs and fitches; but for the Australian trade it is "broken down" or "converted" at the various mills, which are fitted with the very best English and American machinery. Frame-saws are generally employed for cutting wide boards, but weather-boarding is usually cut by the circular saw. Planing and moulding machines are found in even the smallest mills; while in the larger establishments every species of machine required for the manufacture of "converted" timber into doors, sashes, gates, and numerous other articles is supplied of the best patterns and with the latest improvements added. Like every other industry, the kauri trade experienced a

* The warping, twisting, and longitudinal shrinking alluded to above are mainly, if not entirely, due to the timber being felled (as so much timber is felled in Australia) during the growing season of the spring and summer months. If hewn during the dormant season and properly seasoned, the shrinkage is extremely trifling. But, used even in its green state (which is a common practice, though, of course, an objectionable one, with most timbers in New Zealand), kauri, if felled at the proper time of year, stands singularly well.—D. L.

* As a result of these investigations, kauri is now extensively used by the Railway Departments both of Victoria and New South Wales. In the latter colony the import of kauri in 1894 was 10,784,500ft., and in 1895 14,500,100ft., while in Victoria in 1889 (before the depression set in) it was no less than 16,925,900ft.—D. L.

certain check during the year of the disastrous depression: but its healthy and recuperative character is shown by the fact that during the recent summers of 1895-6 every one of the Kauri Timber Company's mills was going at full time and completely manned, while some of them had to work night and day by the aid of the electric light to at all keep pace with the demand for the timber. Such a condition of affairs means, for the whole kauri industry, the employment in the forest and mills of at least 2,000 hands, and the annual expenditure of probably a quarter of a million sterling in wages.

(To be continued.)

CONSTRUCTION OF STEEL SPIRES AND STEEPLES.—III.

WHETHER the application of iron and steel as a constructive material in lieu of timber in the erection of spires and steeples—for so far as stone and brick are concerned there is little or no analogy whatever—will fall on the same lines as were adopted in the wooden structures is very doubtful. So far as roofs are concerned—and spires and steeples are roofs—the substitution of metal for timber has led to the introduction of a number of completely novel forms and designs utterly unknown to the builders of old wooden roofs. The king and queen-post timber roofs have never been imitated in iron or steel, any more than the iron A-roofs, with their inclined ties and struts square to the rafters, were ever seen in the types built of the older material. It is worth remarking that the case is otherwise with respect to the bridges past and present. If we except the suspension, the solid-sided—whether plate, box, or tubular—and the cantilever, the great majority of iron-trussed bridges have been modelled on previous timber constructions of a very similar character. Steel spires and steeples will probably always be of the broach description. Accumulations of solid or melted snow and rain-water are exceedingly injurious to metal-work of all descriptions, no matter how carefully attempts may be made to protect it. Thus parapets springing from the cornice of the towers are to be avoided. In high roofs the snow and rain lodge in the gutters, and cannot get away quickly enough, and any impediment or obstruction in the down-pipes may arrest their egress until purely natural agents cause them to disappear in course of time. Although in our present articles we are considering solely the construction of the metallic portion of the edifice, and have nothing to do with the designing of the lower part of it, or substructure, yet we may venture upon a word of warning respecting the portion which does not come within our province. It is to the effect that the steel spire or steeple should form an integral part of the original design, and not be added or stuck on to a tower which was originally designed to carry a superstructure of a different form and of a different material.

A glaring instance of this anachronistic combination is to be found in the modern cast-iron spire of Rouen Cathedral, already mentioned, which was, after repeated delays and difficulties, finally completed just twenty years ago. It has been pronounced by competent judges as feeble and mean in design, weak and poor in construction, barbarous in ornamentation, and has been universally condemned as a monstrous disfigurement of the old Norman building. The spire certainly has one merit, if, indeed, that particular characteristic of it can be claimed as a merit. It is its great height, about 490ft., and it has been stated that after its erection the people of Rouen consoled themselves for its admitted unsightliness by the reflection that it was the highest spire in the world. This conclusion was not quite correct, for the spires of the cathedrals of Ulm and Cologne both overtop it, and those of Strasbourg and St. Nicholas of Hamburg may fairly be considered to be at least quite equal to it in height.

In our last article we described and illustrated the general principles and the practical application of them, which governed the design and construction of the steel base or platform which carries the superstructure, and, in fact, forms the connecting link between the spire and the tower belonging to the building. The next step is to design the principals or trusses, all of which spring from the steel platform at the same angle of pitch, and ultimately meet at the apex or summit of the spire. These principals, or trussed rafters as they might be termed, are irregular and

unsymmetrical in form, and must obviously all meet in the vertical line along which is ranged the geometrical axis of the spire. There are two chief methods of arranging and securing this indispensable union of all the trusses. In the first place an independent vertical axial shaft or pillar may be built up, and each separate truss or half-roof principal riveted up to it directly, and also thus indirectly to each other. Or, again, the separate trusses may all meet at the centre, so as to form a small hollow octagon, and can be all riveted together by internal plate or angle iron bent to the required shape. It may be stated that in the case of timber spires and turrets, the general practice appears to have been to employ a central shaft or upright. In several instances iron tie-rods have been used to brace together the different members of wooden constructions of this character.

In Fig. 6, which is a skeleton diagram of the plan of the arrangement of the roof trusses, they are shown by the thick lines radiating from the

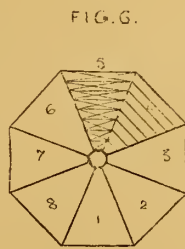


FIG. 6.

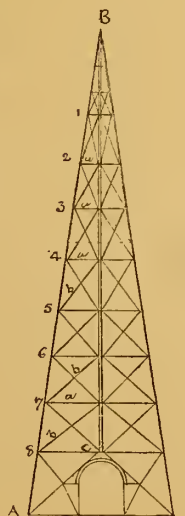


FIG. 7.

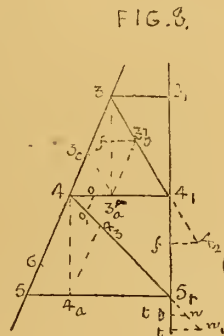


FIG. 8.

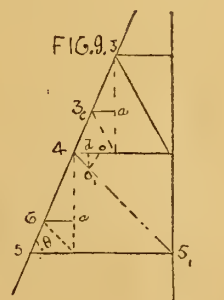


FIG. 9.

central hollow octagonal formed by the junction of the vertical members of the half principals. The height of the spire is assumed to be 100ft., which may be regarded as sub-divided into ten lengths of sloping bays for each of the sides. At a vertical distance, therefore, of every 10ft., the separate trusses will be all united by a series of steel zones or bands, shown in Fig. 6, in side 4 of the diagram, by the lines parallel to the base of the side. In addition to these connecting rings, which are placed also at the same distances within the hollow central octagonal space, each length or section of the sloping faces is braced together by diagonal bars, as shown in side 5 of Fig. 6. A general elevation of a pair of the half-trusses constituting one of the four principals of the spire is shown in Fig. 7. The type of truss having been selected, it remains to determine what scantlings, sections, and lengths the several members should be composed of; but before these practical points can be duly ascertained, the stresses upon those several members themselves must be calculated. An inspection of Fig. 7 will at once point out that one set of the diagonals in each of the half-principals is theoretically redundant, although practical requirements demand the use of them. In taking out the stresses, whatever method may be employed, this fact must be borne in mind, and attended to, in order to avoid ambiguity and uncertainty. The first item or load sought after is the approximate

weight of one of the trusses or half-principals in Fig. 7. Owing to the abnormal value of the angle of the pitch of the roof in which $\theta = 80^\circ$, it is not possible to obtain that datum from "tables" or from examples of existing roofs. A fairly approximate may be arrived at as follows:—Selecting one truss or half-principal, A B C A, in Fig. 7, the sum of the lengths of the three sides, A B, B C, and C A, equals 205ft. These members of the truss may be all of tee-iron, 6in. by 4in. by 5in. There are nine horizontal struts, $a . a . . . a$, of an average length of 9ft., which may be angle irons $3\frac{1}{2}$ in. by $3\frac{1}{2}$ in. by $\frac{1}{2}$ in., and 18 diagonal bars, $b . b . . . b$, of an average length of 13ft., which may be of the scantlings and of the same section of steel. The total weight of the actual truss itself may be now tabulated together with such additional items as the nature of the construction demands.

TABLE I.

Total length in feet.	Section of steel.	Weight in pounds per foot run.	Total weight in pounds.	Remarks.
205	T. 6 in. by 4 in. by 5 in.	19.50	3,997	Sides of truss
81	$\angle 3\frac{1}{2}$ by $3\frac{1}{2}$ by $\frac{1}{2}$	10.85	880	Horizontal struts
234			2,540	Diagonals
Weight of bracing in one side of panel face				
110	$\angle 6$ by 3 by $\frac{1}{2}$	15.00	1,650	Outside rings
Total weight in pounds			12,487	
Add 10 per cent. for rivets, wrappers, gusset pieces, and stiffeners			1,248	
Total			13,735	

In order to account for item No. 3 in Table I., it must be borne in mind that, in addition to the amount of bracing in the truss shown in Fig. 7 in the interior of the spire, there is very nearly an equivalent quantity carried by the truss on the external surface, represented in Fig. 6. This, therefore, forms part of the dead load to be supported by the truss, and is equal to 3,429lb. Besides these several loads, there is that of the covering or outside sheeting of the structure to be accounted for. Zinc tiles, which can be obtained stamped to almost any pattern, weighing, with their fixing, 2lb. per square foot, and of No. 14 to 16 zinc gauge, form an economical and neat covering. The weight for each truss surface will amount to 1,600, and adding this to the 13,735lb. obtained from Table I., the total dead load to be provided for equals 15,335lb., or in round numbers, seven tons. It will not be necessary to make any allowance for the weight of snow, for although a small quantity might lodge here and there for a brief time, yet none could accumulate to a depth worth considering upon so high pitched a roof.

There are two methods of proceeding with the further prosecution of the designs. One is to ascertain the stresses arising from the loads already arrived at, so as to obtain a tolerably fair idea of the proportions and dimensions of the truss. The other is to investigate the stresses due to the action of the wind pressure, and then, by combining all the separate stresses, determine the resultants upon the different members of the truss. The first is, in our opinion, the preferable method, inasmuch as it enables the general type and design of the steel work to assume definite outlines, and also promotes that progressive union between theory and practice which we have consistently advocated.

The total dead-weight upon each half-truss may be considered as uniformly distributed over it, or sub-divided into eight equal parts, and each part may be regarded as acting at the individual points 1, 2, 3, . . . 8 (see Fig. 7) respectively. It will be sufficient to take a couple of panels or bays in order to demonstrate generally in what manner the separate loads affect the members of the truss, and how they are ultimately disposed of. At the point 3 in Fig. 8 the bars 3-3₁, 3-4₁, and 3-4₂ all meet. One of these is theoretically redundant, so far as the transmission of the weight placed at the point 3 is concerned; but, so far as the whole four-sided figure 3-3₁-4₁-4₂ is concerned, it is not.

In the case before us, however, we have only the triangle 3-4-4₁, to be provided for with a single static load at the apex 3. As this triangle is, *per se*, indeformable without the assistance of

the member 3-3₁, it may be discarded in the upper bay or panel, although it comes into play in the lower bays. It will be seen that only one set of diagonal traces is introduced into the bays shown in Fig. 8, although two sets are represented in Fig. 7. The reason for this omission of one set is imperative, and has been previously explained. If the line 3-3₁ be taken to be equal to the weight or share of total load acting at point 3, then by resolving it in the directions of 3-4 and 3-4₁, the stresses are obtained upon the rafter of the truss 3-4, and upon the strut 3-4₁. They will be equal, on the same scale of loads, to the length of the lines 3-3₁ and 3-3₂ respectively. Since all stresses, or, in more accurate phraseology, the vertical components of all stresses must pass through one or other of the two points of support, it is obvious that the stress 3-3₁ on the trussed rafter will be transmitted from joint to joint—that is, from point 3 to 4, 4 to 5, and so on, consecutively, until the last bay connected with the support is reached. In other words, the stress equal to the length of the line 3-3₁ affects every separate panel-length of the whole rafter which is situated below the point 3, and is a constant and uniform stress throughout that length of the sloping side of the truss or half-principal. The stress 3-3₂ is thus disposed of, and it now remains to investigate the further action of the stress 3-3₂ upon the strut 3-4₁.

When the stress 3-3₂ upon the inclined strut 3-4₁ is transmitted to the joint 4₁—that is, to the connection between the diagonal brace and the vertical member of the truss—it directly affects both the members 4-4₁ and 4₁-5₁. Making, on the prolongation 4₁-4₂ of the diagonal 3-4₁, the dotted line 4₁-4₂ equal to 3-3₂, and drawing 4₂-f equal to 3₂-f and parallel to 3-4₁, then the two lines 4₂-f and 4₁-f will give the stresses upon the horizontal and vertical members 4-4₁ and 4₁-5₁. The stress 4₁-4₂ is thus resolved into its components both vertically and horizontally. The vertical component 4₁-f, similarly to the compressive stresses on the sloping member of the truss, is a constant stress upon all the lower panel lengths of the vertical part of the truss, which receives fresh accretments at every joint. The horizontal component 4₂-f is transferred to the point 4, where it stresses the part of the rafter 4-5 and the strut 4-5₁. Put 4-O equal to 4₂-f, and the stresses on each of these will be measured by the length of the lines O-O₁ and 4-O. It should be observed that the stress O-O₁ on the rafter is in this instance not of a compressive, but of a tensile, character, and should, therefore, be deducted from the total stress upon the length 4-5, which will thus remain a strut as originally intended. If the direct vertical load at the point 4 be treated in the same manner as the equivalent load at 3, the resulting stresses can be readily found, as shown by the dotted lines on the other members of the lower panel, and they may be tabulated in table II. :—

TABLE II.

Parts of Truss.	Weight at 3.	Weight at 4.	Total Stress.
3-4	+ 0.65	—	+ 0.65
3-4 ₁	+ 0.50	—	+ 0.50
4-4 ₁	- 0.25	—	- 0.25
4-5	{ + 0.65 + 0.20	+ 0.75	+ 1.20
4-5 ₁	+ 0.20	+ 0.45	+ 0.65
4 ₁ -5 ₁	+ 0.50	—	+ 0.50
5-5 ₁	- 0.15	- 0.30	- 0.45

In table II. the weights at the points 3 and 4 have been regarded as unity. In actual practice the small tensile stress on the rafter might be neglected, especially since the omission would be on the safe side. In Fig. 9 a portion of Fig. 8 is reproduced so that the total stress upon the part of the truss 4-5 may be checked by calculation. Let the vertical components of the separate stresses upon the part 4-5, shown in Fig. 9 by the lines 3'-a, d-o₁, and 4-a, be called V, V₁, and V₂ respectively, let θ = angle of pitch of the rafter, and S₁ = the required total stress on 4-5. Then in the right-angled triangle in Fig. 9, we have for each stress = S—

$$S = \frac{V}{\sin \theta} = \frac{V_1}{\sin \theta} = \frac{V_2}{\sin \theta},$$

and from the nature of the problem—

$$S_1 = \frac{V + V_1 + V_2}{\sin \theta}.$$

From which we obtain, as more easy for calculation, the equation—

$$S_1 = (V + V_2 - V_1) \times \operatorname{cosec} \theta.$$

Measuring the values of V, V₁, and V₂ on any convenient scale common to both Figs. 8 and 9, they are found to be V = 0.6, V₁ = 0.15, and V₂ = 0.7. The angle θ is taken equal to 67°, so substituting these values in the above equation we obtain—

$$S_1 = (0.6 + 0.7 - 0.15) \times \operatorname{cosec} \theta = 1.24,$$

or a difference not worth considering. The wind pressure has next to be investigated, so that the total stresses may be arrived at.

THE RECONSTRUCTION OF GLASGOW BRIDGE.

THE corporation of Glasgow discussed at great length, on Tuesday, a series of reports on the reconstruction of Glasgow Bridge across the Clyde at Jamaica-street. The first was from Messrs. Cunningham, Blyth, and Westland, C.E., Edinburgh, the engineers for the work, who reported having had bores sunk in close proximity to the site of the ten cylinders which had still to be laid. They proceeded: "As you are aware, when the original plans of the new bridge were prepared, no bores were put down on the actual site of the bridge. We had constructed for the Caledonian Railway Company the railway viaduct immediately adjoining, and it was assumed that the rock below the bed of the river would be found approximately at the same level as in that structure—that is, at about a depth of 94ft. below the springing of the arches of the new bridge." Four cylinders had been sunk to the rock, which was found at from 90ft. 11½in. to 105ft. 9in. Coarse sand or gravel, such as had been found, when free from any risk of scour, was an excellent foundation, little if at all inferior to rock. They had, therefore, no hesitation in recommending that the remaining cylinders should be founded on the sand and gravel, at a depth of 75ft. below the springing of the arch. They recommended that the size of the inner cylinders should be increased from 13ft. to 15ft. in diameter, with a bell-mouth at the bottom, widening to 17ft. 6in. The net result of these proposed changes would be a saving of £3,000.

The committee, on receiving the report, decided to consult Sir Benjamin Baker and Mr. J. Wolfe Barry, C.B., on the two points:—(1) Is it impossible to go to the rock foundations? and (2) if so, what should be done in order to secure a firm and sure foundation? Sir Benjamin Baker replied that if it were necessary to go down to the rock to secure a good foundation, it would be possible to do so by removing the air-locks after a certain depth was reached, and completing the sinking by dredging from the open-topped cylinders. Mr. J. Wolfe Barry's report was to similar effect. He expressed the opinion that there would be no risk from scour. His reply to the first question was that it was not impossible, but inadvisable, to sink the cylinders to the rock. Neither in respect of load or scour was there any necessity of going deeper than the engineers recommended. He did not think it desirable to bell-mouth the cylinder.

The special sub-committee in view of these and complementary reports agreed to recommend that the remaining cylinders be sunk to a depth of not less than 75ft. below the springing of the arch, or to a greater depth should the sand and gravel not be found at the above-mentioned depth.

Mr. Martin, in moving the approval of the recommendation, said there was no doubt they had intended to go to the rock. The engineers said at first that that was the proper thing to do; but they were now of opinion that the foundations were quite safe on the sand at 75ft.

Mr. Robert Anderson said that Mr. G. M. Cunningham, of the engineers' firm, recommended, when the scheme was first mooted, that Telfer's Bridge should be taken down and "founded on rock which we know to be at a depth of 85ft." That was stated not as assumption, but as knowledge. He emphatically denied the engineers' remark that the corporation was aware that no bores had been put down. Before going on with the bridge, the corporation remitted the plans to Messrs. Cunningham, Blyth, and Westland, who reported in effect that they would have no objection to carrying out the bridge, provided Mr. Mason (the contractor) would agree to bores being carried down to the rock, which they considered essential. Mr. Anderson protested against the action of the engineers in leading them on to the erection of this bridge under a statement of knowledge that the rock would be found at a depth of 85ft., which was

pure assumption, as they themselves now confessed.

Mr. W. Fleming Anderson said it was extraordinary that a firm of engineers should state that the corporation were aware that no bores were taken before sinking this bridge, which was to carry the greatest traffic in Glasgow. That statement ought to be repudiated.

Mr. Walter Paton pointed out that the mistake had arisen through the fact that Mr. Cunningham built the railway bridge twenty-five yards further west, and he assumed—and assumed wrongly—that he would get rock at the same depth in the present instance. No doubt the firm were to blame for not making borings.

Bailie McPhun held that it would be most unwise to accept the minutes if some other way could be found out of the difficulty.

Bailie Thompson did not think the engineers had made any great mistake. If it had been decided to put down the bores at the outset, it would have been to find that the solid rock was 110ft. deep, and to find that they could not work to that depth with compressed air. They would thus have had to adopt the means now being taken. Sir Benjamin Baker said it would be a waste of money to go to the rock. The depth proposed was 50ft. below the bed of the river, 30ft. below the quay wall, and 20ft. below the subway. The work had now been stopped for a considerable time, and he asked the Town Council to come to a decision, in order that progress might be resumed.

Mr. Main said the understanding before the old bridge was taken down was that the new one would be founded on rock.

Lord Provost Bell, in closing the discussion, said the circumstances were unfortunate. He pointed out that in the specifications the rock was not stated to be at the same depth as was found in the construction of the railway bridge, and contractors were warned against the assumption. Sir Benjamin Baker assured them that the bridge founded on sand and gravel would be as stable as if founded on rock, and that had been the contention of Mr. Mason at the beginning. By the plan proposed they would get a bridge that would bear all the weight that the streets of Glasgow could ever carry.

The committee's recommendations were then unanimously adopted.

CHIPS.

New banking premises for the Wilts and Dorset Bank are approaching completion in Corn-street and Clare-street, Bristol. The hall is 60ft. by 38ft. and has a dome 24ft. in diameter, carried by eight columns of red Devonshire marble.

At the last meeting of the town council for Devonport it was decided to open negotiations with the rector of Stoke Damerel with a view to ascertaining if the glebe land adjoining the church was available for the purpose of erecting thereon municipal buildings, and, if so, at what price. At the same meeting plans were approved for the erection of new technical schools, at an estimated cost of £14,000.

The report of the Departmental Committee appointed by the Board of Agriculture to consider the arrangements to be made for the sale of Ordnance Survey maps, has been issued. The Committee make a number of recommendations for increasing the sale of these maps. One of these is that certain post-offices should be utilised as depots, and another is that the lin. scale maps should be issued in a more popular form.

The foundation-stone of Christ Church Congregational chapel was laid in Stanwell-road, Penarth, on Wednesday week. A little while since the erection of the chapel from the designs of Messrs. Habershon and Fawcner, architects, Newport and Cardiff, was begun, the builder being Mr. D. G. Price, of Penarth. The chapel is intended to seat about 600 persons, and, with schoolroom, classrooms, church parlour, vestries, and furnishing, is estimated to cost about £5,800.

Mr. Strachey, M.P., has been invited by the Board of Management of the Rational Sick and Burial Association to open their new chief offices at Manchester on the 24th of October, which have been built at a cost of £25,000.

The dry state of the grass has brought into high relief at Pevensey Castle the ground-plan of the foundation of the old Norman chapel within the keep of Robert de Montague. The heat has burnt the grass above the foundation-stones into a light brown tint, from which it is found that the chancel is square, and not apsidal, as stated in many guide-books. A north aisle is plainly marked, and the walls have a uniform thickness of 30in.

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ILLUSTRATIONS.

"PORTRAIT OF A LADY," BY PETER PAUL RUBENS.—THE PASSMORE EDWARDS SOUTH LONDON TECHNICAL INSTITUTE.—THE BALL ROOM, BLACKPOOL WINTER GARDENS.—BOARD SCHOOL AT GLASGOW.—QUEEN'S HOTEL, WESTCLIFF-ON-SEA.—NEW BUILDINGS IN THE HAYMARKET.—BRONZE DOOR, NOTRE DAME DE FOURVIERES, LYONS.

Our Illustrations.

OLD MASTERS ON THE CONTINENT: NO. XXXVI.—"PORTRAIT OF A LADY," BY RUBENS.

THIS is the third choice which we have made of works by Peter Paul Rubens, the great Flemish master, and it comes from the Royal Gallery at Dresden. Our previous examples of his art were the "Chapeau de Poil" (BUILDING NEWS, Nov. 17, 1893) and "St. Jerome" (BUILDING NEWS, June 28, 1895). In the first-named number Mr. Charles Eastlake, the Keeper of the National Gallery, wrote for us a brief biographical sketch of Rubens (Vol. LXV., p. 648), so that nothing remains to be added in this place. The picture which we give to-day is thoroughly masterly and contemporary—a portrait to the life, and, above all, a work by its painter which, while thoroughly characteristic, is devoid of that mannerism which sometimes overweighs even the vast limits of Ruben's artistic capabilities.

THE PASSMORE EDWARDS SOUTH LONDON ART GALLERIES AND TECHNICAL INSTITUTE.

YESTERDAY Mr. J. Passmore Edwards laid the foundation stone of this building, with which his name will always be associated as the donor. A vast concourse of spectators assembled on the site in the Peckham-road, Camberwell, and the gathering was presided over by the chairman of the Vestry, Mr. Matthew Wallace, J.P. After the ceremony, the visitors met in the picture galleries at the rear of the buildings, where refreshments were served, and a selection of music, vocal and instrumental, was given. The perspective view and ground plan, now on view at the Royal Academy Exhibition, illustrating these façade buildings in Peckham-road, was published in the BUILDING NEWS for April 10 last. To-day we give a detail from the working drawings of the same front. Mr. J. O. Richardson is the builder, Mr. H. Hogan is the clerk of the works. Portland stone, and Laurence's hand-made pressed bricks are the materials used. The cost will be about £7,000. The architect is Mr. Maurice B. Adams, F.R.I.B.A.

THE BALL ROOM, BLACKPOOL WINTER GARDENS.

ON Saturday next this building is to be opened for the season. The decorations will be completed in the autumn. Messrs. Mangnall and Littlewoods are the architects. Their design was selected by the directors of the Winter Gardens Company, Blackpool, who invited five architects to send competition designs for this work last summer, giving each firm a premium for their time and trouble. Tenders for the work were let in two sections, in consequence of the buildings being required to be ready for opening this

August. One section, comprising the grand hall and lounge, was let to Messrs. Whitehead and Son, contractors, Blackpool, in November last; and the other section, comprising the block of shops and offices to Church-street, with the main entrance to the grand hall in the centre, was given to Mr. Smith, contractor, Blackpool, last October. The iron construction to the ball-room and lounge is being carried out by the Widnes Foundry Company. The clerk of the works is Mr. W. Smith. The main entrance to the grand hall is approached from Church-street by a corridor 24ft. wide 80ft. in length, lined on each side with Doulton's faience up to the springing of semicircular roof, the front portion of roof being also in faience, and the back portion being in glass. This work is in Doulton's best style. The scheme of colour adopted is rich amber for the structural lines, with peacock-blue base and capping to dado. Each side of entrance is laid out in seven bays with enriched pilasters about 12ft. from centre to centre, resting upon a dado about 4ft. in height. Between each pilaster, above the dado, is laid out with semicircular panels, 5ft. 6in. in height, the centre one being a bevelled glass mirror, the side panels receiving painted figures, of which there are 28 in number, each being most artistically painted in tiles, and treated in different design and colour. These panels form a most striking feature, and have been designed and entirely painted by the artist, Mr. W. F. Neatby, of Messrs. Doulton's, the key-notes for tiles being taken from the names and colours from the various precious stones, excepting a few which bear the title of birds. Above the panels is the entablature, which has a frieze in relief and colour. Above the entablature springs the semicircular faience ceiling, treated with a moulded and enriched beam over each pilaster, and divided into panels by intermediate moulded ribs, each panel treated with figures and foliage in colours of most attractive designs in faience, the subjects in the panels being mermaids and conventional treatment of seaweed and fishes. The Italian gardens are situated between the main entrance buildings and the grand hall, laid out in terraces and walks, with groups of statuary and fountains. The ground will also be lighted up with electric lights. On one side of the gardens are erected conservatories, and on the other side will be erected terraces of castellated and palatial buildings, as at Earl's Court, to mask the side walls of the present Opera House. The main avenue down the centre of ground leads to the grand hall. The grand hall, 189ft. by 110ft., has a floor capacity of 20,790sq.ft. There is a promenade 15ft. in width around the four sides raised one step above the pavilion floor. The stage and orchestra are placed on the south side, in the centre of the room. The floor is specially adapted for dancing, having spiral springs fixed 3ft. apart over the whole of the dancing area, and is to be laid with a pine sub-floor secretly nailed upon red deal joists, and finished on the surface with handsome parquet, having a wide border, with pattern in various coloured woods. There is a gallery around the room 15ft. wide on each side, approached by wide staircases. There are sufficient windows introduced on all sides to give light for day performances at all seasons of the year. There are ample cloakrooms and lavatories for both sexes.

MARTYRS' PUBLIC SCHOOL, GLASGOW.

THE school in plan is of the type which the school board of Glasgow have adopted for most of their recent schools. It provides accommodation for about 1,000 scholars, and, besides the classrooms, has a large drill-hall on the ground floor, lit from the roof. A portion of this room is carried up as a central hall, and from the galleries surrounding this access is got to the classrooms. The building is erected in red freestone from Ballochmyle Quarries. The class of masonry is square-dressed work, the cornices and mouldings, &c., being scabbled. The heating is to be by low-pressure hot-water pipes, and ventilated by means of ducts in the walls, led from the walls near ceilings. The playground is to be paved with tar macadam. The architects are Messrs. John Honeyman and Keppie, of Glasgow.

QUEEN'S HOTEL, WESTCLIFF-ON-SEA.

THIS illustration represents the above building as it will appear when viewed from the new Westcliff railway-station platform. It is intended to build the whole of the external walls in red terracotta bricks, with facings and dressings in Casterton stone. The upper portion of

the building is finished in half-timber work in dark oak filled in between with rough-cast and carved plaster panels. A tiled-floor balcony, supported on carved stone corbels and brackets, with shafts in marble, runs round the two principal fronts. The slopes of roofs are covered with dark-red tiles, the upper portion terminating in a promenade measuring 35ft. by 30ft., upon which is constructed a small observatory. The grounds in front and terraces are laid out as ornamental gardens. The principal dining-room and drawing-room open into a large circular-ended conservatory, which is at the west end of the building. A large smoking-room and lounge are placed on the top floor, with a staircase leading from same to the roof promenade. Thirty-four bedrooms are provided for, with suitable private sitting-rooms and other accommodation, including billiard-room, coffee-room, and tea-room, &c. Ample stabling accommodation is provided for at the rear of building, with coachman's rooms over. The building is to be heated with hot water and lighted with electricity throughout, and everything will be done to make it a comfortable and attractive building for both summer and winter visitors. The drawing is by the architect, Mr. James Thompson, now Messrs. Thompson and Greenhalgh, of Southend, Essex.

NEW BUILDINGS IN THE HAYMARKET.

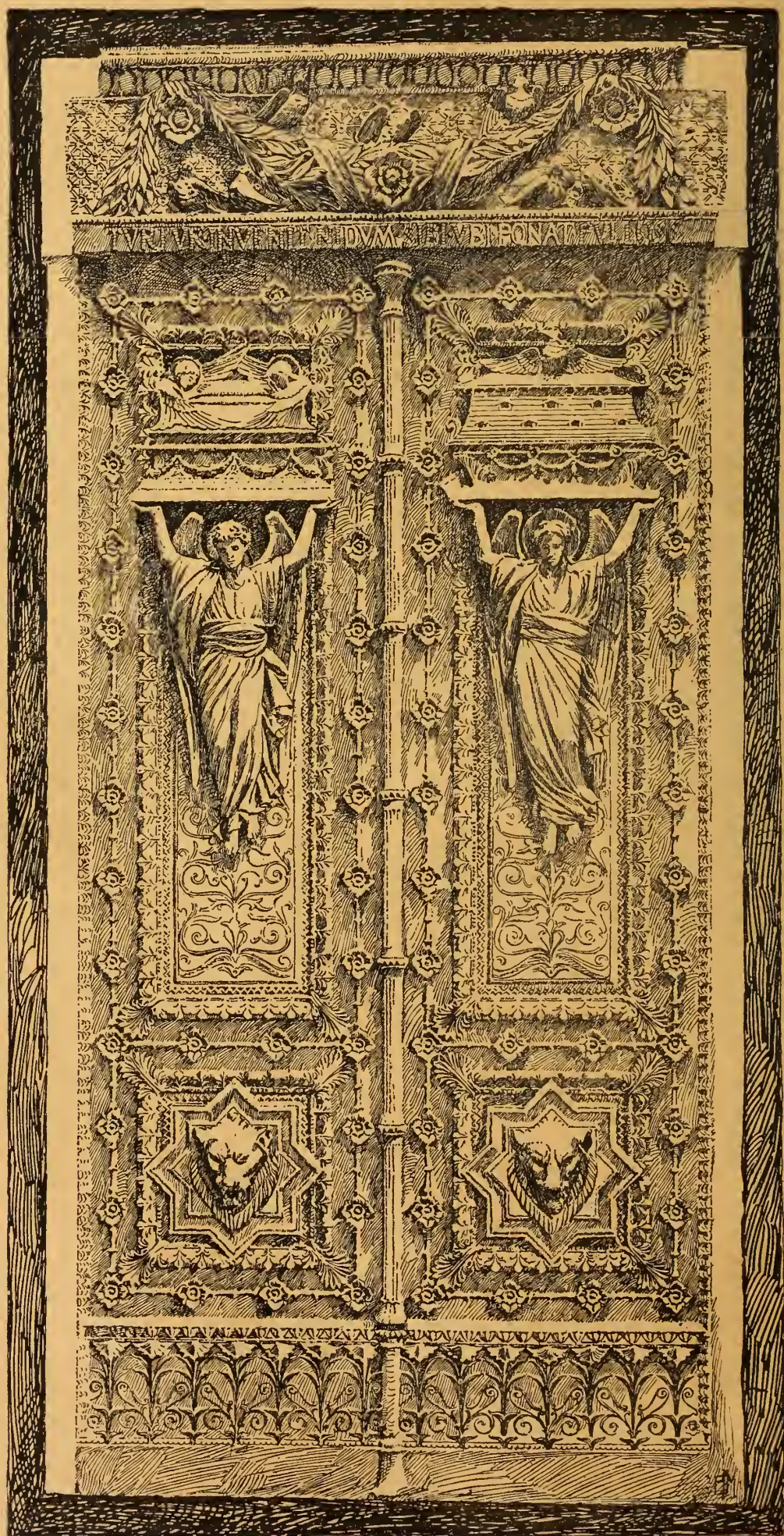
THE site so long vacant upon which Her Majesty's Theatre once stood is now being built upon, and we to-day publish an elevation of the façade towards the Haymarket. It is 256ft. long, of which Her Majesty's Theatre, now building by Mr. Tree, takes up one-third, or 86ft. of the frontage, widening out to 94ft. in the Royal Opera Arcade, and having a frontage also to Charles-street of 150ft. Upon the other portion of the site is being erected an hotel with a courtyard, and having a restaurant, café, drawing-rooms, reading-rooms, and smoking-rooms, and about 200 bedrooms grouped around it. The whole of the block of building now facing in Pall Mall will also come down, so that the new erection will have four frontages—viz., to Pall Mall, the Haymarket, Charles-street, and the Opera Arcade. *Her Majesty's Theatre*.—The theatre will be divided into five classes of audience, stalls and pit level with the street, dress circle opening out upon the loggia on the first floor, upper circle on the second floor with the gallery behind, so that the theatre has really only two tiers. Each of these five classes of audience has two distinct ways out on opposite sides of the building. It will contain accommodation for 1,600 persons seated. The dimensions are as follows:—Auditorium, 70ft. wide; proscenium opening, 35ft. wide; stage, 70ft. wide; stage, from curtain line to back wall, 50ft.; pit, from curtain line to back wall, 61ft.; dress circle to curtain line, 34ft.; upper circle to curtain line, 39ft. 6in.; pit floor to centre of ceiling of auditorium, 45ft. 3in.; stage to gridiron floor where scenery is worked, 58ft. The contractor is Mr. Lovatt, of Wolverhampton, and the building has been designed, and is being carried out under the direction of Mr. C. J. Phipps, F.S.A., of 26, Mecklenburgh-square, London.

BRONZE DOOR, NOTRE DAME DE FOURVIERES, LYONS.

OUR illustration shows the very handsome door in bronze which has been added to the above church by M. Sainte-Marie Perrin, the architect. The heights of Fourvères on which the church stands commands a fine view of Lyons, strikingly situated on the rivers Rhone and Saône. The church has a lofty dome surmounted by a gigantic statue of the Virgin, gilt, and is chiefly remarkable for a large number of paintings, &c., gifts to Our Lady, who, it is said, preserved Lyons from the cholera. We are indebted to the *American Architect* for the print from which our illustration was taken.

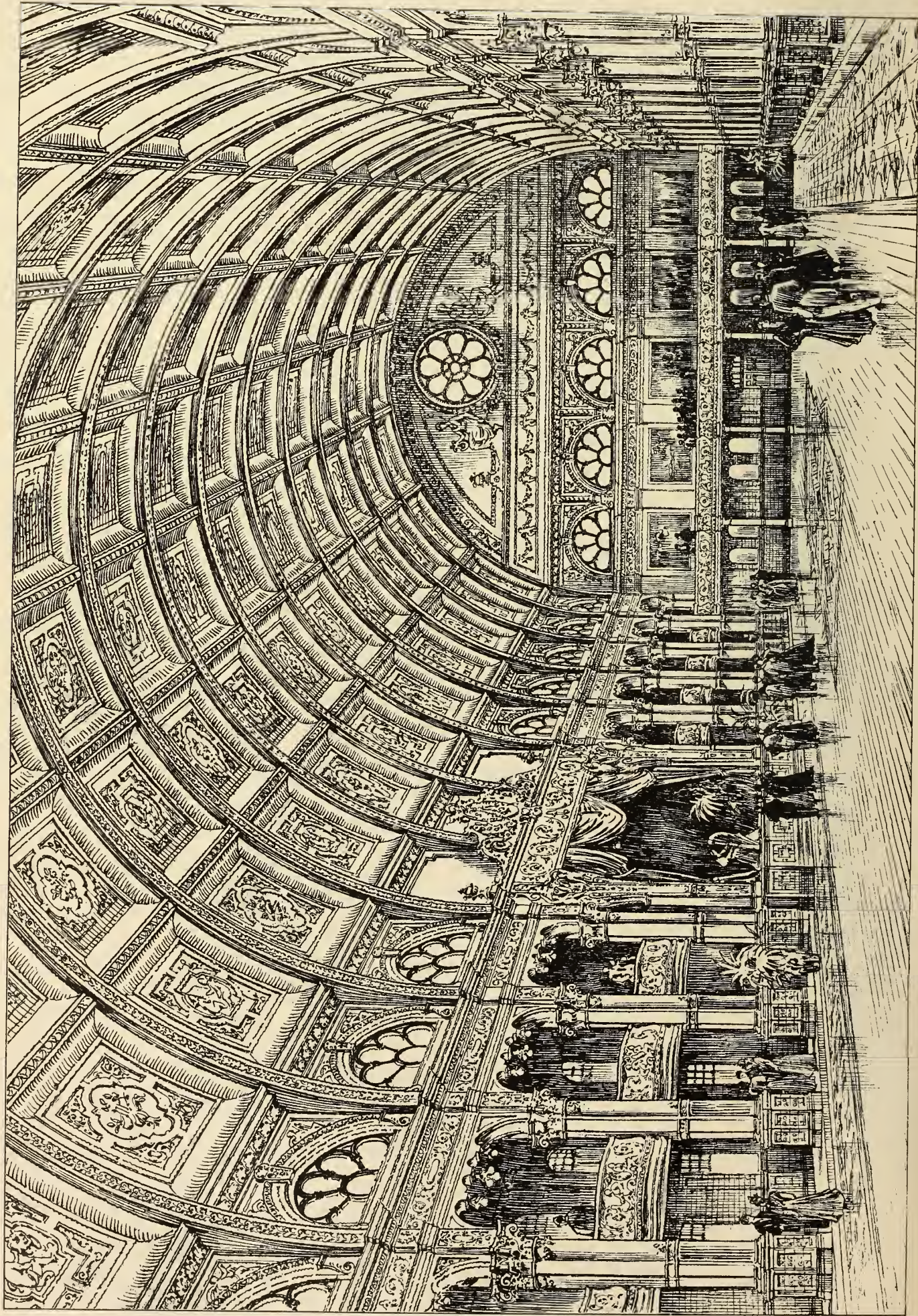
The Ormskirk Urban District Council proposes to seek to embrace Aughton and Bickerstaffe, thus increasing the area of Ormskirk from 573 acres to 1,228, the population from 6,298 to 7,578, and the rateable value from £25,533 to £29,585.

The memorial stone of a new Congregational chapel was laid at Harpenden last week. The building will be Gothic in style, and will be faced with red bricks, with white Monk's Park stone dressings. The interior will be faced with red bricks, and will seat 320 persons. Mr. Arthur E. Anson is the architect, and Mr. T. H. Kinglerlee, of Oxford, the builder. The cost will be £2,000.



BRONZE DOOR, NOTRE DAME DE FOURVIERES, LYONS.

THE BUILDING NEWS, JULY 31, 1896.



THE BALL ROOM, BLACKPOOL WINTER GARDENS.

MARCNALL & LITTLEWOODS, ARCHITECTS.

Photo lithographed & Printed by James Ackerman, 6, Queen's Square, W.C.





FROM A PHOTO BY FRANZ HANFSTAENGL

OLD MASTERS · ON THE · CONTINENT · N° 36 ·

PORTRAIT OF A LADY · (DRESDEN) BY PETER PAUL RUBENS (B 1577 D 1640) FLEMISH SCHOOL

"PHOTO-TINT" by James Akerman & Queen Square London W

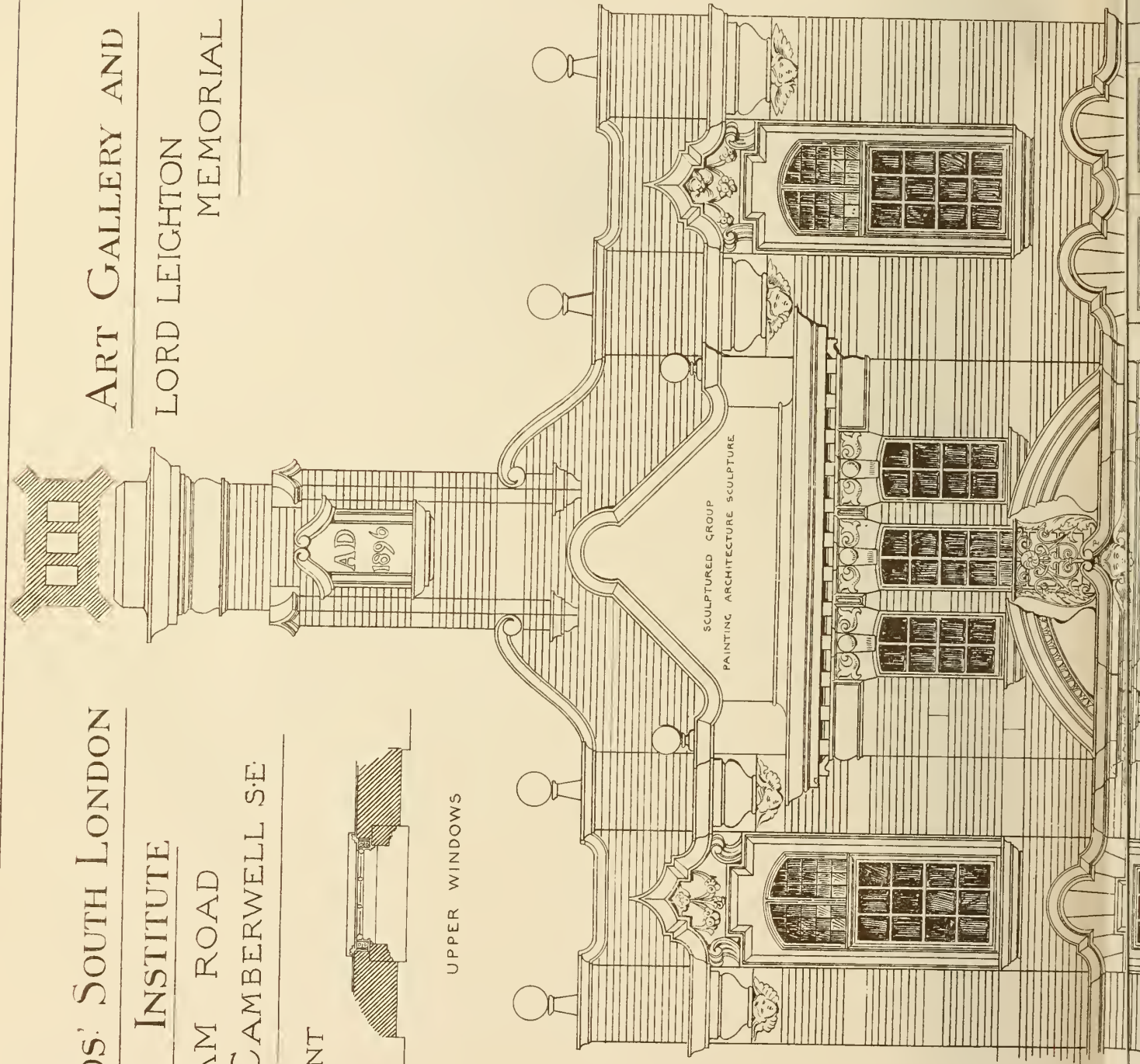
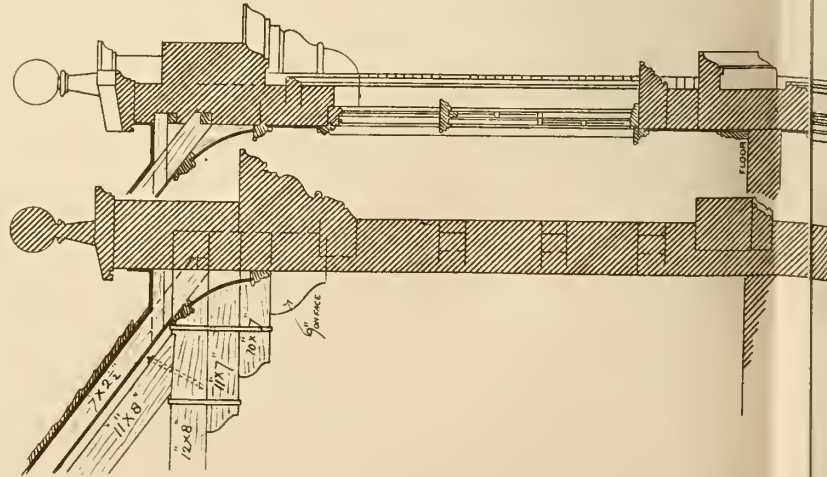
PASSMORE EDWARDS' SOUTH LONDON
TECHNICAL INSTITUTE
PECKHAM ROAD
CAMBERWELL S.E.

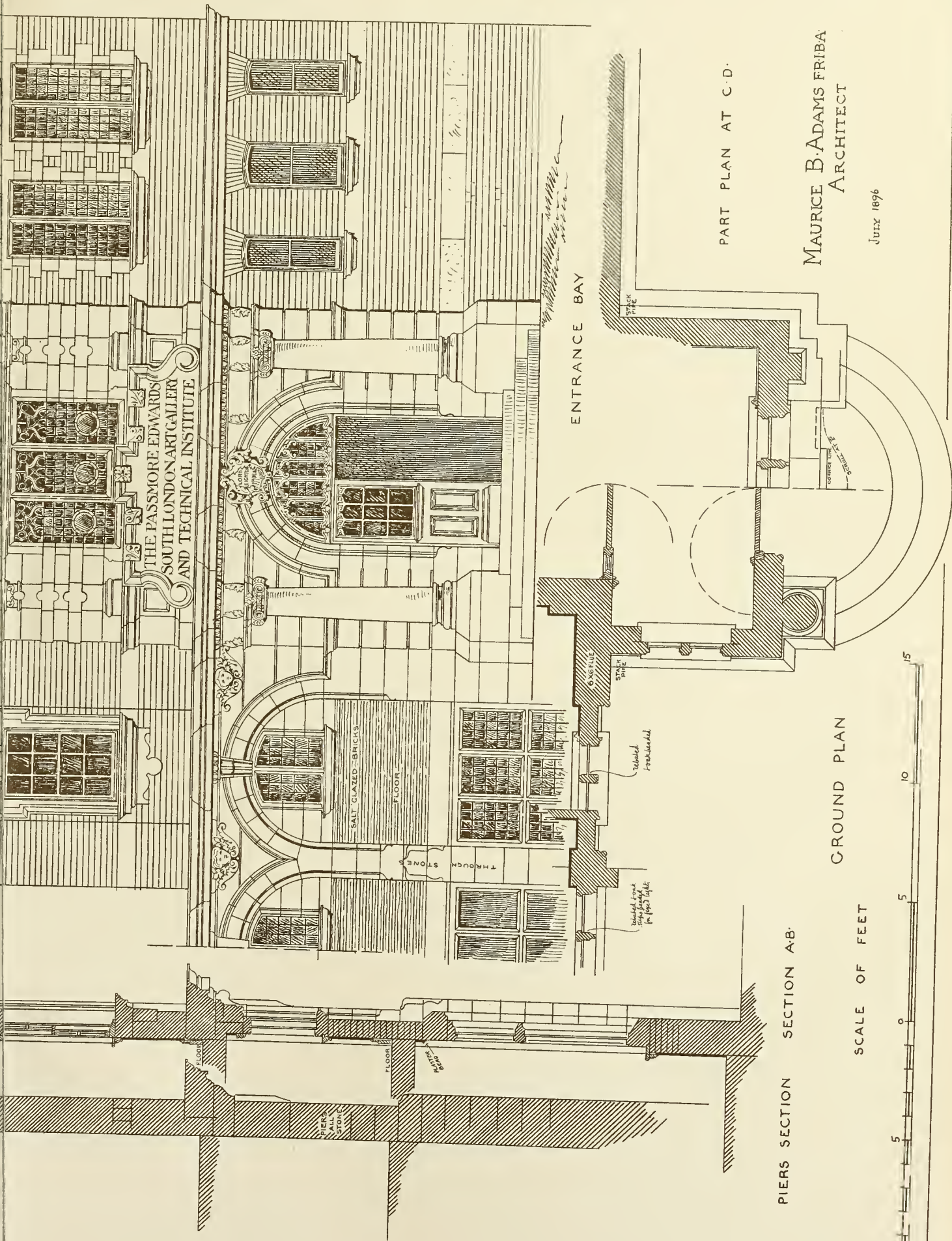
ART GALLERY AND
LORD LEIGHTON
MEMORIAL

DETAILS OF MAIN FRONT



UPPER WINDOWS





NEW BUILDINGS IN THE MAYMOR



FALL MALL

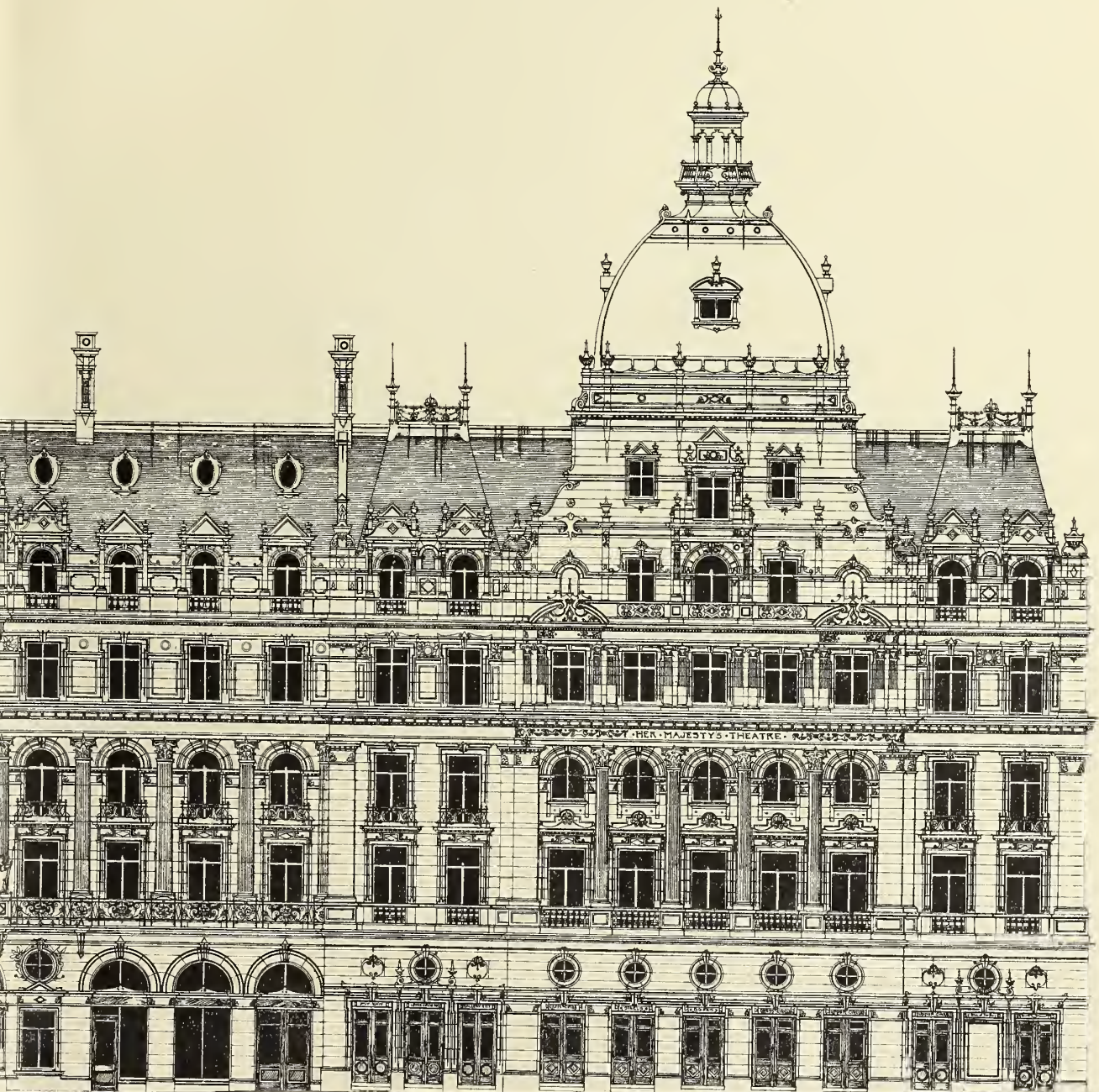
HOTEL

• FACADE TOWARDS

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SCALE

JULY 31, 1896

MARKET C.J. PHIPPS F.S.A. ARCHT.



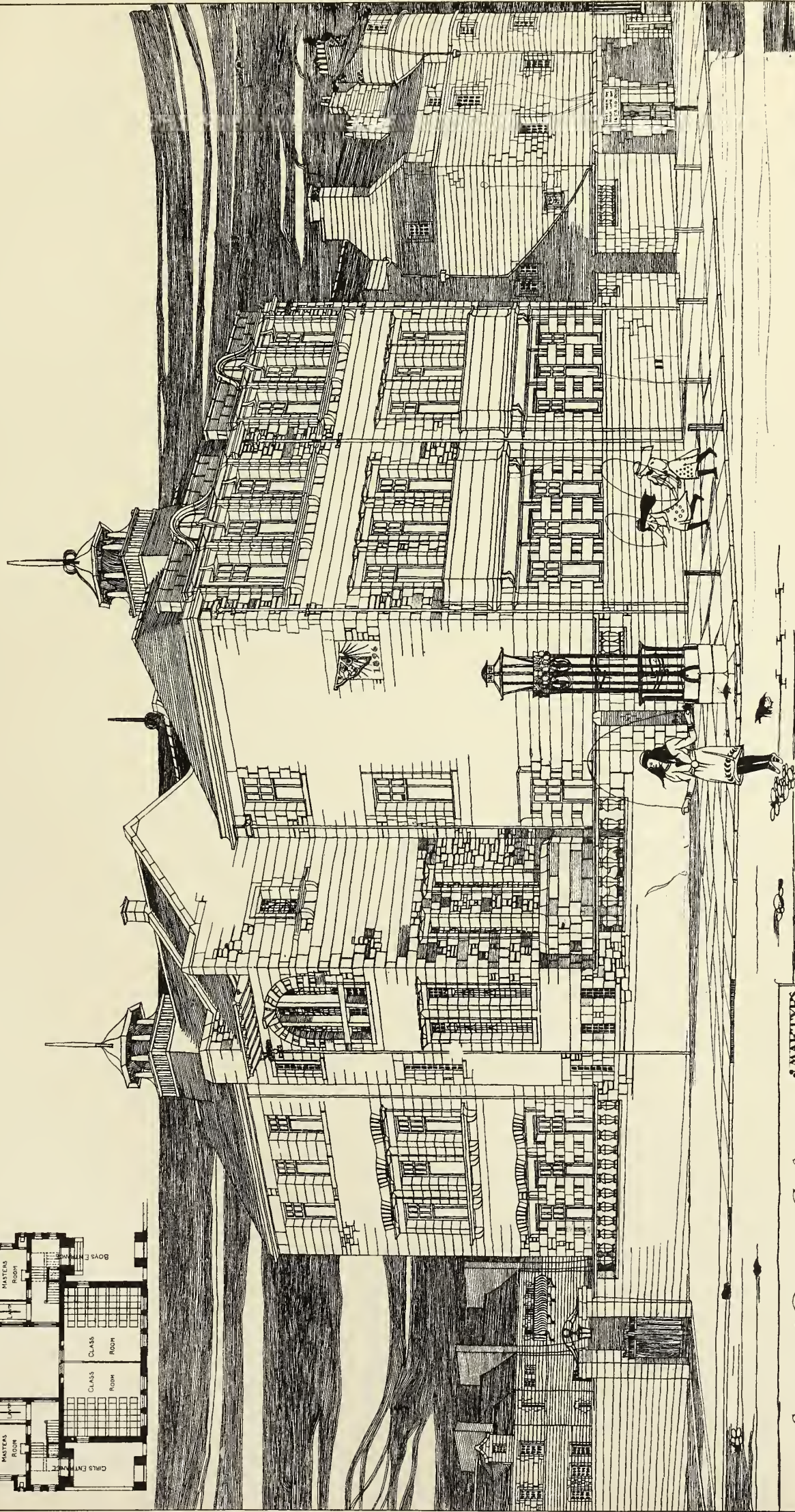
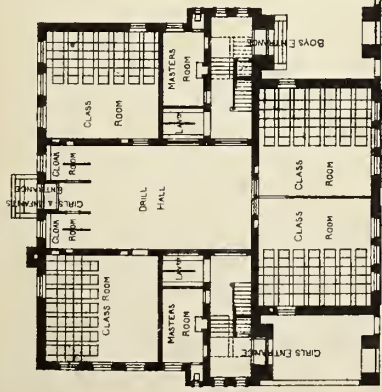
CHARLES ST.

HER MAJESTY'S THEATRE

HAYMARKET



C.J. Phipps F.S.A.
ARCHITECT
26 MECKLENBURGH SQ.
LONDON W.C.



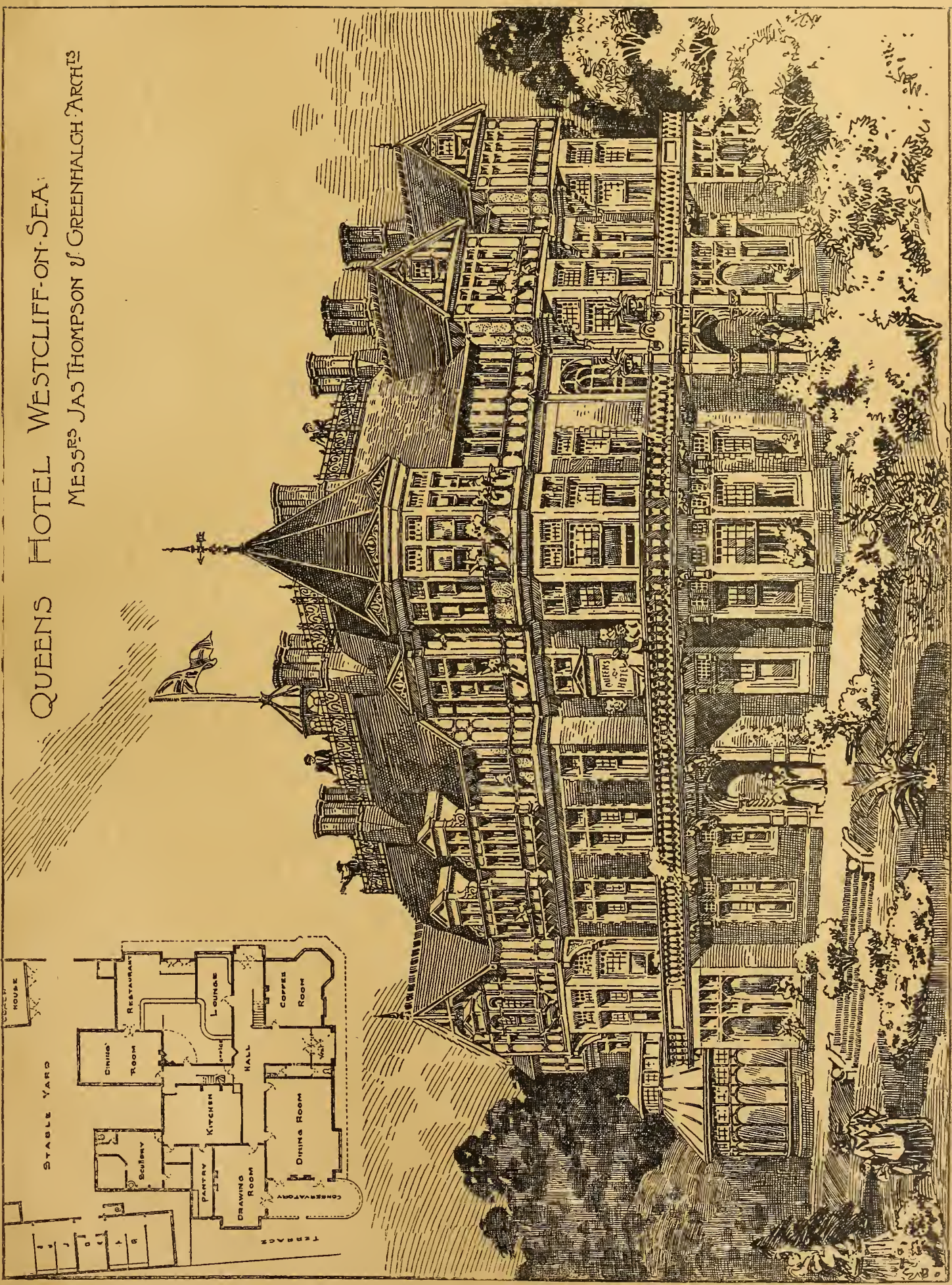
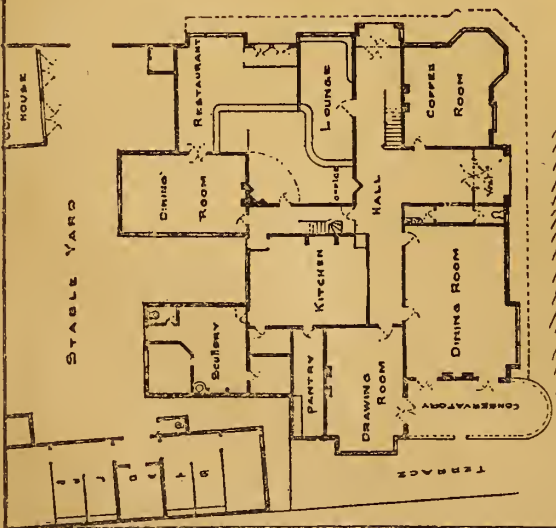
THE SCHOOLBOARD OF GLASGOW MAKING PUBLIC SCHOOL

CHARLES R. H. MACDONALD

JOHN J. JOSEPH & SONS LTD. PHOTOGRAPHERS
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THE BUILDING NEWS, JULY 31, 1896.

QUEENS HOTEL WESTCLIFF-ON-SEA.
MESSRS JAS THOMPSON & GREENHALGH ARCHTS



Building Intelligence.

AYTHORP RODING CHURCH, ESSEX.—On Wednesday, the 22nd inst., the Bishop of St. Alban's reopened this church, which has been closed for the last four months. During that time the decayed portions of the fabric have been renewed, and a new roof has been put to the nave. The chancel roof which was concealed by plaster, and found to be in a very bad state of repair, partly owing to a fire which took place a good many years ago, has been replaced by a new oak one corresponding with the old, the old timbers being reused as far as possible. The church has been resealed, but the old bench ends and seats have been retained, and the design of the new ones follows that of the old. The sacarium has been enlarged, and a new altar and new altar-rails have been provided. An open timber porch has been added on the south side of the church, and a lych gate has been built at the entrance from the road. The work has been carried out by Mr. S. Parmenter, of Braintree, from the designs, and under the superintendence, of Mr. Arthur Blomfield Jackson, architect, London.

EDINBURGH.—The directors of the Music-hall have just spent over £2,000 upon its redecoration and the introduction into it of the electric light. In the scheme of decoration, which has been carried out under the direction of Dr. Rowand Anderson by Messrs. Moxon and Carfrae, vermilion, gold, and turquoise blue, with russet yellows and cooler greys, have been employed in combination, a broad treatment being adopted. The electric lighting of the hall has been effected by adapting several of the original crystal gasfittings, and by the addition of a number of entirely new electric groups and pendants. A new system of lighting the orchestra has been introduced. From the roof above it are hung several groups of electric lamps, each having a large conical shade with gold beaded fringe. The object of this arrangement is to throw a diffused light over the orchestra, and at the same time to shade the eyes of the audience from the strong light. The various side rooms, entrances, &c., as well as the manager's house, have also been fitted up with the new illuminant, the total number of lamps provided for being equivalent to about 1,100, of 16 candle-power each. The installation has been carried out under the personal supervision of the architect, Dr. Rowand Anderson.

HOLYWELL.—The new town-hall was on Saturday formally handed over to the local authority. The building, which has cost about £2,300, occupies a site in front of the market-hall, and has a front elevation of Gwespys stone. In the centre is a tower, from which depends by an iron bracket the town clock, which was previously on another building, and which was built to commemorate the coming of age of Sir Piers Mostyn in 1867. The chief rooms in the building are a council-room, a working men's clubroom, and a very large room which occupies practically the whole of the second floor. The whole of the work has been carried out by Mr. Abel Jones, contractor, Rhyl, from plans prepared by Mr. J. Lloyd Williams, architect, Denbigh.

IPSWICH.—New board schools at Springfield, Bramford-lane, have just been completed, and were opened on Saturday. It is the largest block of board school buildings in the town, and will accommodate 672 children—boys, girls, and infants. Future extension is also provided for. The area of the site is one acre. The planning of the school is a distinct advance on the other board schools in the town, as there is a central hall, around which are grouped the classrooms—the boys' to the west and north, the girls' to the east and north, and the infants on the south. Each department has a cloakroom and lavatory attached. Glazed brick dados and varnished pitch pine woodwork are employed. The architecture is a simple form of Tudor suited to the locality. The borough arms have been carved in the brickwork of the west gable of the infants' school by Messrs. John Groom and Son. The facings are in red brick, with Brosley tiled roofs, and the central hall is covered with Roman tiles. The work has been executed from Mr. E. F. Bisshopp's designs, and under his supervision, with Mr. F. Bennett, of Ipswich, as contractor. The contract was for £7,299. There were no extras.

NEWCASTLE-ON-TYNE.—New board schools in Elswick-road, providing accommodation for 1,600

scholars, were formally opened by the Mayor on Friday. Accommodation for infants and special subjects is made on the ground floor, places being provided for 600; the junior mixed school are allotted the first floor, and the senior mixed the second floor; each of these accommodates 500 scholars. A central corridor runs from end to end of the building through the central hall. Out of the corridor open, on the north side of ground floor, three classrooms for infants, two of them 23ft. by 22ft., and the third 30ft. by 22ft., at the end of the central hall; and also two large schools in the wings, 32ft. by 22ft., one a wash-house and laundry, and the other for manual instruction. On the south side of the corridor are two more schools, 27ft. 6in. by 22ft. in the wings, one for cookery and the other for manual instruction, and the large central hall, 45ft. by 30ft. All these rooms are 16ft. in height, which is also the height of the first-floor rooms, while the top floor is 14ft. high. The first and second floors are reached by the main staircases, which are situated at either end of the central corridor. These floors are practically reproductions of the ground floors, there being three classrooms and two schools facing north, and two more schools and central hall facing south, the intervening space being taken up with lavatories and cloak-rooms. On each floor, by the removal of a swivel partition, the classroom at the end of the central hall can be thrown into it, making a room 70ft. by 30ft. running through the building, and lighted from both ends. The room on the top floor has a curved boarded ceiling, divided into panels by mouldings. The exterior is in the Queen Anne style, with stepped gables and moulded string-courses, pilasters, and cornice. The mouldings and dressings are of red terracotta, supplied by Mr. J. C. Edwards, of Ruabon. A half-timbered gable has been introduced in the centre of the north side. The architects are Messrs. Dunn, Hansome, and Fenwick, of 23, Eldon-square, Newcastle. The contractor for the whole building is Mr. Walter Scott, of Newcastle. The ground floor is laid with wood blocks by the Wood Block Flooring Company, of 11, Queen Victoria-street, London. The lavatory fittings have been supplied by Messrs. Doulton and Co., of Lambeth. Mr. W. Boocock is the clerk of works.

ROCHDALE.—The Equitable Pioneers' Co-operative Society are about to make some important additions to their premises in Rochdale. Messrs. Butterworth and Duncan have just prepared plans for the extension of the Pioneers' Central Stores in Toad-lane, which have been adopted by the committee. The style of the front is to be a free treatment of Late Gothic. The fenestration will be of an elaborate character, all the windows being filled with tracery. On the ground floor of the new building there will be a general office 42ft. square and 22ft. high. On the top floor facing the street there is to be a new board room 42ft. by 21ft., with three large committee-rooms at the rear. At the back provision is made for the erection of a dynamo and engine-house, from which the whole of the premises, old and new, are to be lighted by electricity. The present board-rooms will be converted into workrooms for the drapery and millinery departments. A new staircase leading to the assembly-room is to be made.

SPOTLAND, ROCHDALE.—The memorial stones of the new Free Methodist chapel at Spotland were laid on Saturday. The new chapel is being erected by Messrs. Ashworth and Woolfenden, from plans prepared by Messrs. Butterworth and Duncan. In the body of the chapel, the side seats will be separated from the main walls by narrow aisles. In this respect the plan differs from the usual arrangement. These aisles will not only afford increased accessibility to the seating, but remove the occupants to a convenient distance from the windows away from the currents of cold air which fall from the glass. Another feature of the plan will be a slight sloping of the floor towards the rostrum. The Communion-table and the rostrum occupy the usual position, and immediately behind them will be the seats for the choir, and the loft for the organ. This space is in a wide recess in the main wall. On each side of the choir arch will be a door leading to the schools at the back, and communicating with two vestries. Over these vestries classrooms are to be built, and they will be approached by a staircase situated in a passage separating the chapel from the schools. The chapel will measure 60ft. 6in. by 43ft. 6in.

There will be seating accommodation for 300 persons in the body, and for 150 in the end gallery; but by extending the gallery along the sides of the building 180 additional seats may be provided. The schools will be at the back. There will be one large room, 50ft. by 33ft., where 400 scholars can be accommodated. Leading off the main room, on either side, there are to be ten classrooms, providing teaching accommodation for 350 scholars. The buildings will be faced with Ruabon bricks and Yorkshire stone. The internal fittings will be of pitch-pine. The style selected is the later phase of English Renaissance. The total cost of the chapel and schools will be about £5,300.

THIRGBY, NORFOLK.—The nave and tower of the parish church of Thirgbry, a Decorated structure which had been much neglected for generations, have just been restored at the cost of the squire. From tower to east end the church was nothing more than one great plain room, with walls leaning far out of the perpendicular, roofs and floors beyond repair; externally there was no porch, while the tower exhibited a crack extending from its uppermost window downwards as far as the ground. Walls have been straightened, new buttresses built, a blocked up north window opened, Decorated tracery inserted, a chancel arch erected, a tessellated pavement laid, and the nave covered with a new roof of pitch-pine. Beside all this, a porch has been added on the south side, the tower repaired and refloored, the single bell recast and rehung in a new frame, all old seats modernised, and panelled stone substituted for brick as the support of the ancient font. The cost of the works has been about £700. The special gifts included an oak eagle lectern and reading desk. The chancel has been restored by public subscription. The architect for the tower and nave was Mr. A. H. Hewitt, Regent-street, Yarmouth, and for the chancel Mr. A. J. Lacey, diocesan surveyor, Norwich. The whole of the work has been carried out by Mr. Benjamin Springall, of Great Yarmouth, with Messrs. North and Sons (Norwich) and Mr. Utting (Acle) as sub-contractors. The reopening services took place on Wednesday in last week.

WARWICK.—The fine parish church of St. Mary at Warwick has during the last three months being undergoing improvement, and was reopened on Sunday. The nave of the edifice was burned down in 1694, and was rebuilt in 1704 by Sir W. Wilson, builder and architect, of Leicester. Wilson married the wealthy widow of Henry Pudsey, of Sutton Coldfield, and through her influence obtained a knighthood. It has always been considered that a greater than Sir W. Wilson—viz., Sir Christopher Wren—had a hand in the rebuilding of St. Mary's. While the work was in progress Sir Christopher was residing at Wroxhall, within a few miles of Warwick. The proportions of the building, especially of the tower, and its similarity of detail to Wren's churches, suggest the presence of a master-hand. Further corroboration is afforded by the existence of sketches of the church by Sir Christopher Wren at All Souls' College, Oxford. One of these shows the old church, with its Perpendicular window, resembling those of the Beauchamp Chapel, and a short Early English tower at the west end, and a south porch, with the room over it, in which was a library. Other sketches at All Souls' are suggestive of the restoration of the church on the lines Sir W. Wilson carried out. In these sketches there are no indications that galleries were intended to be erected—in fact, the side galleries were not introduced until 1767, and those across the transepts were not erected till 1797. These galleries have now been removed, to the great improvement of the appearance of the interior of the church. The floor has been covered with a bed of concrete, preventing any unsanitary emanations from the graves and vaults beneath. A wood block flooring is laid upon the concrete where the seats are placed, while large flags of blue-and-white stone are used for the passages. The architect was Mr. J. A. Chatwin, of Birmingham, and the builders have been Messrs. G. F. Smith and Son, of Milverton.

An adjudication in bankruptcy has been made in the case of William Peel, of Prestwich, architect and surveyor.

From Quebec the death is announced of Mr. J. B. Resther, a leading architect of that city, and one of the founders and most active members of the Province of Quebec Association of Architects.

THE SOCIETY OF ARCHITECTS AT SHOREHAM.

THE members of the Society of Architects paid a visit on Saturday last to the ancient town and port of Shoreham, where the two interesting Norman churches afforded fruitful opportunities for discussing obscure points of chronology and ecclesiology. The party, which included Mr. Ellis Marsland (hon. secretary), Major Seymour Leslie, R.E. (hon. corresponding secretary), Mr. H. G. Quartermain (treasurer), Messrs. Henry Lovegrove, Sydney Marsland, R. W. Coventry Dick, F. H. Barfield, and other members and many ladies, travelled down from Victoria to Brighton by the 10.40 a.m. train, and were welcomed at the terminus by Mr. Edwin J. Hamilton, the president of the society. After luncheon the party proceeded by the Upper-road to the small parish church of Old Shoreham, which occupies a site a full mile from the town, overlooking the tidal river Adur, and just opposite the unfinished chapel of Lancing College, which, with its huge buttresses inclosing lofty unglazed mullioned lights, eastern chevet, and blank west end, looks like a fragment of Beauvais Cathedral, transported from the centre of that sleepy Picardy city to a still quieter green Sussex hillside. St. Nicholas' Church, Old Shoreham, is a picturesque cruciform structure with low central tower covered in by a sloping roof. It is very small, and extremely irregular in outline, no two walls being set out at right angles to one another. The greater part of the masonry is of Early Norman character, richly and yet rudely worked out. A feature common in Sussex churches is very noticeable—that there is not, and never has been, a western doorway. The entrances in the north and south transepts are richly carved, and over each is a long, deeply played, and narrow window set behind a bold chevron moulding. The church seems to have been restored about forty-three years ago, when the floors were tiled, the collar-beam roof to chancel was decorated with gilding and colour, and some reproductions of 13th century tracery were inserted in the simply-moulded Early Perpendicular chancel screen. The south-east pier carrying the tower has its cushion capital ornamented with a coeval grotesque head, the others being simply treated with channelling, and the abaci left in block form. In the church, Mr. H. Goodman Quartermain read a short paper, in which he pointed out that the church, unlike that of St. Mary at New Shoreham, was mentioned in "Domesday Book" as in existence, and he claimed that the nave was probably of prior date to the Norman Conquest. The greater part of the church appeared to have been built by William de Braose, who received as a gift the whole district in which Shoreham is situated from his friend and former neighbour, William the Conqueror. All that we know of its early history was contained in two or three old parchments preserved by Magdalen College, Oxford, the patrons of the livings of Old and New Shoreham, and which deeds the college authorities received in 1459 from their own founder, William of Waynflete, Bishop of Winchester and Lord High Chancellor of England. From these documents we learn that William de Braose made a gift of certain properties, including this church of "St. Nicholas de Soraham," to the abbot and monks of St. Florence at Saumur, in France. Mr. Quartermain urged that a large proportion of this Early Norman work must have been constructed with the aid of Saxon workmen, and drew attention to the fact that even now, in spite of whitewashings and scrapings, the surface of much of the internal masonry showed the irregular diagonal lines characteristic of axe-faced work; while the crudeness of the treatment and simple enrichments were indicative of an Early date, as were the thick, irregular walls, the small deeply-played windows (placed high up as a defence against the feared attacks of the Danes), the circular lights in the upper stage of the central tower, and the cushion capitals. The chancel, it was equally clear, had been pulled down in the 14th century to the level of the window-sills, and then rebuilt, the present beautiful Decorated east window and the roof dating from this period, *circa* 1450. On the south side of chancel were a Late piscina and an unfinished benefactor's tomb. Some discussion followed the reading of the paper, in which the President, Messrs. Lovegrove, E. Marsland, and others took part.

The visitors then drove back to the town to

inspect the great fragment of a Norman cruciform church known as St. Mary's, "New" Shoreham. They were received by the vicar, the Rev. C. M. A. Tower, M.A. Mr. Quartermain again acted as lecturer, and explained that the church was a chapel of ease anciently known as St. Mary de Haura (*i.e.*, harbour), and was built about 1103 on an older foundation, and was thus a little later than St. Bartholomew's, Smithfield. In 1291 it was still known as a chapel, although then far more important than the mother church at Old Shoreham, and the date at which it was recognised as the parish church had not been ascertained. The portion now standing consisted of a choir 70ft. by 20ft. across, with north and south aisles, having clerestories and triforia above the arcades; a tower, 80ft. in height, placed at the crossing; and north and south transepts 80ft. across by 20ft. in depth, and one bay of a nave, which, from the fragment of the west wall still remaining, and the remains of north and south walls, must have been 108ft. in length, making a total length from east to west of 198ft. The nave had apparently two other lean-to aisles, making a five-aisled church, similar to those of Yarmouth and Abingdon and Chichester Cathedral, and, he believed, had no west entrance. The present doorway in the west wall, built after the destruction of the old nave, was taken, he believed, from one of the aisles; as reconstructed, it consisted of stone worked with the chevron and other mouldings of the Norman period, but arranged as a pointed arch. The single bay of the nave, the crossing, and transepts showed all the features of the first few years of the 12th century—the square abacus, with hollow moulding below; the arches with deep recessed faces, and here and there the chevron and label mouldings. The Norman church seemed to have had an apsidal termination to the east end, and similar ones to the north and south aisles (although the ground within the west bays of choir had never yet been excavated to test the truth of this theory). During the Transitional period the church was continued eastwards, and the work went on so slowly and irregularly towards the east end, that while that front is of fully developed Early English character, the variety of treatment in the bays is most perplexing to those who attempted to assign dates to the work. It would be seen that the choir consisted of five richly-arcaded bays, with triforium and clerestory, and that it was roofed with simple yet effective quadripartite vaulting of moulded stone ribs filled in with chalk. The singular point was that the bays above and below seemed to have been executed at different periods, so that they saw sturdy circular columns of the Norman period used in conjunction with octagonal ones of the Early English period on northside, and on the south side columns of engaged shafts supporting pointed arches with deep hollows and rounds, arranged in square reveals, with moulded and boldly-carved foliage, to the caps and bases. On the one side the vaulting shafts spring from the floor, and on the other from corbels, while on the north side again, where the columns looked the older, the triforium and clerestory were treated in a Later fashion than on the south side. Again in the aisles, a continuous Norman arcading, a little varied in character, was carried the whole length of the walls, and below it was a stone bench for the accommodation of the monks. Having called attention to the dedication crosses on many of the piers, Mr. Quartermain referred to the nobility, grandeur and repose, variety of treatment and growth of style evidenced in this noble fragment of a great cruciform church, and said that much of the work, especially in the aisles, seemed to have been carved *in situ* without being set out. He could not refer to the work of "restoration" carried out a few years ago by a local architect now deceased, when Perpendicular windows were destroyed to make room for copies from the antique; but he trusted no such work would be executed in the repairs now in progress.

The President remarked that the variety of styles to be seen in the church was very perplexing, and no one could decide as to the chronology of the building without a great deal of study. He saw no data on the spot for the

* Illustrations of the exterior of New Shoreham Church, from drawings by Mr. Maurice B. Adams, F.R.I.B.A., were published in the BUILDING NEWS for July 28 and Dec. 8, 1871, the former showing the east end in elevation, and the latter a perspective view from the south-east, as seen prior to the "restoration" of a few years since. A sketch of the interior of the church at crossing, by Mr. R. Owen Allsop, appeared in our issue of Sept. 30, 1892.

supposition that the original west wall was unperished by a doorway, for the flint and rubble wall remaining on the south side did not extend to the central point. Messrs. LOVEGROVE and MARSLAND proposed a vote of thanks to Mr. Quartermain and to the vicar, calling attention to various knotty points in the building, and both gentlemen replied. The members stayed some time to examine the church in more detail. The tower is now encased in scaffolding, and is being repaired under the supervision of Mr. Benjamin Ingelow. The work is being carried out by Mr. John Thompson, of Peterborough, represented by Mr. James Bloodworth, foreman. The north-east angle of the tower has been underpinned, and rebuilt stone by stone, and the tower roof reconstructed and made weather-proof, while the masonry facing is now being repaired in a like conservative spirit. The five bells, which bore quaint 17th-century inscriptions, are being recast as a peal of six by Messrs. Mears and Stainbank, of Whitechapel. About £2,500 has already been expended, and another £2,000 is required to complete the work.

After a brief glance at the Town Hall, one of Sydney Smirke's buildings, and at the Duke of Norfolk's suspension bridge over the river, the party drove back by the lower or sea-front road from Swinburne's

"Shoreham, graced with the grace of years,
Shoreham, clad with the sunset glad, and grave with
the glory that death reveres,"

to Brighton, where after tea, hasty peeps were given to the Pavilion and parish church, prior to returning by the 7.10 train to Victoria.

CHIPS.

At the prize distribution at St. Paul's School, West Kensington, on Wednesday, it was announced that Mr. Howle Palmer, one of the directors of the Bank of England and a governor of the school, had offered to erect at a cost of £4,000 a bronze statue of Dean Colet in front of the school. The offer had been cordially accepted, and Mr. Hamo Thornycroft, R.A., had been commissioned to undertake the work.

At the National Gallery a fresh picture was hung on Wednesday, "Jupiter and Semele," by Gregorio Schiavone, *circa* 1450, a Dalmatian artist previously represented in the gallery by two paintings of the Madonna and Infant Christ. The picture just added is numbered 1476, and is hung on a screen in Room No. VII.

Several improvements are now being carried out at Kew Gardens. The temperate house was originally designed to comprise a central structure, two octagons, and two wings. The wings were not added; but the Government has now granted the necessary funds, and already such progress has been made that the south wing is nearly completed, and the north wing will be constructed at the earliest possible date. When finished, the temperate house will be one of the largest of the kind in existence. Its central avenue will be 600ft. long, and there will be a clear view from end to end. This is just double the length of the present largest house—the palm-house—in the gardens. The building will be used especially for the accommodation of succulent plants, agaves, the taller cactuses, and the like, from such sub-tropical countries as the Cape, the highlands of Mexico, and the Canary Islands.

On Tuesday a special meeting of the sanitary committee of the Oldham Town Council was held to consider tenders for rebuilding the Westhulme and Strinesdale Hospital. It was recently decided to reconstruct the Westhulme Infectious Diseases Hospital by the erection of permanent buildings, the whole scheme as accepted entailing a cost of about £10,000. Tenders were now submitted for the first portion of the work, and that of Messrs. J. and S. Smethurst was accepted. The work included in the contract is the erection and completion of the boundary wall, discharging bath, porter's lodge, isolation block, and the laundry buildings.

At a meeting of the Paisley Town Council, on Saturday, Mr. F. Teague, Coatbridge, was appointed resident electrical engineer for the municipal electric lighting installation about to be carried out, at a salary of £200 per annum.

Mr. M. Fowler, M.P., laid on July 23 the foundation-stone of the new Sunday-schools, which are to be erected in connection with the Jubilee Primitive Methodist Chapel at Durham. The new schools are to cover the site of the old buildings which have been doing duty for a Sunday-school, and they are to be sufficiently large to accommodate 200 children. The whole work is to cost about £600. It is expected that the schools and other alterations contemplated will be completed by September. Messrs. Plummer and Burrell, of Newcastle and Durham, are the architects, and Mr. J. G. Gradon, of Durham, is the contractor.

OBITUARY.

WE regret to announce the death of Mr. JOHN GEORGE FINCH NOYES, F.R.I.B.A., of Mayfair Chambers, 42, Half Moon-street, Piccadilly, which occurred on Tuesday last at Deneliquin, New South Wales. Mr. Noyes, whose portrait and biography were given in our issue of June 20, 1890, was a pupil of the late William Burn, of Stratton-street, W., and had been in practice for over thirty years. He joined the Institute of Architects as an Associate in 1868, becoming a Fellow eight years subsequently. He carried out an extensive practice, chiefly in mansions, residences, and the laying-out of estates, but also some churches, including Llanwithwl, Brecon, and the new chancel at Chippenham, Cambs. His principal works are Glen Island, above Boulter's Lock, on the Thames; Kingsclere racing stables, 21, Lennox-gardens, Pont-street; Chesfield, Hampton Wick; additions to Chippenham Park, Cambs; Cefn Park, Wrexham; Mapleton Lodge, Edenbridge; Oakley Court, Windsor; and Freston Rectory, near Ipswich; residential chambers at Green Park and Half Moon-street, Piccadilly; and the Heathfield building estate at Handsworth, on the site of the property of James Watt, the engineer.

CHIPS.

Col. Durnford, Local Government Board inspector, held an inquiry at Lowestoft, on Tuesday week, in reference to an application by the town council for sanction to loans of £14,253 for widening High-street, £1,540 for works of sea defence, and £200 for a new fire brigade station at Kirkley. It is proposed to widen the narrow part of High-street from Compass-street to No. 178, at present varying from 18ft. to 28ft. in width from house to house, so that it will average 40ft. There was no opposition to either loan.

The City Court of Common Council decided at their last meeting to hold another Loan Exhibition of Pictures in the Guildhall Art Gallery next Spring, at a cost not exceeding £450. Plans were also approved for providing greater facilities for landing water-borne fish at Billingsgate at an estimated cost of £6,500.

The town council of Southampton have adopted a scheme prepared by their borough engineer, Mr. W. B. G. Bennett, for the storm-water drainage of the western districts of the town, estimated to cost £5,200, and also plans prepared by Mr. Bennett for a refuse destructor, to be built near the railway, west of Millbrook Station.

The Stoke-on-Trent Board of Guardians have adopted plans by Mr. Charles Lynam, F.S.A., for the extension of the vagrant and receiving wards at the workhouse, at an estimated cost of £4,500, and have further instructed him to prepare plans for new offices for the master, new lodge, and slaughter-house.

The death is announced of Mr. Elias Dorning, of John Dalton-street, Manchester, who acted as consulting engineer to Lord Derby, Lord Wilton, and Lord Sefton, and was a prominent member of the Surveyors' Institution. The deceased was arbitrator for the Manchester Corporation.

The Swinton and Pendlebury District Council have received the sanction of the Local Government Board to borrow £7,000 for the purchase of Swinton Old Hall and adjoining estate, for a public park and pleasure grounds.

The parish church of St. Andrew the Great, Cambridge, is about to be reseated at a cost of £500, borne by a lady parishioner as a memorial to her late husband.

The Pontypridd Board of Guardians have decided to purchase 25 acres of land on the hillside, near Pontrhondra, a short distance from Llwynypia, for a site for a new workhouse, and an inclosure to afford employment to the inmates able to perform a little work.

Messrs. Emley and Sons, Ltd., have received orders for their "McMath" wash-hand troughs to be fitted in the new schools at Widnes, and also at Innerleithen, N.B., the former in polished marble, and the latter in polished slate.

The Board Schools, Rochford, are being warmed and ventilated by means of Shorland's patent Manchester grates, the same being supplied by Messrs. E. H. Shorland and Brother, of Manchester.

The work on the new Cathedral library at Hereford is making rapid progress. In the course of uniting the new building to the old south cloister it was found by the builder that this cloister was in a most dangerous condition. This was not discovered until some of the plaster and whitewash and dirt had been removed. Owing to the unforeseen condition of this cloister some £650 extra expense will be entailed in making it safe, of which £400 has been already subscribed.

COMPETITIONS.

ABERDEEN.—A fortnight ago (on p. 94) we referred to the curious development that had arisen as to the Corporation Lodging-house competition in this city. The designs by Messrs. Marshall and Dick, the successful architects in the competition for the Newcastle Model Lodging House, was placed first, but the assessors to the Aberdeen Corporation considered that the work could not be carried out within the stipulated limit of £9,000. Since then the matter has been reconsidered by the committee, and it has now been unanimously decided to adopt the design of Messrs. Marshall and Dick, and to employ them as architects, unfettered by any question as to keeping below the stipulated sum of £9,000.

HALIFAX.—The competition for the new police-station, court-house, and public-hall has been settled. The authors of the premiated plans are as follows:—1st premium, £100, "Justice," Messrs. Cheers and Smith, Blackburn and Twickenham, London, W.; 2nd premium, £60, "Persimmon," Messrs. H. and D. Barclay, 245, St. Vincent-street, Glasgow; 3rd premium, £40, "Hali-1662-Fax," Messrs. Farrow and Nisbett, 7, New-court, Carey-street, Lincoln's Inn, London, W.C. The following is an abstract of the report of the referee, Prof. Roger Smith:—I have examined the fifteen designs sent in. The site is an excellent one, and the fall from east to west is advantageous to such a building as a public hall. It permits entrances at two levels. One result of the competition is to show that the area, as defined by the frontage lines on the plan, is sufficient for the erection of the proposed buildings. Another result is, I consider, to show that £25,000 is a barely sufficient allowance for their erection. The approximate estimates of buildings are always to some extent uncertain guides, and an additional element of uncertainty is introduced by the valuable building materials which form a part of the price of the building, and which are estimated by competitors at sums ranging between £3,000 and £600. Still there are many designs, and these not extravagant ones, but merely liberal, well considered, with good architectural treatment, about which I can say without a shadow of doubt that they cannot possibly be carried out for £25,000, plus the old materials. None of them are, therefore, in my judgment, eligible for a premium, and this unfortunately shuts out some very good ones. From among the remainder, that is to say, from the designs of which I do not feel able to say positively that their execution for the above price is impossible, I have selected the three which in my judgment are the best. The first premium should be awarded to the design with the motto "Justice." The design has been very carefully planned so as to provide the required accommodation with the smallest possible loss of space. The court-house is placed back from the street, so as to be quiet. It is well planned, and its approaches and the different departments belonging to it are very conveniently arranged indeed. The police station is complete and well contrived, and quite distinct from the Court, yet easily reached. These services occupy a distinct block from the public hall. The hall is arranged to seat the numbers required; it is provided with sufficient cloak-rooms, band and chorus rooms, and with well and economically designed entrances, lobbies, staircases, and outlets. Good use has been made of the fall of the ground in arranging for egress from the upper part of the hall. The hall has piers and arches at the side, and corridors behind them for access to the side seats in balcony and gallery. Its form and proportions would, in my opinion, be favourable to the transmission of sound, but some of the back seats facing the orchestra on the ground floor, and also on the balcony floor, are more overshadowed by the ceilings above than is desirable. The whole is as compactly planned, and with as little loss of space, as is possible consistently with efficiency. The architectural treatment of the interior of the hall, and also of the elevations, is extremely pleasing, and the buildings, if erected according to these plans, would form an ornament to the town, and would include a hall of excellent architectural character. The author of this design has obviously made some miscalculation in his estimate, but I have made an approximate price, and I am of opinion that, supposing the value of the old materials to turn out well, such value and the sum you name in your instructions should suffice for the erection of the building, especially if in the carrying out

the same economy which has been displayed in dealing with the plans is observed throughout. I recommend the design with the motto "Persimmon" for the second premium. The two buildings are kept in distinct blocks. I cannot praise the arrangement of the court-house and police block so highly as in the last case, but the accommodation is fairly well provided. The hall has been extremely well dealt with, a really fine entrance vestibule has been designed. The hall itself has iron columns carrying the galleries and supporting arcades. It would probably prove good for hearing, and the balcony fronts are further apart than in many designs. This competitor has adopted the newly introduced convex curve, which is used at the sides and top of the orchestra in the new Queen's Hall, London, and he is the only one who has done so. The architectural treatment both of the exterior and interior is good. The architect's estimate is £24,700. I think a higher rate per foot than he has used should be employed for part of the cubing; but still this design comes within the limits I have laid down above. I recommend that the third premium be awarded to "Hali-1662-Fax." This design is unquestionably a most economical one. The two blocks of buildings are completely separated. The planning of the court and police block is fairly satisfactory. The court is, I think, rather too large. The planning of the entrances and exits to and from the hall is good, but I should prefer to see more staircases. The hall itself would answer the purpose well. As in the design of "Persimmon," there are iron columns to carry the balcony and gallery, and the seats there are reached from inside, without external corridors. Both the internal and the external architectural treatment is plain; in fact, one external elevation is a mere blank wall. The architect's estimate is £24,960, and he does not in his calculation include any sum for the value of old materials.

ROCHDALE.—The Provident Co-operative Society, having decided upon the erection of a large new central store in Lord-street, instituted an open competition for designs for the proposed building. Messrs. Woodhouse and Willoughby, of Manchester, the architects of the Technical and Castlemere board schools, Rochdale, were the assessors. In the new structure it is proposed, among other things, to fit up large offices, and to have an assembly room capable of accommodating a thousand persons. Messrs. Butterworth and Duncan have been awarded the first premium, the second going to Mr. Crompton, architect for the new Lancashire and Yorkshire Bank, and the third to Mr. Dixon, of Manchester.

WIMBLEDON.—As the result of a limited competition recently held, the building committee of the New Congregational Sunday Schools, St. George's-road, Wimbledon, at their meeting on Monday last unanimously adopted the design of Mr. R. Allsebrook Hinds, architect and surveyor, of No. 36a, Hill-road, Wimbledon.

A drinking fountain, erected at the corner of Quarry and Albion-roads, Tunbridge Wells, was unveiled by the mayor of that town last week. The fountain is 13ft. high, and is constructed of Bath stone from the Monk's Park Quarries in the Renaissance style, the columns, key-stone, and the basin being of polished red Peterhead granite. The work has been carried out by Mr. Albert Burslem, Calverley-road, Tunbridge Wells.

A year ago a mission church for the deaf and dumb was opened in Oak-road, Northam, near Southampton. A club-room for the same afflicted class has just been erected on the ground at the rear of the mission church. The new building, which measures 50ft. by 20ft., has been constructed with bricks, and has an iron roof, lined inside with boarding. The builder was Mr. Kite, of Salisbury, who erected the mission church, and the building was from the designs and built under the superintendence of Mr. J. E. Batchelor, of Salisbury.

A new diocesan home of mercy, which has been erected in Salter's-lane (opposite the Coxlodge Lunatic Asylum), Gosforth, Newcastle-on-Tyne, to take the place of an older institution in Ravensworth-terrace, was dedicated by the Bishop of Chichester (Dr. Wilberforce), on Thursday, July 23. The new building stands immediately opposite the principal entrance to the city asylum. It is of three stories, is faced with Kenton stone, and contains a chapel, 24 dormitories, recreation-room, committee-room, washhouses, offices, &c. Adjoining the home, drying-grounds have been made. The architect was the late Mr. Arthur Gibson, of Newcastle, since whose illness and death the work has been superintended by Mr. W. Stubbs, and the contract for the building was taken at £6,328 by Mr. John Ferguson, of Newcastle.

Engineering Notes.

EDINBURGH.—Begun in April, 1895, the new Waverley Bridge has at last been completed, and opened from end to end for traffic. Its completion marks another step forward in the reconstruction of the Waverley station. The new bridge, which is 72ft. in width, is about 57ft. longer than the one it replaced—27ft. being added on to the south end and 30ft. to the north. The footpaths on each side are over 12ft. in width, and the roadway 48ft. wide. The bridge is carried on six sets of cast metal columns, seven in a set, and is thereby divided into seven spans varying from 43ft. to 65ft. across. The abutments are each 11ft. in thickness. These 42 cast-metal columns, which have an average height of 24ft., carry seven plate girders forming the chief part of the superstructure of the bridge. Between the flanges there are arches of brick which carry the roadway. One of these is closed below so as to form a pipe track across the bridge. This is 11ft. wide by 5ft. in height. Concrete has been spread on the top of the arches, and on the top of that again has been formed the street, which is laid with granite blocks. The iron parapet of the bridge is the one taken off the old one, with some new pieces added, and at three of the corners are moulded stone pilasters. The fourth corner (on the south-east side) is occupied by shops. The engineers for the bridge were Messrs. Blyth, Cunningham, and Westland, C.E.

CHIPS.

Col. A. G. Durnford, R.E., an inspector from the Local Government Board, held an inquiry at the Oddfellows' Hall, Stowmarket, on Thursday in last week, as to the application of the Urban District Council for permission to borrow £6,000 for the purpose of sewage disposal works. Mr. J. Pollard, Old Queen-street, Westminster, the engineer of the scheme, explained the plans.

Two additional wards are about to be erected in connection with the hospital in Whitegate-lane, Blackpool. Mr. Thomas P. Worthington is the architect.

The new Welsh church of St. Catherine, at Flint, opened last week, is Gothic in style, 72ft. by 32ft. in dimensions, and seats about 300 persons. It is constructed of red Ruabon brick, with Cefn stone dressings, and has a square tower at west end. The woodwork of the interior is of pitch pine, and the pillars and arches are Stourton Hill freestone. The heating will be by hot-water pipes. The total cost of the building and furnishing has been about £2,000. The work has been carried out by Mr. M. S. Rogers, of Flint.

The Falkirk fever hospitals, now in course of erection—Messrs. A. and W. Black, architects—are being ventilated by means of Cousland and Mackay's patent direct-acting turret ventilators, which have been supplied by Messrs. Cousland and Mackay, ventilating engineers, Glasgow.

Messrs. J. and W. Lowry, Corporation-street, Newcastle-on-Tyne, have obtained the contract for the erection of the Northumberland Buildings, a first-class Temperance Hotel, shops, &c., to the designs of Messrs. Oliver and Leeson, architects, Mosley-street, and to the order of Messrs. W. and J. Suttie, Suttie's Hotel, Newcastle-on-Tyne. The contract price was over £18,000.

At All Saints Church, Maidstone, on Friday, Dr. Tristram, Q.C., Commissary-General, held an inquiry relative to the petition of the vicar and the late churchwardens for a faculty authorising certain works. The proposal was to remove a portion of the wall of the churchyard adjoining Mill-street on the north-east side, and appropriate a portion of the churchyard for the purpose of widening the roadway and footpath. This work was to be done at the expense of the urban district council. The alterations inside the church comprised the construction of a chapel in the ancient chapel of Corpus Christi on the north-east of the church, and with that view to erect a reredos, altar, and rails; to remove the mural tablets; to erect a rood screen, and screens in the north and south chancel aisles; and to place gates at the chancel and chancel aisles. The cost of the proposed alterations was estimated at £1,400. The faculty was granted.

The early Scottish poet, William Dunbar, is to have a statue to his memory placed in the exterior of the National Scottish Portrait Gallery, Edinburgh. Mr. Pittendrigh Macgillivray, of Edinburgh, has been commissioned by the Board of Manufactures to execute in stone the figure of the Chaucer of Scottish poetry, whose writings, after lying neglected for more than 300 years, were, in the present century, printed in collected form.

TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. All communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondents.]

It is particularly requested that all drawings and all communications respecting illustrations or literary matter should be addressed to the EDITOR of the BUILDING NEWS, 332, Strand, W.C., and not to members of the staff by name. Delay is not unfrequently otherwise caused. All drawings and other communications are sent at contributors' risks, and the Editor will not undertake to pay for, or be liable for, unsought contributions.

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Advertisements for the current week must reach the office not later than 3 p.m. on Thursday. Front-page Advertisements and alterations in serial advertisements must reach the office by Tuesday morning to secure insertion.

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The charge for advertisements for "Situations Vacant" or "Situations Wanted" is ONE SHILLING FOR TWENTY-FOUR WORDS, and Sixpence for every eight words after. All Situation Advertisements must be prepaid.

NOTICE.

Bound copies of Vol. LXIX. are now ready, and should be ordered early (price Twelve Shillings each), as only a limited number are done up. A few bound volumes of Vols. XXXIX., XL., XLI., XLVI., XLIX., LI., LIII., LIV., LVIII., LIX., LX., LXI., LXII., LXIII., LXIV., LXV., LXVI., LXVII., LXVIII. may still be had, price Twelve Shillings; all the other bound volumes are out of print. Most of the back numbers of former volumes are, however, to be had singly. Subscribers requiring any back numbers to complete volume just ended should order at once, as many of them soon run out of print.

RECEIVED.—F. C. Barker.—Foreman.—L. J. and Co.—Interested One.—F. W. T.—C. D. B. Co.—H. B.

Correspondence.

SCHIERMONNIKOOG.

To the Editor of the BUILDING NEWS.

SIR,—This little island, with a long and somewhat unpronounceable-looking name, lies a few miles direct north from the coast of Friesland, and measures some seven miles by a couple wide. It is difficult of access to the ordinary traveller, is quite off the beaten track of the average tourist, and as yet has been untouched by the publishers of guide books. As a matter of actual fact, I believe I am the only Englishman that has made the island even a temporary halting place for the last dozen years.

Schiermonnikoog (pronounced *Skin-mon-na-co*) is a name derived from two old Frisian words—viz., *schier* (grey) and *monniken* (monks). So, freely translated, it signifies "The Island of the Grey Monks." The earliest known charter having reference to it is dated 6 Nov., 1465, and is signed and sealed by David van Bourgondie, Bishop of Utrecht. Peter the Cistercian was then abbot of the island.

Three years and a half ago (Count) Graaf von Berdorff, a member of the German Reichstag, and a prominent German nobleman of high standing and great wealth, whose country residence is at Wehningen, near Dömitz, on the Elbe, Prussia, purchased the whole island. So, like the Rev. Mr. Heaven, of Lundy Isle, and Mr. Smith, of the beautiful Isles of Scilly, he is to-day practically "lord of all he surveys," and thus Schiermonnikoog, although actually, as territory, part and parcel of the Dutch province of Friesland, is now practically German property.

Count Berdorff contemplates converting the whole of the western part of the island—now a dreary waste of sand-hills—into a fashionable sea-bathing resort. Scheweningen, near the

Hague, so long the most popular bathing place of the Hollanders, is fast becoming choked by sand. Heligoland, once English but now a German seaside resort, is admittedly getting more and more mixed (too much mixed!) in its society. Hence, North-west Germany and Holland alike have neither of them a really good watering-place. Schiermonnikoog, it is believed, is to be the holiday resort of both countries for the future. At present, the accommodation it can offer for an annually increasing influx of visitors is little more than a Badhuis (hotel) of 60 bedrooms, and such slight, but cordial, if very curtailed convenience, the honest and scrupulously clean fisher folk—who are residents—can afford in their pretty, old Dutch tile-walled cottages.

The Count has procured designs (which, through his courtesy, I have had opportunities for carefully examining) for laying out the new estate from Mr. Georg Thilen, architect, of Hamburg, and these plans he proposes almost at once carrying out. He hopes, indeed, to commence with the fall of the present year. The works will consist, in the main, of a central public park, two large hotels, and a mansion; Protestant and R.C. churches; sanatorium for sick children, some public buildings, and a number (not less than fifty) of detached villas. The whole will group well, and be of freely-treated Flemish character in red brick with stone dressings. The contemplated estate is already staked out; but although it has been stated in more than one English paper, I believe, that his lordship has procured and accepted estimates for carrying out the projected works, this is incorrect. He is ready and wishful to consider any tenders English or other contractors, who may desire to compete, care to send in.

Schiermonnikoog is but little over 300 miles from the Port of London (measuring on the exact line the seagull is assumed to fly), and on its north-west side, within a mile or so of the proposed building scheme site, there is a pier, accessible for several hours daily (at high tide) to steamers of average size.

Messrs. Lee and Sons, of Westminster, who were the contractors in the '50's for the North Sea Canal, and who carried out the task at a cost of some £2,000,000, to everyone's entire satisfaction, gave Holland and its good-natured inhabitants an excellent practical illustration of the kind of work Englishmen can do. I am sure, if some enterprising firm at home will give this proposed speculation of the German millionaires their serious and earnest attention, it is likely that such steps will lead to good results all round.

Whether the scheme is carried out by British, Dutch, or German labour depends entirely upon the individual enterprise of their respective representatives. All three are almost equally handicapped. There is no local labour obtainable, any more than local material available; so both alike will perforce have to be brought to the island from afar by sea.—I am, &c., HARRY HEMS.

Schiermonnikoog, July 24.

At Blairs College, Maryculter, N.B. (a Roman Catholic seminary), the foundation stone was laid, on July 23, of an extension of the buildings about to be commenced, at a cost of £8,000. Messrs. Ellis and Wilson are the architects, and Mr. Robert Buchanan is the builder.

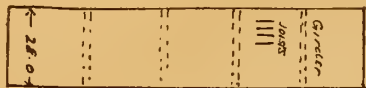
A memorial to Sir Thomas More, the cost of which has been defrayed by public subscription, was unveiled in the Chelsea Public Library, and handed over to the library commissioners on Thursday in last week. The memorial consists of a bronze statuette by Ludwig Cauer, of Berlin, which was exhibited in last year's Royal Academy. More is represented seated, and wears the furred robes of a member of the Court, as in Holbein's sketch of More and his household, which is now in the Basle Museum.

The members of the Kent Archaeological Society visited Sittingbourne on Tuesday, under the presidency of Earl Stanhope. Having inspected the parish church, which was described by Dr. Francis Grayling, the visitors drove in succession to Tunstall House, and the parish churches of Tunstall, Bredgar, and Stockbury, the Rev. Canon W. A. Scott Robertson acting as guide and lecturer. The ancient earthwork at Stockbury was described by George Payne, F.S.A., who read at the evening meeting held at Sittingbourne, a paper on "The Antiquities of the Sittingbourne District." On Wednesday the members visited the Isle of Sheppey, visiting Queenborough, Minster, Eastchurch, and Shurland Castle.

Intercommunication.

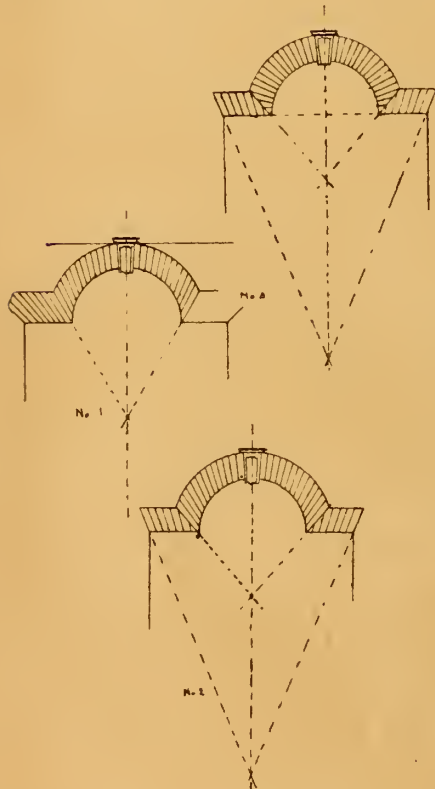
QUESTIONS.

[11532].—**Roof Flat.**—Would 28ft. be too great a span for wood joists for a zinc flat? Would it be necessary to construct the flat in the form of a double floor as



sketch, using iron girders and laying the joists between them? In such a case how would the firing up for falls be constructed?—TADPOLE.

[11533].—**Arch Striking.**—Will some reader inform me which out of the three sketches of arches is the best from a constructional point of view, and whether the one chosen will carry a fair amount of brickwork above it



without any artificial support? Mark out line of stress, and say if you know of a better way of jointing this arch. —TRUE CONSTRUCTION.

REPLIES.

[11531].—**Building Construction Exams.**—Go in for design and the different styles of architecture, practise specification-writing, and study Rivington's Vols. 3 and 4. These should be sufficient. If not satisfied, I can assist you, having previous exam. papers and model answers to them.—F. J. WEBBER, Silver Medallist B.Con., Pellhurst-road, Ryde, I.W.

In the Chancery Division, on the 22nd inst., Mr. Justice Kekewich gave judgment in the case of "Prance v. the Western Mercury Company," in which the plaintiff, the holder of the reversionary lease of certain premises in Frankfort-street, Plymouth, sought to restrain the defendants from rebuilding the frontage. His lordship decided against the plaintiff on all points, remarking that the case ought never to have been brought in a London Court. The premises will, therefore, be rebuilt in Aberdeen granite stone, in accordance with plans prepared by Messrs. Hine and Odgers, of Plymouth.

The War Office is to be built next year on the Carrington House site at Whitehall, and a Bill is to be obtained from Parliament in January giving power to buy out the leasehold interests on such of the Crown property on that site as is not vacant. In August, 1897, the Crown comes also into possession of the whole of the Great George-street site, which comprises mainly the whole of the block between Charles-street and Delahay-street; and on this block it is proposed that several offices, including the Education Department, shall be housed—King-street being closed by the new buildings. It is also proposed that the Mall shall be continued through Spring-gardens into Charing Cross.

Legal.

A LANDLORD'S LIABILITIES.

IT is sometimes an important question whether or not the owner of a house or other premises can be made liable in damages for an accident, arising from defective construction, happening to a person who is rightly there by the request or permission of the tenant. It is said that if the defect was a nuisance, then the owner could be made responsible; but the definition of what amounts to a nuisance under such circumstances is not very clear. In the recent case of *Lane v. Cox* (*Times*, July 17), it was held, at all events, that a landlord is not liable for injuries caused through a defective staircase to a workman employed by the tenant. The facts were simple, and not at all unusual. The plaintiff had been employed by the tenant of a new cottage at Barnet to remove some furniture, and while carrying a bedstead downstairs the stairs gave way, and he was severely injured. It was proved that the place was recently erected, and that the tenant had complained of the staircase as unsafe, and although it was admitted that only one step came away from the wall, a surveyor gave evidence to the effect that the staircase was defective in having no blocking and no support running up the centre of the stairs.

Upon these facts it was objected, on behalf of the defendant, that in law there was no duty coming from him as the owner of the cottage towards the plaintiff, who was a complete stranger as far as he was concerned. Upon this legal point it was argued by plaintiff's counsel that where premises like this cottage were newly constructed and thrown open to the world, any person who had business on them might reasonably assume that he would be safe in going there. For the defence it was answered that in all the cases quoted for the plaintiff there had been a nuisance, which was an illegal act, and on which the owner's liability had been decided. Here there was no nuisance, but merely a defect of construction, of which the defendant himself might not have been aware. In the end, the Lord Chief Justice non-suited the plaintiff, staying execution that he might appeal if he wished. It seems to have been held before that a landlord was not liable for any accident arising to his tenants' guests from the defective construction of the premises; but the state of the law is hardly clear or satisfactory.

FRED. WETHERFIELD, Solicitor.

1, Gresham Buildings, Guildhall, E.C.

NOTE.—All questions for reply in this column must be headed "BUILDING NEWS," and must reach my offices, as above, by *Tuesday* morning to insure answer same week.

H. W.—**PLANS.—COMPETITION.—DAMAGES.**—The committee should be liable for some reasonable charge in regard to the work thrown away because of their misleading block-plans, and it might be worth while to try a County Court action for a fair sum. But, of course, all the rules and papers relating to the competition must first be read carefully, to see if there is any condition protecting them from such errors.

The First Lord of the Treasury has appointed Mr. G. F. Watts, R.A., to be a trustee of the National Portrait Gallery, in place of Mr. W. H. Alexander, who has resigned.

The reports of the engineers for the divisions of the great extension of the Manchester, Sheffield, and Lincolnshire Railway to London show that rapid progress is being made. On the northern division 4,167 men are employed. On the southern division 5,464 men are employed. In London good progress is also being made. The directors add that the remainder of the capital authorised for the new line has been fully subscribed.

Mr. B. Howard Cunningham, F.S.A. (Scot.), hon. curator of the Wilts Archaeological Society's Museum at Devizes, has just carried out, with Mr. J. W. Brooke, of Marlborough, a series of investigations on the site of a reputedly Roman well near Silbury Hill. The well had been filled by the silting in of the sides and by rubbish carted into it. On excavating to a depth of 16ft., water was reached, and the work had to be abandoned for the present. But in the rubbish dug out in the course of excavation some interesting relics were discovered, including some Roman coins of the 4th century, a bronze steelyard, a bronze finger-ring, a pickaxe, made from the antlers of a deer; also some Roman, British, and Samian ware. Explorations will be continued in September.

LEGAL INTELLIGENCE.

PATENT REVOCATION.—(In the matter of Joshua William Taylor's Patent, 6,538, of 1894. In the High Court of Justice, Chancery Division, before Mr. Justice Romer.)—This matter came on for hearing on the 17th and 20th July instant. The action was a petition by Richard Bowes, of Darlington, solicitor, the patentee of the "Well Fire," of which Messrs. Henry Walker and Son, Limited, of Newcastle-on-Tyne, are the manufacturers, for the revocation of the Patent No. 6,538 of 1894 of Joshua William Taylor, of Bolton, Lancashire, on the ground that the patent, as disclosed in the respondent's patent specification, was substantially the same invention as the petitioner's, and such fires had been publicly used, sold and manufactured by the petitioner previous to the date of the respondent's patent. The petitioner's invention consists of a fireclay trough forming firebox and ashpit, having grate-bars resting therein. Mr. Taylor's patent fire, of which revocation was sought, was, it was contended, a substantially similar trough with similar fire-bars, and a metallic ashpit placed inside the trough. Mr. Fletcher Moulton, Q.C., and Mr. J. C. Graham appeared for the petitioner, and Mr. Baird Fulton and Mr. Salt appeared for the respondent. The evidence for the petitioner was such as to show that the respondent's fires were substantially the same as the petitioner's, and had been anticipated by the latter, in accordance with which Mr. Justice Romer stated that the patent of the respondent Taylor had, in his opinion, been anticipated by the petitioner, and that on this ground alone the respondent's patent failed, and it follows that the petition succeeds, and that the respondent's patent must be revoked, with the usual costs against the respondent.

IN RE D. F. COOKE.—An application was made to Mr. Registrar Giffard on Wednesday by David Frederick Cooke, the elder, described as a builder, of Coleman-street, for an order of discharge. The debtor traded as a builder from 1875 until December, 1894, his operations having been of a speculative character. He erected offices and warehouses in London under building agreements, during the last six years of his trading in the Old Jewry, Philip-lane, Warwick-lane, Leadenhall-street, and Lower Thames-street. The trustee reported that proofs had been admitted for £7,274, and, in addition, there were claims not yet admitted £4,562; the assets had realised £279, and it was estimated that a dividend of about 1d. in the pound would be paid. The debtor attributed his failure to losses incurred during the last two or three years owing to his inability to let or sell his properties through depression in trade, and to possession having been taken by the mortgagees. The Official Receiver reported that for the last three years the debtor had traded at a loss, and that he had contracted most of his present unsecured debts during that period. Further, that he effected a private arrangement with his creditors in 1866, and again in 1879, his gross liabilities at the latter date amounting to £80,000, and a composition of about 2s. 6d. in the pound was paid under those proceedings. The Official Receiver opposed the application, and his Honour dealt with the case by suspending the order of discharge for three years from that day.

FAILURE OF WINSFORD BUILDERS.—At Crewe Bankruptcy Court on Friday, before Mr. Registrar Speakman, Henry Barker and Christopher Barton, builders and contractors, of Winsford, attended for their public examination. The gross liabilities were £1,871 4s. 2d., and the deficiency £1,633 7s. 2d. The debtors, in reply to questions by Mr. Thomas Bullock, the Official Receiver, said they commenced business in partnership in 1893. They had not kept the necessary books of accounts, and had never attempted to ascertain their financial position. They had very little capital at starting. They lost £300 or £400 on a Moulton hotel, on a contract of £1,200, and about £450 on some villas at Altrincham. A week before they stopped they tried to ascertain their position, and roughly estimated they were £500 or £600 behind. The Official Receiver said the debtors were nice men to be in business when, on the very eve of bankruptcy, they could not reckon up their liabilities nearer than one-third what they owed. Instead of owing £500 or £600, they owed £1,800. The examination was adjourned.

FACTORY FURNACES AND THE BUILDING ACT.—Messrs. Brookes, Simpson, and Spiller, Limited, nitric acid manufacturers, of the Atlas Works, Hackney-wick, were summoned to the North London police-court on Saturday at the instance of Mr. Meeson, district surveyor, for not giving notice of the erection of a certain building in connection with their factory. Mr. C. V. Young appeared for the district surveyor, and Mr. R. Cunningham Glen was for the defendant company. The defendants have recently made additions to their factory at Hackney-wick, and Mr. Dabbs, of Stamford-hill, was the builder. The latter gave the district surveyor notice as required by the Act, and Mr. Meeson, noticing that some furnaces were also being constructed, asked Mr. Dabbs if he would undertake any responsibility in connection with their

erection. Mr. Dabbs declined, saying that the construction of the furnaces was being carried out by the firm's own men. The firm declined to allow Mr. Meeson to superintend the building of the furnaces, as they contended that the construction was a secret, and they admitted that they had not given notice to the district surveyor of their intention to build, although they contended that if notice was necessary it had been given by Mr. Dabbs. The arguments were very complicated, and Mr. Young said that one section of the London Building Act seemed to make the other more confusing. It was very strange that there was no definition of "building" in the Act. Mr. Taylor held that the furnaces were exempt from the Building Act as they were under 30ft. high, over 30ft. from the nearest building, and more than 8ft. from a foot or road way. The summons was dismissed without costs.

REFUSAL TO APPROVE PLANS.—In the Queen's Bench Division of the High Court of Justice on Friday, before Mr. Justice Mathew and Mr. Justice Wright, sitting as a Divisional Court, Mr. Lowenthal moved ex-parte on behalf of Mr. Wilfrid Busfield for a rule nisi for a mandamus directed to the Urban District Council of Farsley, to show cause why they should not approve certain building plans submitted to them. In May, 1896, Mr. Busfield entered into an agreement for a building lease with a large owner of property at Farsley, in the West Riding of Yorkshire, and in the same month he deposited his plans with the District Council, in accordance with the by-laws, showing six houses. On the 3rd of June he received a letter from the Council refusing to pass the plans unless the road on which the houses were to abut was left 36ft. wide. The agent for the estate, Mr. F. C. Crowther, wrote asking for the reasons for this decision, but no reply giving any reasons had been sent. The road in question was laid out and dedicated to the public before 1859. In 1877, two houses were erected upon it; in 1887, five more houses were put up, in 1888 eight more, and in 1889 ten more. The plans of all these were approved by the local board, which then carried on the government of the district. The road was then left at a width of 30ft., and the houses Mr. Busfield proposed to build were between those first erected and those last put up. Therefore, on that part it could not be contended that this was a new street, because the place must have become a street years ago. Rule granted.

A BRADFORD ARBITRATION.—At the Alexandra Hotel, Bradford, an arbitration was held on July 22, before Mr. James Ledingham, F.R.I.B.A., as sole arbitrator, in regard to an obstruction of certain ancient lights in a portion of Quebec Works, Quebec Terrace, the property of the trustees of the late Mr. Charles Nelson, brassfounder, alleged to be caused by a building in the course of erection by Mr. S. Illingworth, the owner of adjoining land on the north side, to restrain which an action has been commenced in the Chancery Division, the question in dispute in this action being the subject of the reference. Mr. L. A. Kershaw, Q.C., supported by Mr. Eli Milnes, architect, appeared for the trustees, and Mr. J. J. Wright for Mr. Illingworth, for whom Mr. Rhodes Calvert appeared as architect.

FATAL FALL OF THE GIRDER IN GOWER-STREET.—At the St. Pancras Coroner's Court on Monday, Dr. G. Danford Thomas held an inquest on the body of William Cook, aged 43 years, a labourer, lately residing at St. George's-road, Holloway, who was killed on Thursday morning in last week by the fall of a girder at the premises in course of erection in Gower-street for Messrs. Maple and Co. (Limited). The evidence showed that Messrs. W. Scrivener and Co., the contractors, were carrying out some work for Messrs. Maple and Co., a part of which consisted in placing girders across a basement. On the morning in question a number of workmen were engaged in the basement when one of the girders fell, killing the deceased and injuring seven other workmen. William Robert Hunt, general foreman of the works, stated that the deceased and other workmen were cutting away preparatory to fixing another girder when the collapse occurred. This cutting or chipping might have caused it. The brickwork under the joists supporting the girder gave way first. This brickwork proved inadequate to the weight it had to bear.—Mr. Henry Woodzell, the architect of the works, ascribed the accident to the work which was being done. Had a column been built up or a strut placed beneath the girder before the cutting away began, all risk would have been obviated.—The jury found a verdict of Accidental Death, adding that in their opinion the bearing which held the girder was insufficient for the weight.

IMPORTANT ARBITRATION CASE FROM NOTTINGHAM.—At the Surveyors' Institution, Westminster, on Monday, before Sir Frederick Bramwell, as sole arbitrator, proceedings were commenced, in which the Nottingham Corporation seek to recover £225,451 from the Manchester, Sheffield, and Lincolnshire Railway Company in respect of detached portions of corporation property which the Company are acquiring, or injuriously affecting, in connection with the construction of their new line through the town of Nottingham. Mr. Palfour Browne, in open-

ing for the corporation, said some 36 properties were involved, in respect of which the corporation made a net claim of £225,451. Among the larger items of the claim were £76,338 15s. 9d. for the Meadows Recreation Ground, the area of which was 20 acres; and £54,178 in respect of the union workhouse, which will revert to the corporation in about 15 years. Mr. Arthur Brown, engineer to the corporation, gave evidence in support of the claim, his examination occupying the greater part of the day.

IN RE G. A. SHEPHERD.—The debtor, George Albert Shepherd, against whom a receiving order was made in March, 1894, applied for an order of discharge. The Official Receiver reported that the debtor commenced business as a speculative builder in October, 1889, having then a capital of £300. He erected 82 houses in the neighbourhoods of Walthamstow, Leytonstone, Forest-gate, and Upton Park. These were speculations, and he was financed as the buildings progressed. He attributed his insolvency to his inability to realise his house property at a value which he considered it should yield. The liabilities were estimated at £867, and the assets at £598; but the Official Receiver reported that the unsecured claims amounted, in fact, to nearly £3,000, and that the assets had realised £60 only, the marked difference being explained by claims which had been made by mortgagees of leasehold properties, estimated by the debtor to produce a surplus. The Official Receiver also reported that the debtor became aware of his insolvency in January, 1891, and that the whole of the unsecured indebtedness had been incurred since that time. Further, that the debtor's net income had amounted to £1 per week, whereas he had expended £6 per week. The application was opposed by the Official Receiver on the grounds (1) that the assets had not yielded the statutory dividend of 10s. in the pound; (2) that the debtor had omitted to keep proper books; (3) that he had continued to trade knowing himself to be insolvent; and (4) that he had contributed to his bankruptcy by unjustifiable extravagance in living. The debtor did not dispute the allegations of the Official Receiver. Mr. Registrar Linklater said this was the case of a man who, with practically no capital, commenced speculative building; living from hand to mouth upon his creditors, and relying upon the financial assistance of those who were willing to lend money on the property. When the mortgagees thought they had advanced sufficient, they took possession, and those persons who were silly enough to supply the debtor with goods found themselves without a farthing. During the period that the debtor traded with knowledge of insolvency he was making only £1 per week, and spending £6, and when he became bankrupt he submitted an inflated statement of affairs showing a trifling deficiency only, while the actual result was that a very large deficiency was disclosed. The order of discharge would be suspended for five years from that day.

CONSTRUCTION OF THE LONDON BUILDING ACT.—Mr. B. Hobbs, of 51, Moorgate-street, was summoned at Thames Police-court on Saturday by the London County Council for expenses in respect of a dangerous structure. The first point was that before the survey was made the matter should have gone before the Council, and the requirements to survey should then have come from that body, and not from its officers, according to section 103 of the London Building Act, 1894. It was admitted that the case never went before the Council itself, and at the first hearing the magistrate said he was disposed to dismiss the summons and allow £1 ls. costs. Mr. Mead now said that Mr. Hobbs had most improperly written to him; but from the letter it seemed the Council were prepared to pay the costs. Mr. Berry said the Council had also received a letter from Mr. Hobbs, who wrote to say he was going to ask the Court for permission to sell the chairman's chair to recover the costs. With regard to the point the Council's duties were purely ministerial. Mr. Mead was unable to accept that, as the section stated, "where it was made known to the Council." That meant when it was made known to them. There was no difficulty in complying with the section as he construed it. The second point was that the expenses were recoverable under section 109 of the Building Act, 1894, and that, therefore, they must be expenses which have been incurred in obtaining an order under the Act—viz., to take down or secure a dangerous structure. In this case no order was obtained, the previous summons (as to dangerous structure) having been withdrawn. It was admitted that the proceedings in such matters were left to the superintending architect. Mr. Mead said he must dismiss the summons on the ground that the owner was only liable for the fees in the event of the preliminaries required by section 103 being complied with. There was no evidence the Council did require a survey or cause notice to be served on the owner requiring him to take down. The second point did not arise.

LONDON MORTAR.—At Lambeth police-court on Saturday, judgment was given in the case of "Dicksee and the London County Council v. Sloman," which raised some points of interest to metropolitan builders. The case, which has been

before the Court on several occasions, arose out of the erection by the defendants of some houses in Westmoreland-road, Walworth. There were two summonses. The first was taken out by Mr. Bernard J. Dicksee, district surveyor, for non-compliance with a notice of irregularity, and the second was issued against the defendants by the County Council, the complaint being that the brickwork of the buildings in question had not been put together with mortar composed in accordance with the by-laws of the Council. Mr. Hopkins, in delivering judgment, remarked that he would deal with the second summons first. It was a summons against the defendants as builders for an offence against the London County Council by-laws, made under the statute, the allegation being that the mortar used by the defendants upon the building in question was not up to the by-law standard. The by-law in question was as follows:—"The mortar used must be composed of freshly-burned lime and clean, sharp sand or grit without earthy matter, in the proportion of one of lime to three of sand or grit." The evidence was that samples of the mortar were taken from between the bricks of the building and submitted to a chemical analysis. The analysis showed that this mortar contained earthy matter, and that the proportion of lime in its composition was considerably less than one part to three parts of sand or grit. He was satisfied that this mortar was not up to the by-law standard, and upon that summons he inflicted a nominal penalty of 20s. With respect to the first summons, there would be an order requiring the defendants to comply with the notice of the district surveyor within one month, with £5 5s. costs.

CHIPS.

On Saturday the memorial-stones of a new Wesleyan chapel in Hale-road, Altrincham, were laid. Accommodation will be provided for 500 worshippers, at a cost of about £2,000. The designs have been prepared by Messrs. Potts and Pickup, architects, Manchester.

The memorial stone of Sunday-school buildings which are about to be built next the Baptist Tabernacle, at Sittingbourne, was laid last week. The work, which will cost £1,700, is being carried out by Mr. G. Bowes, of Milton.

The co-operatives of Wakefield are about to build in that city a large block of shops and stores with an assembly hall on the first floor. The architects are Messrs. W. and D. Thornton, of that city.

The Porter Institute which has been erected near St. Peter's Church, Earley, Berks, at the sole cost of a parishioner, was opened on Tuesday week. The classroom measures 50ft. by 22ft., which can be divided at will into two apartments, and at the back is an ante-room about 12ft. square, for committee purposes. The architecture harmonises with the school buildings, as also does the materials (red brick and Bath stone dressings, and red tiles), in which the work is carried out. Messrs. Wheeler Brothers, of Caversham-road, Reading, were the builders, and the cost has been £1,200.

The National Association of Master Builders have issued a comparative statement, showing the hours worked per week and the rate of wages per hour, in the various branches of the building trade in all the principal towns.

The executive committee of the City and Guilds of London Institute have appointed Mr. W. E. Dalby, since 1891 University Demonstrator of Mechanism and Applied Mechanics at Cambridge, to the Professorship of Mechanics and Applied Mathematics at the Institute's Technical College, Finsbury, rendered vacant by the resignation of Professor Perry.

The memorial stone of the new West Monmouth School at Pontypool was laid on Monday. The cost is estimated at £30,000 (including everything), and the funds are derived from Jones's (Monmouth) Charity, connected with which are valuable properties in London.

The building of the Lutheran Church of the Redeemer in Jerusalem is being vigorously carried on. The roof and the tower are both nearing completion, and the furnishing of the interior will, it is stated, be begun during the present year. The German Emperor is credited with having "supplied" the designs for both the pulpit and the tower; but it has not yet transpired whether or not the Kaiser employed a "ghost" to draft the scheme as well as make the actual working drawings.

The present season has been the most successful known in the estate market for some years. The aggregate results of the sales at the Auction Mart last week were £189,067.

Extensive repairs and alterations are being made to the historical old church of St. Nicholas, Warwick, facing the entrance to the Castle, and special attention is being given to the ventilation, which will be carried out on the Boyle system.

PARLIAMENTARY NOTES.

WORKING MEN'S DWELLINGS BILL.—This measure, which seeks to provide facilities for the acquisition by working men of their own houses, was considered on Tuesday by the Standing Committee of the House of Lords. Lord Herschel, who occupied the chair, pointed out that there was some lack of proper machinery in the Bill for carrying out its operations, and the Marquis of Londonderry, the sponsor of the Bill, promised to put down amendments to meet the deficiency before third reading. On clause 3 (regulations as to purchase and advance), Lord Harris moved an amendment providing that the rate of interest payable on advances should not be less than such as might reasonably be expected to insure the local authority from loss. The amendment was agreed to. On Clause 5 (advances for building dwelling-houses), Lord Harris moved the omission of the clause on the ground that there would be a greater risk in connection with building houses than in the purchase of houses. The Marquis of Londonderry said that he should personally be glad to see the clause part of the Bill; but it was not a vital point, and if the Local Government Board thought the measure overloaded, he should accept the amendment. The clause was struck out, and the Bill, as amended, was ordered to be reported to the House.

NEW CHRIST'S HOSPITAL, HORSHAM.—In reply to Captain Norton, Mr. Grant Lawson explained on Tuesday that the estimate for the erection of the new buildings in accordance with the plans, as now modified, is about £253,000. These plans have not as yet been approved by the Charity Commissioners. It is proposed to provide at present for 500 to 600 boys, and for 200 girls. The Charity Commissioners, while responsible for the approval of the site for the new hospital buildings and for the general sanction of capital expenditure upon that site, are not charged with the current administration either of the hospital generally or of the particular work of its removal to another site. The Commissioners can, therefore, only say that their approval was given to the acquisition of the site at Horsham upon professional evidence as to the abundance and excellence of the water supply there, and that they have sanctioned the expenditure by the governing body of a capital sum not exceeding £20,000 in draining, roads, levelling, and planting in connection with the new buildings.

CHIPS.

On Saturday afternoon the foundation stone of a new mission church which is being erected in Lawley-street, Ashted, Birmingham, as an extension of the work of the parish of St. James's, Ashted, was laid. The building will seat 400 persons, and will cost £1,200.

The Duchess of Connaught laid, on Tuesday, the foundation-stone of a new hospital at Aldershot. The institution, which will cost about £3,000, is being built from designs by Mr. Davison.

Mr. Walter Crane has retired from the management of the Manchester School of Art, as an active protest against the restrictions imposed upon him by the Science and Art Department.

The City Commission of Sewers agreed, on Tuesday, to pay £1,900 for ground laid into the public way in Bishopsgate-street Within, and £1,995 for an improvement in Carter-lane and St. Paul's-churchyard. Mr. W. Burch, M.I.C.E., was appointed resident engineer to supervise the works of the Central London Railway so far as they affected the streets, sewers, and subways.

The framework of an Episcopal church now in process of erection in New York City, and of a Jewish synagogue at St. Louis (the latter including a central dome), is composed of structural steel.

Both the important railway companies running through Peterborough, the Great Eastern and the Great Northern, are about to rebuild and enlarge their stations. The works in both cases will soon be put in hand.

The Duke and Duchess of York visited Halifax on Saturday, and opened the new Royal Infirmary, illustrated by us last week, and built from Mr. Alfred Waterhouse's designs at £100,000; and the new Corporation Market, constructed from the designs of Messrs. Leeming and Leeming, of London (and late of Halifax), at an outlay of £120,000.

A stauied-glass window, erected by members of the Cowper Coles family to the memory of Captain Cowper Coles, R.N., C.B., who perished on board her Majesty's ship *Captain* in the Bay of Biscay on September 7, 1870, was dedicated at Harting Church, Sussex, on Sunday, by the Bishop of Chichester. In the highest light is an old English battleship with scrolls underneath bearing the words, "They that go down to the sea in ships . . . these see the works of the Lord and His wonders in the deep." Two other lights show Noah building the Ark and Moses dividing the waters of the Red Sea.

STATUES, MEMORIALS, &c.

DURHAM CATHEDRAL.—A memorial in Durham Cathedral to the late Dr. J. Collingwood Bruce is approaching completion, and will be unveiled in August. It has been executed by Mr. George Simonds, of London, and consists of a marble sarcophagus, supporting, on six marble brackets, a draped bier, upon which lies the recumbent figure in marble of the late Dr. Bruce in his doctor's gown, the head propped on cushions, and the hands simply crossed on the breast. The feet rest upon a fragment of stone, representing one of the Roman relics figured in Dr. Bruce's great work on the Roman Wall. Beyond that lie an open book, and a pen thrown down after use. The total cost of the effigy and sarcophagus has been about £700.

WATER SUPPLY AND SANITARY MATTERS.

HUDDESFIELD.—The waterworks committee of the Huddersfield Corporation, accompanied by Mr. J. W. Schofield, their engineer, made their annual inspection of the whole of the town's waterworks on Thursday in last week. The committee first proceeded to Butterley Reservoir, now in course of construction. Last year, when the committee visited the works, the engineers were engaging in overcoming a fault at a depth of 120ft. below the level of the bed of the Wessenden Brook; but since then the difficulty has been remedied by concrete work 120ft. deep, which will form the basis of the embankment of the new reservoir. When completed, Butterley Reservoir will be capable of containing 400 million gallons; but the whole of the supply will not be available for the ordinary consumption of the borough, as the corporation are bound to provide a supply of not more than 2,258,640 gallons per day, as compensation to the mill-owners in the Wessenden Valley. On leaving Butterley, the committee walked to the site of Blakeley Reservoir, examined the borings there, and were informed that a suitable stratum had been found. The construction of Blakeley Reservoir has not yet been commenced; but the corporation recently obtained an extension of time for the undertaking till 1901. Blakeley Reservoir, when finished, will have a capacity of between 70 and 80 million gallons, and will complete the Wessenden Valley waterworks scheme of the corporation. The Wessenden and Deerhill Reservoir, the Great Dyke Springs, the Blake and Blakeley Clough Springs, &c., having been visited, the committee viewed the new treatment of the water begun a few weeks ago in the catch-water leading to Blackmoorfoot Reservoir, in order to minimise the acidity of the water, which in the past had been found to have a corrosive effect upon the lead service-pipes in the borough. The treatment, which consists of an automatic mixing of lime with the water, and is similar to the process used by the Sheffield Corporation, was subjected to repeated experiments, and it was clearly demonstrated to have a very beneficial effect upon the water.

In connection with the extension of the electric tramways from Roundhay to Kirkstall, the tramways committee of the Leeds Corporation last month accepted a tender by Messrs. Crompton and Co., Chelmsford, for trolley wires and attachments, for the sum of £3,370. Messrs. Crompton afterwards withdrew their tender, and at a meeting held three weeks ago the committee resolved to accept the tender for the work of Messrs. Siemens, London, at the sum of £5,620. That firm has also withdrawn, and the committee decided, on Monday, to recommend the council to accept the tender of Messrs. Laing, Warton, and Downes, London, the amount being £5,740.

The members of the Bath Master Builders' Association held their annual excursion on Wednesday week, when they proceeded by rail to Teignmouth and Torquay. Dinner was served at the Queen's Hotel in the latter town, when the president, Mr. E. W. Wooster, occupied the chair, and Mr. Stephen Ambrose the vice-chair. The toast of "Our honorary members" was given from the chair, and responded to by Mr. Jolly, on behalf of the Bath Stone Firms.

The new asylum for West Sussex at Grayling Wells Farm, about a mile from Chichester, is approaching completion, and will be opened next June. The asylum will ultimately house 600 patients; but at present accommodation is being provided for 450 only. Sir Arthur W. Blomfield and Son are the architects, Messrs. Longley and Sou are the contractors, and Mr. G. Horton is the clerk of works. The buildings are faced with red bricks from Cranleigh, artificial stone being used for dressings, and green slates for roofing. The chapel is 13th century in style, and is built of flints, with Box Ground stone dressings, and internally is plastered, with Corsham Down stone for dressings. The wards are all two stories in height. Features of the institution will be a water-tower, 100ft. in height, and the recreation hall, which measures 91ft. by 41ft.

Our Office Table.

The London County Council, at its meeting, on Tuesday, resolved that the salary of the chief officer of the Fire Brigade should be £900 a year, and that a gratuity of £1,100 should be given to Mr. Simonds, in addition to six months' salary, on leaving the force. £3,580, being one-half the estimated cost, was voted for the acquisition of the frontage of the site of No. 89, Fleet-street (between Bride-lane and Salisbury-court), so as to increase the width of the thoroughfare from 45ft. to 60ft. Another £3,000 was contributed towards acquiring Fortune-green, Hampstead, an area of about 2½ acres, as a recreation ground. The total cost will be £6,000, towards which the Vestry of Hampstead have promised to contribute £3,000. The General Purposes Committee recommended: "That the principle of the clause adopted by the Council, on July 7, for its building contracts, by which a reference is allowed to an independent arbitrator in certain cases of dispute between contractors and the certifying officers of the council, be applicable to the settlement of any questions that may arise between officers of the Works Committee and the certifying officers of the Council, in connection with works carried out by the Works Committee." To this an amendment was proposed to the effect that the Council was of opinion that some arrangement was required for the settlement of disputes between the certifying officers of the Council, and the officers of the Works Department, and accordingly resolved that such disputes should be in the future referred to the General Purposes Committee. After a long discussion, the amendment was lost by a majority of one, and the recommendation was agreed to.

The half-yearly return of completed works, just issued by the Works Committee of the London County Council, gives a history of their operations during the six months ended March 31, 1896. From the particulars of accounts for nineteen estimated works completed and certified during the half-year, it appears that the original estimate for these works as passed by the Council was £83,574, the final estimate £85,244, and the actual cost £80,912, showing a saving of £4,332, or about 5 per cent. over the final estimate. The summary of estimated works completed and reported to the Council since the commencement of operations by the Works Committee in March, 1893, shows that up to March 31 last 108 works had been executed, the final estimate for which was £383,538, and the actual cost £378,533, exhibiting a saving of £5,005, or 1¼ per cent. The estimated cost of the works in progress, as accepted by the committee, amounts to £306,972, and the amount that has been spent on account of these works up to March 31 is about £122,500. The summary of the jobbing works completed and certified during the year ended March 31 shows the schedule value of the works to have been £26,927, and the actual cost £24,787, exhibiting a saving of £2,140, or about 8 per cent. on the agreed schedule of prices. The total profit on estimated and jobbing works covered by the return is £7,145.

The quarterly report of the Technical Education Board connected with the London County Council, just published, states that the board has for some time had under its consideration the necessity of providing specialised art teaching in connection with particular handicrafts. Whilst the various local schools of art have been enlarged and greatly improved as regards general art teaching, it has become apparent that the more specialised art teaching required by particular industries can only be provided by a central institution. The entries in the examination for art scholarships and exhibitions held in March last were in every particular in advance of those of last year. The board awarded the full number of scholarships and exhibitions offered—viz., 20 school of art scholarships, 20 artisan art scholarships, and 100 evening art scholarships. For the evening exhibitions in science and technology 283 candidates sent in their names, against 256 last year. The results of this examination showed a considerable advance on the work of last year. The board awarded 88 exhibitions, as compared with 77 last year. Much attention had been given to the question of continuing to aid the technical departments of University College and Bedford College and of commencing to aid the corresponding department of King's

College. Grants of £1,500 a year to University College and £1,000 to King's College had been promised. Considerable additions were being made to the facilities for technical instruction at Bedford College, and towards their cost the board had promised £500. The expenditure of the board for the quarter up to June 30 was £28,072.

In the general report for the year 1895, by the Rev. T. W. Sharpe, C.B., her Majesty's Senior Chief Inspector, on the schools in the metropolitan division, recently issued as a Blue-book, it is stated that since its formation to the present time the London School Board had been making up lost ground in the supply of schools, and the time had not yet arrived when the annual addition of school places could be limited to the annual increase of school-children requiring places. This year, however, the total number of school places in London was equal to the total number of children in London requiring them, showing, indeed, on the usual basis of seven school places for every eight children, a balance on the right side of 5,700. It remained, of course, to make the supply balance the demand in each part of London as well as over the gross area. At present the statistics showed an excess of school places in the City, Chelsea, Marylebone, Southwark, Tower Hamlets, and Westminster, and a deficiency in Finsbury, Greenwich, Hackney, and East and West Lambeth. As to the cost of erecting schools the report states that this item was necessarily heavier in London than in most places both for buildings and sites. As much as $3\frac{1}{2}$ millions had been spent to secure an area of 30sq.ft. per child, which was at a rate approaching £9,000 per acre, as compared with £30 or £40 in agricultural parishes, or a sum told by hundreds, not thousands, of pounds in country towns. "With our present knowledge of school architecture, it would be hardly possible to improve upon the later schools; the Board has wisely profited by the defects of the earlier buildings, and has added airy, well-lighted central halls, has widened the corridors, and given more light and ventilation throughout." The last ten years had also seen a great extension of cookery and laundry centres; the erection of schools for the deaf and for mentally deficient children was being rapidly pushed forward, and the provision of proper quarters for blind scholars was also being taken in hand.

Another instalment of the work of the Photographic Survey of Warwickshire has been completed, and is now being exhibited in the Birmingham Art Gallery. The section just completed covers a belt of the county extending from Sutton Coldfield to Tamworth, and from Tamworth to Warwick, and comprises 345 views. The survey of Sutton and the neighbourhood, comprising about fifty pictures, has been carried out by Sir J. B. Stone (president) and Mr. C. J. Fowler; Mr. Pickard (hon. secretary) has sent in about 140, his subjects including the Castle and other scenes at Maxstoke, the "Woodmen of Arden," Holt Hall, Kingsbury, &c.; Mr. Middleton's pictures number about 80, of which 50 illustrate Warwickshire windmills; and Mr. Baynton has sent in photogravures of views of Warwick and Coventry. All the prints are permanent, having been printed, with the exception of Mr. Baynton's, in platinotype.

The administration report on the railways in India for the past year has just been issued, and states that the total length of railways open and sanctioned at the end of 1895 was 23,467 miles, of which 19,678 only were open for traffic, the increase in open line being 823 miles, leaving 3,789 still under construction. The financial returns show an increase of 72,80,496 rupees over previous year in gross earnings of rupees 2,623½ lakhs, percentage of working expenses 46.19 against 46.98 per cent. for the past year, and an increase in net earnings of 59,20,836 rupees, making a return of 5.78 against a previous 5.69 per cent. on the capital as stated in rupees. Seven million more passengers, and about a million tons more goods, were carried than in 1894. Among works in progress, the new bridge over the Indus at Kotri for the Kotri-Rohri chord line of the North-Western Railway has been fixed at five spans of 350ft. each, with a land span of 100ft., and the estimated cost is 25 lakhs. The works in hand to existing railways chiefly come under the heads of doubling the lines and strengthening, the bridges over rivers.

A new church of St. Alban is about to be built at Blackburn, from plans by Mr. R. Curran, of Warrington.

Trade News.

WAGES MOVEMENTS.

DUBLIN.—The strike in the building trade, which began in Dublin several months ago, still continues, notwithstanding the efforts made by several prominent public men unconnected with the trade to bring about a settlement. A conference between the master builders and representatives of the Carpenters' Society was held on Saturday in the Grosvenor Hotel. The conference lasted for about an hour and a half, and the situation was fully discussed. The only difficulty between the parties was in reference to the hours of work during the winter months. The masters want to reduce these from 54 to 47½, while the men wish them to remain as they are. As an inducement to the men to accept the terms offered, the masters proposed an increase of wages of ½d. an hour, to 8½d. an hour, during these hours. The representatives of the men, having no authority to give any undertaking with regard to this proposal, contented themselves with promising to submit these terms to a meeting of their society. It is not thought probable that the terms will be accepted. It was further intimated by the masters that in the event of their proposal not being accepted, they would withdraw all the concessions made up to the present.

HARTLEPOOL.—The protracted strike of joiners at Hartlepool, which has put a stop to all local building operations, has been settled by compromise. The men asked 9d. per hour, but the masters at length offered 8½d., with arbitration respecting the other farthing. This the men have accepted, and work was resumed on Monday.

PORTSMOUTH.—The strike of carpenters at Portsmouth still continues, though it is said that many of the men, after their eleven weeks' play, are returning to their employment. A specially adjourned sitting of the Quarter Sessions was held on Tuesday at Portsmouth to try one of the men charged with intimidation. Mr. Temple Cooke was for the prosecution, and the defence was really conducted by the Union, who secured the services of Lord Coleridge and Mr. Tickell. A verdict of guilty was returned, and a sentence of 21 days' imprisonment imposed, the Recorder thinking a fine would be no punishment.

SCARBOROUGH.—The local bricklayers', joiners', and plasterers' labourers, having been refused an advance of ½d. per hour (5½d. to 6d.), came out on strike on Monday.

CHIPS.

A new workhouse infirmary of 400 beds is about to be built in connection with the Halifax workhouse at Skircoats, near that town. Messrs. Horsfall and Wilkins, of Halifax, are the architects.

Mr. William Haskins, M.Iust.C.E., the city engineer and manager of the waterworks at Hamilton, Ont., died on the 5th inst. in his 69th year. A native of County Wicklow, deceased emigrated in 1852 to Canada, and obtained a position as assistant engineer on the survey and construction of the Great Western Railway. In 1856 he was appointed city engineer of Hamilton, which position he filled until his death. In 1861, when the city took over the waterworks from the Board of Commissioners, the duties of manager were intrusted to him.

The National Association of Master Builders, now meeting at Edinburgh, have agreed that the summer meeting next year shall be held in Bristol.

The restoration of St. Mary's Church, Charnminster, is so far completed that divine service was held in the nave and south aisle on Sunday week. It is a large church consisting of a nave with two aisles and a tower of 90ft. high containing a clock and bells. The tower was erected by Sir Thomas Trenchard about 1500. The original chancel was demolished about the time of the Civil Wars, and for many years the arch was walled up. Some fifty years ago a temporary chancel was added out of proportion to the rest of the church, both as to its length and breath, and when the present works are finished it is proposed to rebuild this. The architect for the restoration is Mr. Ponting.

Speech day at Monmouth Grammar School, on Tuesday, was marked by the opening of extensive additions to the building, which have been made at a cost of £17,000.

A short time ago, Professor Flinders Petrie discovered, at Thebes, a granite tablet containing the first known Egyptian mention of the people of Israel. It was erected by Merenptah, whose portrait bust was recovered at the same time. King Merenptah has been supposed by scholars to be the Pharaoh who released the Children of Israel from the bondage imposed by his father, Rameses II.; but this tablet records that he himself conquered the Israelites, probably in Syria.

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TENDERS.

** Correspondents would in all cases oblige by giving the addresses of the parties tendering—at any rate, of the accepted tender: it adds to the value of the information.

ASHFORD.—For additions and alterations at Bucksford, near Ashford, Kent, for Col. J. L. Toke. Mr. George Judge, F.R.I.B.A., architect. Quantities by Mr. R. C. Glead.

Otway, J.	...	...	...	£4,130 0 0
Lowe, R. A.	...	...	...	3,759 0 0
Wilson, H. B.	...	...	...	3,667 0 0
Wallis, G. E., and Sons	...	...	...	3,457 0 0
Wood, J., and Sons	...	...	...	3,364 0 0
Knock, H.	...	...	...	3,345 0 0

BATTERSEA.—For the electric lighting of the municipal buildings. Thirty-five tenders were received, and upon the recommendation of the consulting electrical engineer, Mr. Robert Hammond, the following have been accepted by the vestry, subject to the respective contractors entering into contracts with two sureties for the due and satisfactory execution of the work:—

Section A.—Boilers and accessories:—	
Spurr, Inman, and Co., Ltd.	£638 10 0
Section B.—Engine-house plant:—	
Johnson and Phillips...	1,030 15 0
Section C.—Main switchboard and Instruments:—	
Laing, Wharton, and Down	143 0 0
Section D.—Accumulators:—	
The Chloride Electrical Storage	
Syndicate, Ltd.	314 0 0
Section E.—Wiring and fittings:—	
Wood, A. H., Westminster...	1,042 13 6
Total...	3,198 18 6

[The vestry passed a resolution giving the committee power to carry the scheme into effect, and having regard to the urgency of the matter, the vestry has been authorised to enter into the necessary contracts for the execution of the work. It was decided that application be made to the London County Council for a loan of £4,200, in lieu of the sum of £3,000 previously sanctioned by the vestry, for the purpose of defraying the cost of the work.]

BOWNESS.—For commercial hotel, Bowness, for Messrs. H. Spencer and Co., of Whitehaven. Mr. Robert Walker, F.R.I.B.A., Windermere and Lancaster, architect:—

Wallis, &c.:—Fleming and Son.
Joiner's work:—Co.'s own men.
Plastering:—Armstrong, H. B.
Plumbing, &c.:—Bonney, E. D.

CHESTER-LE-STREET, CO. DURHAM.—For building a new infirmary at the workhouse, for the Chester-le-Street Board of Guardians:—

Groves, C., Chester-le-Street (accepted), £6,693.

BRISTOL.—For dwelling-houses and shops in West-street. Messrs. W. B. Gingell and F. Bligh Bond, architects. Quantities by Mr. W. Barratt:—

Bastow, T.	£2,150 0 0
Brown, T. H.	2,045 0 0
Walters, E.	1,975 0 0
Forse, H. W.	1,930 0 0
Davis, J. E.	1,896 0 0
Cowlin, W., and Sons ..	1,886 0 0
Wilkins and Gosling ..	1,805 0 0
Church, W.	1,799 0 0
Love, E.	1,797 0 0
Gay, E.	1,794 0 0
Humphreys, G.	1,786 0 0
Eastbrook and Sons ..	1,769 0 0
Clark, E.	1,765 0 0
Perrott, J.	1,753 0 0
Hughes and Weeks ..	1,743 0 0
Perkins, J.	1,729 0 0
Hayes, C. A.	1,727 0 0
James, J. (accepted) ..	1,659 0 0
Downs, G.	1,655 0 0

CATFORD HILL.—For Baptist church. Mr. George Baines, F.R.I.B.A., 5, Clement's Inn, Strand, W.C., architect:—

Higgs, F. and H. F.	£3,902 0 0
Halliday and Greenwood ..	3,771 0 0
Lowe, R. A.	3,591 0 0
Holloway, H. L.	3,489 0 0
Jerrard and Sons ..	3,459 0 0
Scott, S. J.	3,379 0 0
Battley, Sons, and Holmes ..	3,309 0 0
Willmott, J., and Sons ..	3,307 19 3
Barden, T. L., Maidstone (accepted) ..	3,242 0 0

COSHAM.—For the erection of three cottages, Havant-road, for the trustees of the late Miss Curtis. Mr. Norman H. Atkins, Town Hall, Fareham, architect:—

Croad, J., and Son, Portsea ..	£925 0 0
Staples, J., Havant ..	630 0 0
Plummer, J., Fareham ..	610 0 0
Carter Bros., Cosham (accepted) ..	597 13 8

EDINBURGH.—For carrying out additions and alterations to the Central Electric Lighting Station, for the city council:—

Lownie, J., Gilmore Park (accepted), £1,397.

FAREHAM.—For erecting four cottages, Wallington, for Mrs. Bishop. Mr. Norman H. Atkins, Town Hall, Fareham, architect:—

Tutte, E.	£613 0 0
Shepherd, F. G.	569 0 0
Wareham, C.	560 0 0
Plummer, J. (accepted) ..	550 0 0

FAREHAM.—For the erection of a villa residence, Titchfield Common, for Mrs. Foster. Mr. Norman H. Atkins, Town Hall, Fareham, architect:—

Shepherd, F. G.	£637 0 0
Wareham, C.	639 0 0
Newbury, C. J. (accepted) ..	586 0 0
Hackett, G. H.	525 0 0

GOSPORT.—For alterations and additions to the Alverstoke National Schools. Mr. Harry A. F. Smith, M.S.A., architect. Quantities supplied:—

Croad, J.	£363 0 0
Dash ..	366 0 0
Lear and Son ..	358 0 0
Rapley (accepted) ..	315 5 9

HORNSEY.—For the erection of a new school at Campsbourne, Hornsey, for the Hornsey School Board. Mr. Howard Chatfield Clarke, 63, Bishopsgate-street Within, architect. Quantities by Messrs. H. H. Leonard and Clarke:—

Leslie and Co., Limited ..	£22,970 0 0
Patrick, J. and M.	21,500 0 0
Lawrance and Sons ..	21,240 0 0
McCormick and Sons ..	20,950 0 0
Brown, Son, and Blomfield ..	20,760 0 0
Kirk and Randall (accepted) ..	20,314 0 0

ISBOTHOLME, WINDERMERE.—For new verandah and alterations, for Mr. James Wigley, J.P. Mr. Robert Walker, F.R.I.B.A., Windermere and Lancaster, architect:—

Mason's and joiner's work:—Jackson, A.
Plastering:—Keighley, E. J.
Plumbing:—Pattinson, J. A.
Painting and glazing:—Croft, F. G.

LEEDS.—For trolley-wires and attachments in connection with the extension of the electric tramway system from Roundhays to Kirkstall, for the city council:—

Laing, Warton, and Downes ..	£5,740 0 0
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(Accepted).
[Two lower tenders successively accepted and withdrawn.]

LONDON.—For alterations and erection of new photographic studio, &c., to 52 and 53, Newgate-street, E.C., for Mr. Arthur Weston. Mr. W. Duvall Goodwin, 14, Hatton-garden, E.C., architect:—

Hayward and Sons ..	£954 0 0
Pitcher and Sons ..	880 0 0
Mason and Co.	870 0 0
Pitman and Sons ..	826 0 0

LONDON.—For the erection of a block of four warehouses on the site of Nos. 102 to 122, Tabernacle-street, E.C., for Mr. W. R. Sutton. Mr. John Groom, architect. Quantities prepared by Mr. Henry Theobald, 48, Finsbury-pavement, E.C.:—

Nightingale, B. E.	£20,670 0 0
Holloway Bros.	20,500 0 0
Mowlem and Burt ..	20,297 0 0
Bywaters ..	20,000 0 0
Lawrance and Son ..	19,904 0 0
Downs ..	19,904 0 0
Patman and Co.	19,826 0 0
Holloway, H. L.	19,774 0 0
Greenwood and Son ..	19,489 0 0
Stimpson and Co.	19,400 0 0
Mattcock Bros.	18,991 0 0
Grover and Son (accepted) ..	18,948 0 0

LONDON.—For alterations, new shop-front, &c., to Nos. 52 and 53, Newgate-street, E.C., for Messrs. Smith and Sons. Mr. W. Duvall Goodwin, 14, Hatton-garden, E.C., architect:—

Sage and Co.	£1,289 0 0
Mason and Co.	1,220 0 0
Drew and Cadman (accepted) ..	1,029 0 0

LONDON.—For painting the exterior of Hindle-street School (old portion), between the 21th October and 21st November, 1896, for the London School Board:—

Silk, W., and Son ..	£297 0 0
Chinchen, F. T.	253 0 0
Unsign ..	256 10 0
Willmott, C.	207 19 0
Dearing, C., and Son ..	178 0 0
Stevens Bros.	168 0 0
Corfield, S. H.	145 0 0
Nicholson, T. (accepted) ..	142 0 0

LONDON.—For painting the exteriors of the following schools between 26th September and 21th October, 1896, for the London School Board:—

Sleaford-street:—	
Bulled, E. P., and Co.	£169 0 0
Holloway Bros ..	160 0 0
Brown, H.	135 0 0
Hammond, W.	119 0 0
Foxley, G.	115 0 0
Lathey Bros.	111 0 0
Williams, R. E., and Sons ..	109 0 0
Triggs, E.	108 0 0
Gurling, C.	99 0 0

Stanhope-street:—	
Kirby, G.	310 0 0
Riley, J.	297 0 0
Davis Bros.	285 0 0
Rowe, G. H.	280 0 0
Chinchen, F. T.	245 0 0
Cruwys, T.	245 0 0
Minter, F. G.	233 0 0
Chappell, W.	195 0 0
Brown, W.	190 0 0
Marchant and Hirst ..	189 0 0

Bromley Hall-road:—	
Jackson, H. T.	225 0 0
Atherton and Dolman ..	191 0 0
Derby, A. W.	185 0 0
Kybett, J.	172 0 0
Gibb, D., and Co.	165 0 0
Robey, J. T.	161 0 0
Wales, G.	147 0 0
Corfield, S. H.	133 0 0

Gill-street:—	
Atherton and Dolman ..	163 0 0
Kybett, J.	149 0 0
Banks, W.	124 0 0
Gibb, D., and Co.	124 0 0
Derby, A. W.	122 0 0
Corfield, S. H.	116 0 0
Robey, J. T.	114 0 0

* Accepted.

LONDON.—For various works for the London School Board:—

Rolls-road—Enlargement:—	
Tyrie, W. C.	£11,716 15 0
Shillito, J., and Son ..	8,705 0 0
Marsland, J.	8,435 0 0
Kirk and Randall ..	8,408 0 0
Killby and Gayford ..	8,310 0 0
Collinson, J. F.	8,284 0 0
Pattinson, W., and Sons ..	8,239 0 0
Dove Brothers ..	8,225 0 0
Grover, J., and Son ..	8,218 0 0
Charteris, D.	8,190 0 0
Lathey Brothers ..	8,181 0 0
Holloway Brothers ..	8,178 0 0
Downs, W.	8,173 0 0
Green, T. L.	8,135 0 0
Perkins and Co.	8,123 0 0
Cox, C.	8,019 0 0
Nightingale, B. E.	7,960 0 0
Lawrance, E., and Sons ..	7,938 0 0
Stimpson and Co.	7,750 0 0

Gordon House, Isleworth—Converting building into a home for 50 girls:—

Lathey Bros.	£7,587 0 0
Brooking, J. W.	6,887 0 0
Heasler, G. W.	6,807 0 0
Soole, S. N., and Son ..	6,643 0 0
Speechley and Smith ..	6,529 0 0

TOTTENHAM-ROAD.—Enlargement of pupil teachers' centre, erecting manual centre, providing laundry centre in arches of manual centre, providing covered playground for girls' and junior mixed departments, and inclosing, draining, and tar-paving additional land:—

Dove Bros.	£4,630 0 0
Killby and Gayford ..	4,575 0 0
Lawrance, E., and Sons ..	4,472 0 0
Shurmer, W.	4,419 0 0
Grover, J., and Son ..	4,374 0 0
Williams, G. S. S., and Son ..	4,326 0 0
Treasure and Son ..	4,125 0 0
Cox, C.	4,097 0 0

WINSTANLEY-ROAD.—Rebuilding girls' and infants' offices, altering and refitting boys' drainage scheme:—

Neal, G.	£1,939 0 0
Hammond, W.	1,930 0 0
Downs, W.	1,929 0 0
Lathey Brothers ..	1,919 0 0
Yerbury, R. A., and Sons ..	1,850 0 0
Triggs, E.	1,796 0 0
Holliday and Greenwood ..	1,770 0 0
Garrett, J., and Son ..	1,747 0 0

PLUMSTEAD-ROAD.—Extending and refitting boys' girls' and infants' offices, and new drainage scheme:—

Kirk and Randall ..	£2,480 0 0
Bowyer, J. and C.	1,994 0 0
Parker, G.	1,949 0 0
Black, A., and Son ..	1,890 0 0
Marsland, J.	1,851 0 0
Akers, W., and Co.	1,830 0 0
Patrick, J. and M.	1,719 0 0

BELVEDERE-PLACE.—Rebuilding boys', girls', and infants' offices, and providing drainage:—

Collinson, J. F.	£1,700 0 0
Williams, G. S. S., and Son ..	1,677 0 0
Grover, J., and Son ..	1,650 0 0
Downs, W.	1,623 0 0
Vernall, Danes, and Co.	1,587 0 0
Robey, J. T.	1,577 0 0
Knight, H., and Son ..	1,570 0 0
Triggs, E.	1,555 0 0
Goad, W. V.	1,522 0 0
Lathey Bros.	1,519 0 0
Munday, G., and Sons ..	1,483 0 0

BOUNDARY-LANE.—Converting two old houses into a special school and schoolkeeper's house, and providing boys' and infants' offices, &c.:—

Downs, W.	£1,485 0 0
Marsland, J.	1,435 0 0
Goad, W. V.	1,195 0 0

BARRETT-STREET.—Enlarging and refitting the boys' and infants' offices, rebuilding offices for female infants, refitting girls' offices on roof, playground, and new drainage scheme:—

Minter, F. G.	£1,300 0 0
Cruwys, T.	1,250 0 0
Foxley, G.	1,190 0 0
Vernall, Danes, and Co.	1,188 0 0
Lilly and Lilly (Limited) ..	1,187 0 0
Knight, H., and Son ..	1,166 0 0
Gregar, W., and Son ..	1,162 0 0
Lathey Brothers ..	1,149 0 0
Christie, J.	1,148 0 0
Parker, G.	1,115 0 0
Goad, W. V.	1,095 0 0
Triggs, E.	1,018 0 0
Yerbury, R. A., and Sons ..	967 0 0

CREDON-ROAD.—Laundry centre and sundry works to site:—

Downs, W.	1,167 0 0
Holliday and Greenwood ..	995 0 0
Ford, J. F.	936 16 5
Garrett, G., and Son ..	929 0 0
Castle, W. and H.	905 10 9
Akers, W., and Co.	860 0 0
Goad, W. V.	856 0 0
Otway, J.	850 0 0
Triggs, E.	839 0 0

QUEEN'S-ROAD.—Providing and fixing complete low-pressure hot-water apparatus and Trentham boiler:—

Milan, F.	£896 19 0
Harlow, B., and Son ..	697 0 0
Davis, G.	670 0 0
Brooke, J. W.	652 0 0
Russell and Co.	548 0 0
Duffield and Co.	543 0 0
Oldroyd, E., and Co., Ltd. ..	539 0 0
Strode and Co.	517 0 0
Deiries, J., and Sons, Ltd.	511 0 0

LYNN.—For rebuilding St. Mary's Church, King's Lynn:—

Foster and Dickson, Rugby ..	£1,896 0 0
Bardell Bros., Lynn ..	1,465 0 0
Brown, W. H.	1,448 0 0
Dye, R.	1,384 0 0
Read and Wildbur, Lynn ..	1,360 0 0
Hubbard, W., Derham (accepted) ..	1,184 10 0

PAIGNTON.—For the erection of six houses at winner-street, for Mr. H. G. Deller. Mr. W. G. Coudrey, of Paignton, architect. Quantities by Mr. Vincent Cattermole Brown, of Paignton:—

Westlake, E.	£1,960 0 0
Webber, G., and Maunders ..	1,778 0 0
Timewell and Son ..	1,776 0 0
Rabbich, H. P.	1,773 0 0
Webber, H., and Sons ..	1,750 0 0
Drew, C. and R. E. (accepted) ..	1,700 0 0

PRESCOT.—For the erection and completion of new laundry buildings at the Whiston Workhouse, Prescot, Lancs. Mr. Jas. Gandy, Masonic Buildings, St. Helen's, architect:—

Sephton and Hodson ..	£3,270 0 0
Paterson and Son ..	3,125 0 0
Whittaker and Woods ..	3,113 0 0
Rothwell and Sons ..	3,005 0 0
Tickle, P.	2,862 0 0
Lucas, J.	2,839 0 0
Brown, E.	2,694 0 0
Molynaux, W., St. Helen's ..	2,675 0 0

(Architect's approximate estimate, £3,000.)

* Accepted.

RAVENSTONDALE.—For country house, Ravenstonedale, for Mr. John Carver, J.P., of London. Mr. Robert Walker, F.R.I.B.A., Windermere and Lancaster, architect:—

Walling, &c.:—Potter, T. Joiner's work:—Brunskill, T. Plastering:—Keighley, C. T.	
Plumbing, painting, and glazing:—Brunskill & Nicholson.	
Ross.—For the erection of house on Royal Cross Estate, for Mr. Geo. Johns. Mr. A. H. Pearson, Ross, architect:—	
Kear, M., Colesford, Glos.	£945 15 0
Hatherly and Carr, Bristol ..	945 0 0
Ryall, T. W., Ross ..	889 0 0
Taylor, W. C., Monmouth ..	880 0 0
Lewis, J., Ross ..	870 0 0
Kemp and Sons, Ross ..	860 0 0
Lewis, W. E., Ross (accepted) ..	820 0 0

ROSS.—For the erection of a house on Hill Field Estate, for Mr. F. Gwillim. Mr. A. H. Pearson, Ross, architect:—

Cracknell, A. J. J., Gorseley ..	£490 0 0
Ryall, T. W., Ross ..	445 0 0
Lewis, W. E.	440 0 0
Kemp and Sons, Ross ..	435 0 0
Lewis, J., Ross (accepted) ..	415 0 0

ST. IVES, CORNWALL.—For building new boundary walls and making new roads for an extension of the cemetery, St. Ives. Mr. Scaton B. Shelton, C.E., St. Ives, architect:—

Care, W. H.	£485 0 0
Tor, R. (accepted) ..	315 0 0
Berriman, P. H. (roads only) ..	110 0 0

(All of St. Ives.)

THE BUILDING NEWS

AND ENGINEERING JOURNAL.

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FRIDAY, AUGUST 7, 1896.

DRAUGHTSMEN AND BUILDERS.

WHEN Ruskin observed that society was made up of "morbid thinkers and miserable workers," he only echoed the condition of men who in different vocations perform separate functions of the same work. The remark is very applicable to the modern draughtsman, or so-called designer, and the actual craftsman or builder, except that the thinking is not always done by the first, but is more generally a necessity of the latter. We call one a gentleman, and the other an operative. The business of the architect is now an almost separable incident; the actual work is carried on by the draughtsman and the builder working independently of each other. Let us look briefly at drawing itself. It has changed wonderfully from being at first the means to a certain end, as it always was in the old days; it has now an independent existence, and has come to be an end in itself. To mistake the means for the end has been the fault of all time. From at first being the instrumental means of showing how to construct or arrange, it has become a record of the past, a pictorial art of representing a building already existing, or an art of sketching, though, as we have been lately told by a competent writer, "we shall sketch in future for the training of our hands, the strengthening of our memories, and the cultivation of the faculty which is the mainspring of art." We shall have no need in those days of photographs and illustrative processes to store up or record for ourselves old work. All this has been amply done already, yet the modern draughtsman persists in pursuing his art as an independent profession.

The professional practice of the architect has accentuated this division. The able and competent draughtsman is generally a man who has spent the best years of his life at the drawing-board. He would not be what he is or command a decent salary if he had not been so. It is worth his while rather to remain a drudge at the drawing-board than to make himself proficient in other practical branches; hence he is not eager to enter as a candidate for the examination, which means loss of salary. He begins to think that drawing is the chief part of the business, though it is the worst preparation for the practical duties of the architect. He is at least freed from all the responsibilities and anxieties where he is; if any discrepancy occurs between his drawing or detail and the real requirements it can be got over by the foreman or clerk of works; he does not bother himself about details. He is paid for something which the architect cannot do, and is contented. It is his experience and skill as a draughtsman that he is paid for—and nothing else. When the time comes, and it does generally when he sees others, like himself, in practice and doing well, and he attempts to break through the trammels of office life, he begins to see the mistake he has made in spending so many years in the drawing-office. Others who can only vaguely sketch what they mean on a piece of paper, who have no artistic power of expressing themselves, are better equipped. They understand the builder and workmen; they have a knack of making themselves heard and understood by clients and committees. Their ready business qualifications, learned in the general office or in the workshops and buildings, enable them to understand what is wanted; to grasp the details of any workmanship which it would be impossible for the draughtsman confined in

his office to appreciate. What would the latter give if he had the builder's clerk's knowledge of business accounts and building operations, or half the knowledge of the clerk of works in building construction and materials! Scarcely an architect's draughtsman must not have felt his want of practical knowledge; if only he knew something of the mason's or the joiner's trades, how much more perfect he could make his sections and working drawings. And is not the reciprocal wish also expressed? Do not the builder's clerk and the clerk of works wish they had a little more skill in drawing? No doubt, but they still feel they possess the most useful and practical knowledge, that they can construct and carry out any building, and know what workmanship is a great deal more than the man whose life has been spent on the office stool drawing out to scale the sketches of the architect. Still, they each feel they are mere fragments of the whole, that one cannot do much without the other; that the draughtsman, the clerk of works, the quantity surveyor, and the builder are each necessary in carrying out the design of some other individual who calls himself the architect.

These persons represent the natural division of modern architecture: they have broken up into parts that which was once united. Has the specialisation been attended with success? Has better architecture been produced than when the chief workman was also the artist, and made the plans of the building and drew out the details as it proceeded? These queries come home with conviction to the conventional architect: they are not kindly regarded by him, and he would like to ignore them. He calls them inopportune; that in this half of the 19th century we have no right to discuss what was the practice in the 13th or 14th century. It is sufficient for him that draughtsmen and quantity surveyors and clerks of works and contractors have become necessary in an age of division of labour. Well and good; we only desire to compare results. A comparison of ancient with modern buildings is a sufficient answer. There was a vitality and growth in the old temple or minster: it was the work of men who thought in brick and stone and timber. We have no record of elevations and elaborate sets of scaled drawings, of contractors, but of men who superintended and worked on the building, and gave rough diagrams and plans of what they wanted executed. There was no hard and fast line between the architectural draughtsman and the builder which makes the one independent of the other. When we see an elaborately drawn perspective, shaded or highly coloured, or a set of contract drawings, we cannot fail to perceive that all the labour and skill have been expended to produce a representation on paper quite distinct from the building, that architectural drawing has come to be regarded as an art in itself. There is no sympathy between the drawing and the building. How can there be? We scarcely know whether the architect is entirely responsible for it; he may have only given a sketch or a hint or two, the rest has been left to the draughtsman, who has produced a record of something.

In short, if we were asked what our average modern architectural practice is, we should define it as a compound of draughtsmanship and building. Each is intensified; we have drawing brought to the perfection of a fine art—building a strictly utilitarian and commercial business. Architecture, as we see it at the Royal Academy, is the representation of buildings by accomplished draughtsmanship; as we see it executed, it is often a contractor's copy. The draughtsman and the builder represent together the average architectural talent of the day. We do not say the better traditions of the art found in the work of a few of our leading men, but the two special branches of practice. The profession is divided between those who make

designs on paper and those who carry out buildings. The former are often the architectural "ghosts" (as they have been called) of the practising architect. Their labours are over as soon as the competition plan is selected or the client adopts a design. The latter is a builder or business man, who carries out the work and gets the credit.

And we cannot deny that this division is fostered by educational methods and training. Are not our schools of art manufacturing a class of students who will become designers of our ceramics and textiles and metal-work, and also "architects" who are being taught drawing as the only preparation? Those who know something about the training of workers in the applied arts feel that more is necessary to produce artists. Mr. Robert Anning Bell, in his remarks at the Liverpool Society some time ago, advocated the mingling together more closely of the students and workers of the various crafts, not to confine their attention exclusively to their own work, so as to develop sympathy and a flexibility of mind necessary to adapt an artistic idea to the material in which it is carried out. If architects, modellers, decorators, iron and brass workers, paper and carpet designers were thus to work together, some kind of common feeling would be shown in their mature work. As he said, the art schools are mere "museums of dead styles" instead of training places for living ones, and are poor substitutes for workshops. Whatever its equipment, an art school can but teach art theoretically; the application can be only learned practically through the workshop. All this is true, and is exemplified in the National Schools of Art competitions, where we see designs in which there is a complete lack of sympathy between the idea and the material. The designers of architectural subjects often exhibit a similar divorce—there is nothing to show in what material the design is intended; generally the brick design is more suitable for stone. As we have pointed out year after year, these drawings are too ambitious in subject, a fault which is manifestly due to placing so high a mark on mere draughtsmanship. Drawing, excellent as a means, is made an end, and the more elaborate the subject is, the better the opportunity for its display. Yet we find a Royal Academician addressing the students at South Kensington, advocating the compulsory instruction in drawing of every child in the kingdom. No doubt it is useful to teach the elements of line and curve to every boy and girl as a training for the eye and hand; but to make it compulsory to draw from the "flat" or the "round," to teach every lad and girl to draw landscapes and flowers, or to copy the antique, is undesirable in the interests of art. What an army of copyists, cribs in design, and amateur artists would be the consequence! What the art school formula has done to encourage invention or design let the exhibitions of industrial art tell. No; drawing taught in this way has swelled the army of cribs. A large proportion of them have filled the ranks of architecture, and are still producing men who look upon all building and crafts as a separate and independent class. Taught in this way, drawing has increased the difficulty of producing the right material from which the architect should spring. It will be for the societies which promote architecture to carefully note the causes which have differentiated the draughtsman from the practical builder, and try to introduce a corrective. The practical workshop is not popular with these organisations. The young man who has passed his "exams." and has obtained medals for his drawings thinks it *infra dig.* to soil his hands by the use of tools, or to rub shoulders together with practical bricklayers or plumbers, and so from the very nature of things—a sort of "natural selection"—the separation between

the two becomes wider and deeper. But for all this it will never be possible to separate two things so intimately connected as design and workmanship; they will always exist together, either in a state of sympathy or hostile rivalry, producing either honesty of artistic expression or that attitude of independence which exists now between the two occupations we have been discussing, each setting up as the representative of the building profession. Let the architectural draughtsman recognise again the motive and real function of his work, that it should primarily be explanatory and illustrative instead of trying to emulate the pictorial arts, and one important step towards reconciliation will be possible.

LEGAL DEFINITIONS AND THEIR AMBIGUITIES.

MANY legal questions turn on the proper interpretation of terms. We all know how many disputes have arisen owing to the imperfect definitions in the London Building Act. The expression "street" is applied in a great many ways; in the present Act it includes any highway, road, bridge, lane, mews, footway, court, alley, or a part of any such—a very wide definition, yet restrictive to those things, and used in the sense of a way having houses or buildings along it. But it has been often disputed whether a place or a square court could be intended by the term, and questions have arisen whether the word "street" includes anything within the definition of the term "way," which is applicable to a private road or footpath. There is certainly a doubt about the word, though the decisions have done something to remove ambiguities, and to make it clear that a road or lane may be converted into a street by the erection of houses along it, as was decided by the ruling in "Robinson v. the Barton Eccles Local Board." The meaning of "new street" has been a subject of still more doubt, as, for example, when an old highway becomes a new street within the meaning of sections 98 and 112 of the Metropolis Management Act, 1862. A street may become a "new street" in a variety of ways, which have been pointed out in the well-known decision of Justice Hawkins in "Williams v. Powning." Equally ambiguous is the expression "new building," which has given rise to many costly litigations. The Act makes it include three things: any building erected after the commencement of the Act; any building which has been "taken down for more than one half of its cubical extent," and re-erected wholly or partially on the same site; or any space roofed between walls and buildings after the commencement of the Act. The term "building" itself has not been defined, and hence there have been numerous attempts made to evade the law, one of them being the erection of structures of wood without foundations let into the ground; but the Court has very properly defeated this intention by deciding that a structure with a foundation of some kind is a building, as is also a structure of large size intended to endure for a considerable time. Again, wooden structures built on wheels have been held to be buildings, the contention being that the wheels were adopted to evade the Act. We all know what a cause of strife has been the meaning of the word "party-wall," and how many cases have been tried on the question. Our present definition is taken from the Local Government Board model by-laws, and is an enlargement or remodelling of the old definition. As may be seen by those who compare the two forms, the old clause was framed not with reference to rights of ownership, but with reference to the mode in which it was used; the present definition has reference to ownership and occupation as well as user. In looking through the decisions on this point, one

is amazed at the ability and legal acumen that have been displayed, examples of which would fill a volume. The cases of "Knight v. Pursell," "Wiltshire v. Sidford," "Cubitt v. Porter," "Watson v. Gray," are pretty well known, and the judgment of Justice Fry in the latter case is an able summary of the different meanings that may be attached to the term. In the old Act, as the same authority pointed out, the definition shows the intention of the Act is to define a party-wall not by reference to ownership, which the adjoining owners may have in the wall, but by reference to the mode in which it is used. Again, it has been held that a wall may be a party-wall to such height as it belonged in common to two buildings, and cease to be one for the rest of its height. The meaning of the terms "topmost story," "party fence," "wall," "domestic," and "public" building, "warehouse class," are other instances of terms the meaning of which has exercised a great deal of legal ingenuity and quibbling, and enabled the evasive builder to make a score sometimes.

Lastly, important judgments have just been given as to the meaning of "sewer" or "drain." The first was an appeal from the decision of a County Court judge by the defendant in an action brought by the Corporation of Eastbourne to recover the proportion of expenses on relaying a drain connecting the defendant's house and other houses of different owners to the public sewer. The question in dispute was simply whether the conduit was a public sewer within the Public Health Acts, 1875 and 1890, or a "single private drain" under section 19 of the latter Act. The County Court judge said it was a private drain. The defendant appealed, and the Court affirmed this decision that it was a private drain within section 19 of the Public Health Acts Amendment Act, 1890. The next was an appeal from the Divisional Court. The London School Board applied for a *mandamus* against the Vestry of Bethnal Green to compel them to repair a certain sewer which received the drainage of several houses, and was constructed in 1866. The question was whether it was a "drain" or a "sewer" within the definition in section 250 of the Metropolis Management Act of 1855. If a sewer, it was repairable by the vestry; if a drain, it was repairable by the school board as the owners of the premises. Section 69 enacts that no new sewer should be made without the approval of the Metropolitan Board of Works, which approval had not, it appears, been given; and the Divisional Court held that the mere fact that the requisite consent had not been obtained did not prevent the new sewer from being a sewer repairable by the vestry. The vestry appealed, but the Court dismissed the appeal. The Master of the Rolls referred to section 250, which defined both "drain" and "sewer." It enacts that a "drain" shall "mean and include any drain of and used for the drainage of one building only, and made merely for the purpose of communicating with a cesspool or other like receptacle for drainage, or with a sewer in which the drainage of two or more buildings or premises occupied by different persons is conveyed, and shall also include any drain for draining any group or block of houses by a combined operation under the order of any vestry or local board; and the word 'sewer' shall mean and include sewers and drains of every description except drains to which the word 'drain' interpreted as aforesaid applies." "Therefore," the Court proceeded to argue, "if this was not a drain it was a sewer—it was a sewer unless they could say that it was a combined operation for draining a group of houses under the order of the vestry. There was no minute of any such order; if there had been an order it must be known. Therefore there was a 'combined operation' dealing with the sewage of more than one house carried out without an order of the vestry, and it was a

sewer and not a drain." The judgment was, therefore, confirmed. Thus, although the consent had not been obtained, it did not prevent the sewer when it was made from being a sewer repairable by the vestry. They must have known of this sewer and its connection with their principal sewer. The plea raised by the vestry was a technical one. It was argued it was a "combined operation" made under the order of the vestry, and was, therefore, a drain. Here is the same arrangement dealing with the sewage of more than one house carried out without an order, and it was therefore declared to be a sewer. These decisions are useful, as they show us the importance of attaching a proper meaning to definitions of the Act. Section 250, which we have quoted, clearly defines a sewer as meaning both sewers and drains of every description, except drains which have received an order from the vestry, and as this particular conduit was not made under such order it comes under the meaning of sewer.

ARCHITECTURAL ASSOCIATION EXCURSION, 1896.

[WITH LITHOGRAPHIC ILLUSTRATIONS.]

ON Monday next this year's outing of the excursion party will open proceedings, with the Castle Hotel at Tunbridge Wells as their headquarters, and although some of the ground included in the programme was covered by the Malling excursion, a decade has passed since the Architectural Association visited Kent. Rochester and Maidstone furnished the chief towns in the itinerary of 1886. This year Canterbury has no competitor, while Knole, as well as Penshurst and Ightham Mote are the principal houses down for inspection. The two latter formed part of the previous trip in this district, when Leeds Castle and Cobham Hall were also seen. Haver Castle and Knole were originally included, but for various reasons could not be visited. Good fortune, it may be hoped, will overcome any such difficulties at Knole on this occasion, and we are assured that permission to sketch there has been obtained. The accompanying sketches serve to indicate the typical village architecture of this neighbourhood, which is one of the most familiar in the home counties, possessing scarcely a building of note which has not been fairly well illustrated. This excursion, the 27th of the series, is the first one in which any part of Sussex has been included. Tunbridge Wells itself is, however, on the border of that county, and two days are to be devoted to Wadhurst and Mayfield, with Burwash, Groombridge, Ticehurst, and Etchingham deservedly working in for a share of attention. The type of cottage and historic farmhouse is distinguished in Kent by its high-pitched roof, usually utilised for fruit or root storage, and the old roadside dwelling from Leeds village figuring among our sketches to-day exhibits exactly the style of building to which we refer. Scattered up and down the country side the exact counterpart of this old cottage may every now and again be seen repeated, as at Hollingbourne, Chiddingstone, Larkenfield, and Goudhurst, famous in the annals of the Kentish smuggler. This drawing from Leeds represents all that remains in this particular instance, because only about half of the original house is now standing, for at some time or other it seems to have been severed in two. The two ends of the first floor sail over on projecting timbers, or more strictly speaking the ends of the floor-joists, and from the internal angle-posts a shaped brace supports the over-sailing eaves, below which projecting bay windows enhance the picturesque effect. The "Town House" at Ightham village, one of the places down for a halt next week, is shown by another of the accompanying sketches. A plan and set of measured drawings of this charming old example of Kentish timber-work will be found illustrated in our pages for August 20, 1886. The chapel at Ightham Mote, from Joseph Nash's original drawing, was reproduced in the *Building News* for Jan. 4, 1895, while a whole series of views of the exterior of the mansion was printed by us on August 6, 1886, together with measured details of the staircase and hall furniture. East Sutton Church, when this sketch of it was made, had the great charm of being unrestored. The side chapel, with its lofty roof and beautifully traceried windows, are the most conspicuous and

uncommon features about the church. In the chancel is a raised brass located in front of the altar representing Sir Edward Filmer, a well-known Royalist, and his wife, in full-length costume. The courtyard sketch of the stables at Aylesford Friary shows the work carried out in altering the older buildings, belonging to the Carmelite establishment (founded in 1240), by Sir John Banks, towards the end of the 16th century. The plastered gables rising above the ancient rubble walling are eminently picturesque, and group together in an unsophisticated way which cannot fail to be suggestive. The foundation was by Richard, Lord Grey, of Codnor, and it is a question as to whether Aylesford or Newenden in Sussex has the better claim to the honour of being the first house of this order established in England. Sir Thomas Wyatt, of Allington, obtained the property at the Dissolution; but in the first year of Queen Mary's reign he lost his lands for his rebellion. Elizabeth gave Aylesford to John Sedley, of Southfleet, and in Charles I. days it was sold to Sir Peter Rycant, coming into the hands of Heneage Finch, Earl of Aylesford, in 1714. The old premises are incorporated in the present house, which is located near the river, and good views are obtained from the terrace.

Taking the places from over the Sussex border enumerated in the programme, Wadhurst claims the first reference. Situated midst woodland and hop-gardens, the place derives its cognomen from the Saxon *wād*, a ford, and *hurst*, a wood: the ford by the wood. The ferruginous soil in these parts accounts for the old Sussex ironworks, carried on extensively at one time, and it is curious still to notice the cast-iron firebricks about the country, and the grave slabs still frequently met with in this neighbourhood marking the memories of these old Sussex ironmasters and their contemporaries. The church has a shingled spire of lofty proportions, and its structure dates partly from Early English times, with additions at various periods. Mayfield, next to be seen, possesses an exceptionally interesting old timber mansion known as "Middle House," which figures in Dollman's "Domestic Architecture," and we gave a sketch of it from the Royal Academy, Sept. 22, 1876. Besides this and other wayside dwellings in the village street (including that now converted into the Mayfield School of Woodwork) is the old Archbishop's Palace, dedicated to St. Dunstan—one of the most famous examples of Mediæval domestic work to be seen in the county of Sussex. Pugin restored it, and the place has for years been occupied as a R.C. educational establishment. At one time this Palace was one of the staliest edifices in the South of England, and afforded accommodation to Royalty. Edward I. visited it on several occasions between 1297 and 1305. Simon de Meopham, Archbishop, and his successor both died here. Archbishop Islip erected the magnificent hall in 1350. It is 70ft. long by 39ft. broad, and is 60ft. high to the apex of the roof. The whole series of buildings, grouped round a quadrangle, with projections in the form of square towers, must, prior to the Reformation, have presented a really grand ensemble. Some of the work is Perpendicular in style, and some dates from the early part of the 16th century. The gate-house to the south of the Palace is still standing, and is of 15th-century work. For many years the hall was stripped of its roof, and the three cross arches remained exposed to the weather, a picturesque ruin of sad memories. After Pugin restored it, the old hall of the Archbishops was fitted up as a chapel for the Convent. No traces of the original chapel remain. The building is described in G. E. Street's paper on "Gothic Woodwork" in the R.I.B.A. Transactions, 1864-5, and in the Journal of the British Archaeological Association, Vol. XXIII., a good account is given. Queen Elizabeth visited Sir Thomas Gresham here in 1573, and our present Queen spent a few hours at Mayfield in 1833, when she was Princess Victoria. The church was rebuilt after a fire in the first half of the 15th century. The Flamboyant window belonged to the earlier church; but the building has in recent times been modernised. Groombridge, near Tunbridge Wells, is a Jacobean moated house, surrounded by water, and has some charmingly-terraced gardens, where two hours are to be well spent. Etchingham has a delightful old church—one of the finest in the county—with a central tower over the easternmost bay of the nave, and some capital tracery occurs in the windows, which are of refined

design. Although a typical old English church, it has generally been described as having been the work of a foreign architect. The original banner-shaped vane over the stair-turret bears the fretted coat of the De Echynghams, a rare instance of so early a vane. The choir-stalls, with their grotesque subelle, and the richly-carved screen are worth sketching, and the antique encaustic tiles, if still remaining, should be noted as well as the sedilia, and also the brasses, including that to William de Echyngham, the builder of the church. The sacred edifice was moated at one time with water from the adjacent river Rother. Ticehurst Church has a parvise over the porch, which is not common in Sussex, and the unusual font cover will attract attention. The chancel is flanked by two chantry or memorial chapels, each having a piscina. The tower is capped by a shingled spire, and in the windows are remains of ancient glass. The grated window in the room over the porch led to the local reputation of its use as a manorial prison. There is a good brass, and some other monuments in the building. Bodiam Castle, close at hand, but now omitted from the list, is a most picturesque ruin, located further east towards the borders of Kent, but still in the valley of the Rother. It stands in a lake similar to, but by no means so large as, that round Leeds Castle. The building is almost square in plan, with a circular tower at each angle, and intervening between these are quadrangular towers. The great gateway is towards the north, and is flanked by two fine square towers; the postern gate is on the other side. Little exists of the barbican, which stood in front of the great gate, and was approached by a causeway. The arms of De Bodiam, Dalyngruge, and Wardeux occur over the portal. Inside the place has been gutted; but the positions of the guards' room, chapel, great hall, armoury, and the ladies' bower are all traditionally pointed out to the visitor. Few baronial fortresses of late date possess so much interest as Bodiam, and since the Cubitts bought the estate it has been well preserved. It was dismantled by the troops of Sir William Waller during the Civil Wars, and he left little more than the bare *enceinte*. Burwash Church and village stands on higher ground in a well-wooded country between two and three miles from Etchingham station and the village contains some interesting 17th-century houses. During the last century Burwash was notorious for lawlessness, smuggling, sheep-stealing, and burglary being the leading accomplishments of the population; and on Burwash Down the highwayman flourished unchecked. Thomas Chaucer, son of the poet, was associated with Burwash Park, and Henry, the ambitious and rebellious Bishop of Lincoln, was a member of the family of De Burghersh, temp. Edward I., and to whom the manor gave both name and title (see Lower's "Worthies of Sussex"). The tower has some very Early Norman, if not Saxon, work in it, and is capped by a shingled spire. Unfortunately, the church was restored in 1856. An iron slab of the kind previously mentioned exists here of 14th-century date, one of the earliest examples of Sussex iron-founding. It is enriched by a floriated cross, and prayers are solicited for the soul of Jhone Colins. The two 16th-century houses known as Holmhurst and Batemans, in this vicinity, are to have half an hour each devoted to them.

On Thursday, Canterbury will be visited. As most of the members have studied at the cathedral, it has been thought that this day should be spent in rapid glances at the whole of the principal objects of interest in the city, carriages will thus be in waiting at the S.E.R. station, and will convey the party to Harbledown (St. Nicholas Hospital), Pilgrims' View, St. Dunstan's Church (exterior), gateway of Roper Manor House, St. Stephen's Church, old house, Falstaff (old house, sign, &c.), West gate, St. John's Hospital, through Broad-street, City wall, view of cathedral, St. Augustine's Gateway, Hall, and ruins, St. Martin's Church (recent discoveries), view of the city, Marlowe's Memorial (E. Onslow Ford), Mercery-lane, High-street, old houses, East Bridge Hospital, the cathedral.

Penshurst Place (not "Castle," as in the official list), will be found illustrated in the BUILDING NEWS for Sept. 24, 1886, and on Aug. 20 of the same year the building is rather fully described. Its charms, however, are always fresh and worthy of examination. Near Chiddington is Leigh Hall, said to be the last house designed by the late Mr. Geo. Devey. It

was built for the late Mr. Samuel Morley, and will well repay the visit included in the programme. The Chequers Inn, Tunbridge, is shown in the same number, as well as the grand staircase from Knole.* Chiddington figured among some other Kentish sketches in the BUILDING NEWS for Sept. 12, 1890.

On Saturday, it is proposed to make up the week's work by visiting two houses in the neighbourhood of Tunbridge Wells, built from the designs of Mr. Norman Shaw, R.A., thus combining the study of new work with old.

We have thus cast together these few references, as they may, on the eve of the forthcoming excursion, prove of interest, as giving some idea of the places to be seen, and besides, although no attempt has been made to furnish anything like an exhaustive account of the less familiar places to be inspected, the gathering together of these notes of this itinerary will supply information as an index to the general reader for subsequent use.

NEW USE OF GLASS IN CONSTRUCTION.

IT is not a little surprising that this artificial vitreous material, of which the ingredients are so cheap and abundant, and the process of manufacture so simple and inexpensive, has not long ago occupied a more important place in the art of construction. The truth is that people have been so accustomed to regard it as fit only for such purposes as those of glass windows, mirrors, vessels for containing liquids and drinking out of, and for the making of toys and other trivial objects, that it has not been considered capable of playing any other rôle. As a matter of fact, although the tensile strength of glass does not exceed on an average $1\frac{1}{2}$ ton per square inch, yet its compressive or crushing strength is as high as 13 tons. When, in the early days of iron bridges, engineers were always in terror lest their iron plates should buckle or become distorted under pressure, Hodgkinson told them that the proper method to prevent such accidents was not by putting in an enormous amount of extra material as "stiffening stuff," but in making the plates thicker; and they did so with marked success. So it is with glass. It has hitherto been made so excessively thin, that "fragility" has become an almost synonymous term with that of the material itself. But increase the thickness, and glass will be found to possess a power of resistance which is rarely accorded to it. A familiar and very instructive example of its strength is to be seen in the ordinary champagne bottle, which—although probably not generally known—frequently withstands an internal disruptive force of fifteen atmospheres, or about some 200lb. pressure.

Experiments have been made with the view of ascertaining whether glass bricks, suitable for the building of transparent walls, and paving sets, could not be turned out quickly and economically. Unfortunately, the manufacture of these articles in cast glass is difficult, laborious, and expensive; but another method has been tried with very good results which promise well for future ultimate success. Instead of casting or running the glass, the brick or slab, which may be almost of any convenient shape, is blown in exactly the same manner in which ordinary bottles are. Care is taken to plug up the blow-hole before the material is cold, and the brick can then be reheated or baked until the required degree of constructive strength has been obtained. There are unquestionably several especial advantages belonging to these vitreous productions. In the first place, they are light, cheap, readily manipulated, and clean, both in appearance and in actual handling. Owing to the circumstance that the blow-hole is closed while the hollow slab is still hot, it contains a constant volume of dry air. Its contents thus eminently qualify it for a perfect non-conductor of heat, and it can be employed with manifest suitability for walls, and in the construction of refrigerating chambers and ice-houses. While walls built of glass thus manufactured would be perfectly translucent, they would not be sufficiently transparent to render objects more than dimly visible on either side of them. The process of fabrication is not intended to produce glass of crystal purity, though if it were required, there would be no

* Other illustrations of Knole have appeared in our pages:—Historic beds, Nov. 23, 1888; park gates, Oct. 11, 1889; chapel room and stairs, Sept. 5, 1890; the stone court, Feb. 16, 1894; Joseph Nash's view of the gallery, Nov. 23, 1894; his view of the cartoon gallery, April 19, 1895; and a small view of the house, Dec. 20, 1895.

difficulty in accomplishing the desired result. The merit of introducing this new application of an already well-known process for the manufacture of glass is due to M. Falconnier, an architect, of Lyons, who employs hydraulic lime cement in the vitreous *mélange*. As a proof that the bricks or slabs can be employed for constructive purposes, it may be mentioned that arches 10ft. in span have been constructed with Falconnier voussoirs or "ring-pens," and have given very satisfactory proofs of their strength, stability, and durability. It may be urged that 10ft. is not a very great datum to start upon; but the concrete arch started upon spans of only 3ft. At present, the largest concrete arch in the world is that of the bridge of Munderkingen on the Ulm and Sigmaringen Railway over the Danube, which has a span of 165'25ft. It is, mathematically, a simple sum of proportion to determine. If concrete arches, commencing at the very modest span of 3ft., can attain to the comparatively gigantic span of 165ft., what may not the vitreous arch hope to accomplish in the future, when it can give original points of three to one to its concrete brother? T. C.

THE AGE OF TREES.

THERE has been a great deal of speculation at one time and another regarding the age of growing or living trees; but it is quite probable that there is no means of accurately determining the age of any species of tree in the absence of date of its original planting.

Science discloses the fact that two trees of the same species, known to be identical in age, show such varied characteristics of structure that but for the fact that the date of planting was known, it would be impossible to tell their ages within a number of years, and the probabilities are that the estimated age of each would vary considerably from the other.

The ordinary manner of determining the age of trees is by counting the so-called rings of annual growth. In a latitude of alternating summer and winter, with regular seasons of actual growth and absolute rest, with climatic conditions generally uniform, the ring test may be counted upon as usually correct to within less than 25 years; but these conditions cannot be depended upon during the lapse of centuries, which are required for the full maturing of the majority of species.

There is probably no more equable climate than that in the middle portion of the so-called Temperate Zone; but even here there are, at irregular periods, such violent climatic variations as to seriously interfere with the basis of the ring theory, which presupposes the formation of one fully-developed ring every year. As an illustration of this point, it may be said that a warm, early spring, following by a mild, short winter, would stimulate an early and rapid growth, which in a few weeks might produce a well-developed ring. A season of intense drought, if long continued in midsummer, might as effectually suspend all growth in the tree as the freezing temperature of winter. In such cases the ring of wood formed in the early part of the season would practically mature its walls, become complete as though autumn or winter had arrived, and the tree was prepared for its annual rest. Afterwards a climatic change might occur, bringing with it plenty of warmth and moisture, which, being continued late into the fall, would act precisely as the vivifying influence of spring, and thus produce another ring or growth identical with the first in appearance, though perhaps thinner, and as completely distinct as one ordinary ring is from another.

In the case of a tree several hundred years old, such as covered America at the time of its first settlement, it is not beyond the bounds of possibility to suppose that more than two such climatic variations might occur within the limits of one year, at least in the early age of the tree, when science tells us there were great and sudden variations of climate and a long summer season. If such could have been the case, what then can we say of trees from two to three thousand years old, like the great sequoias of the Pacific coast?

It is entirely probable also that the growth of a tree, through similar causes to those mentioned, might be suspended early in the season so suddenly that the complete ring would not be perfected, simply through the suspension of the vegetable functions, which lasting all through the growing season and through the following regular resting

period might be resumed with the commencement of another season exactly where suspended; and thus no mark being placed between them, the two seasons' growth would appear as one. There are good authorities for stating that such an instance did really occur in New England no longer ago than in the early years of the present century. During that year snow and frost occurred in some portions of that section during every month of the year, and careful observers of the various phenomena assert that during the season no wood growth in the trees matured as in ordinary seasons, but that Nature's work seemed suspended and carried over to be resumed with the next spring, and that thus the two years' growth had the appearance of only one.

Whatever may have been the cause, there are known instances of trees of the same species, of exactly the same age, showing a difference of ten or more in the number of rings. The difference in the ring appearance of these trees was so great that even microscopic examination failed to disclose anything which would positively determine that they were of the same age, had that fact not been known at the outset.

It is probable that trees never entirely stop growing from year to year, so long as there is any life left in the sap wood, although the rest of the tree may have become practically dead, it having matured years before. At the same time the annual growth may be so infinitesimally small as to be hardly determinable without the aid of a powerful glass.

This globe of ours has passed through many wonderful changes and conditions, and the old trees of North America, whose birth dates back beyond the discovery of Columbus, may have passed through some changes that even modern geology fails to disclose.

In the centre of Labrador there is a large forest of coniferous trees, spruce, pine, and fir of different species, and also cedars, which to all outward appearances are living and thrifty, with their foliage nearly intact, but which have made no growth for a century at least, if not longer. The earth at their feet is in a dense shade, where the sunlight seldom penetrates, and it has not thawed to a sufficient depth in all these years to permit the natural functions of nature to act and produce growth. The trees are in a state of suspended animation.

It is known that a fish may be frozen when alive, kept in that condition for a long time, and afterwards thawed, when it will become as lively as ever. Possibly in some future age, a change in the earth's condition may thaw out the great sleeping forests of Labrador and Central Alaska, and permit of their renewing their growth. In such a case how will it be possible for the botanist of the future to determine the age of those trees?

The sequoias of California are at least from 3,000 to 3,500 years old, as estimated on the most reasonable theories at our command. It is also possible that they are much older than that, as the species is undoubtedly a survival from the glacial epoch. Who shall say that during that epoch, when the continent was covered with the great ice cap, those forest giants were not held for centuries, perhaps, in a condition of suspended animation, as are the forests of Labrador to-day, and that when the shackles of ice were rent away, the sap commenced to flow again in their ancient pores, and that the regular annual growth was renewed.

Of course there is more or less speculation that may be indulged in in this country as to the age of trees and vegetable growth, and in this connection the most that can be said is that, in the absence of the date of planting, the age of no tree can be absolutely determined by any known process. The queries here raised suggest the reason why.—O. S. WHITMORE, in *Hardwood*.

CONCERT-HALLS AND ASSEMBLY-ROOMS.—XXIV.

By ERNEST A. E. WOODROW, A.R.I.B.A.

IN Germany the music-hall is frequently placed on the first-floor level, like the Cambridge Music-hall in London, which was so lately burnt down. This arrangement is never satisfactory, as it increases the danger to the public by placing them so much further from the street level than is necessary. An example of such a hall is the Rheichshalle in Berlin.

The Concordia Music-hall, Berlin, now better known as the Apollo Hall, is an assembly-hall in which smoking is allowed, which is devoted to

many kinds of entertainment, dances, general assemblies, variety shows, spectacle ballets, &c. Figs. 1 and 2 are the ground and first-floor plans, and Fig. 3 the section showing the architectural

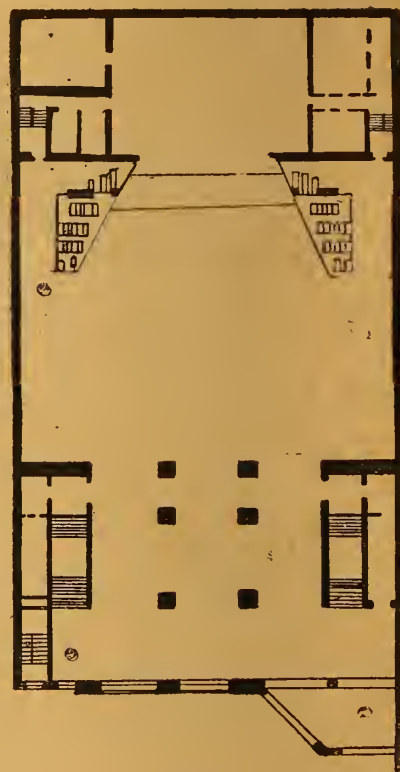


Fig. 1.

treatment of the proscenium opening, and the proscenium private boxes. This well-known Berlin music-hall, although chiefly devoted to variety entertainment, has been so arranged that it can easily be formed into a ball-room or assembly-hall. Although the present building was erected to take the place of an older one of

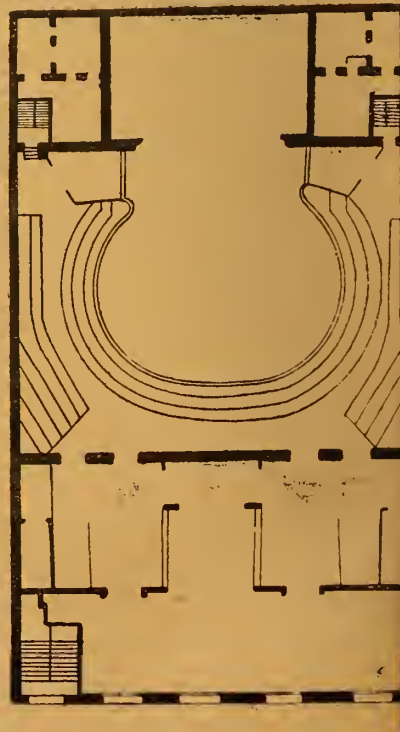


Fig. 2.

a similar character on the same site, the treatment has been so little influenced by its predecessor that it may practically be regarded as the original conception of the talented architect, Mr. G. Ebe.

The assembly-hall proper does not front a

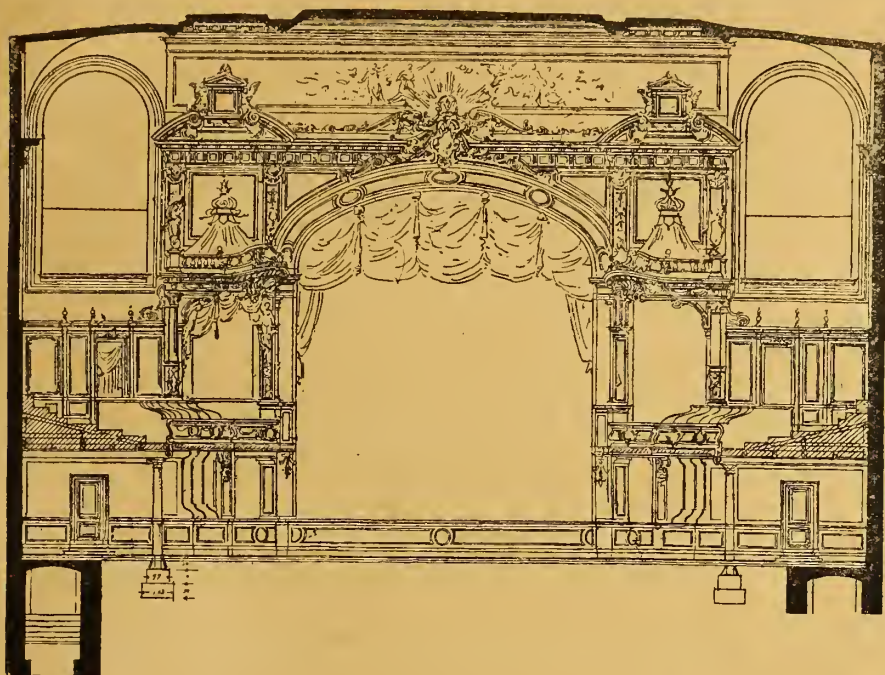


FIG. 3.

street, the entrance passage-way, which is not shown upon the diagrams, Figs. 1 and 2, passing through another building. To the student of public building planning this does not commend itself; but the frontage of the hall is upon an inclosed courtyard or garden, although there are no exits at the sides or at the back of the hall. Between the entrance from the street and the hall, which is 28·50 mètres long by 22·50 mètres wide and 18 mètres high, there is a garden, as I

which it is used, is a most attractive feature in the building. In the colour scheme of the hall more restraint has been shown than in most buildings of a similar class; but the ornamentation and painted panels, especially of the ceiling, are most elaborate. The general scheme is ivory-white picked out with gold and blue. The decoration of the foyer, however, is very brilliant. Fig. 3 shows that there is true architectural treatment throughout the whole interior of

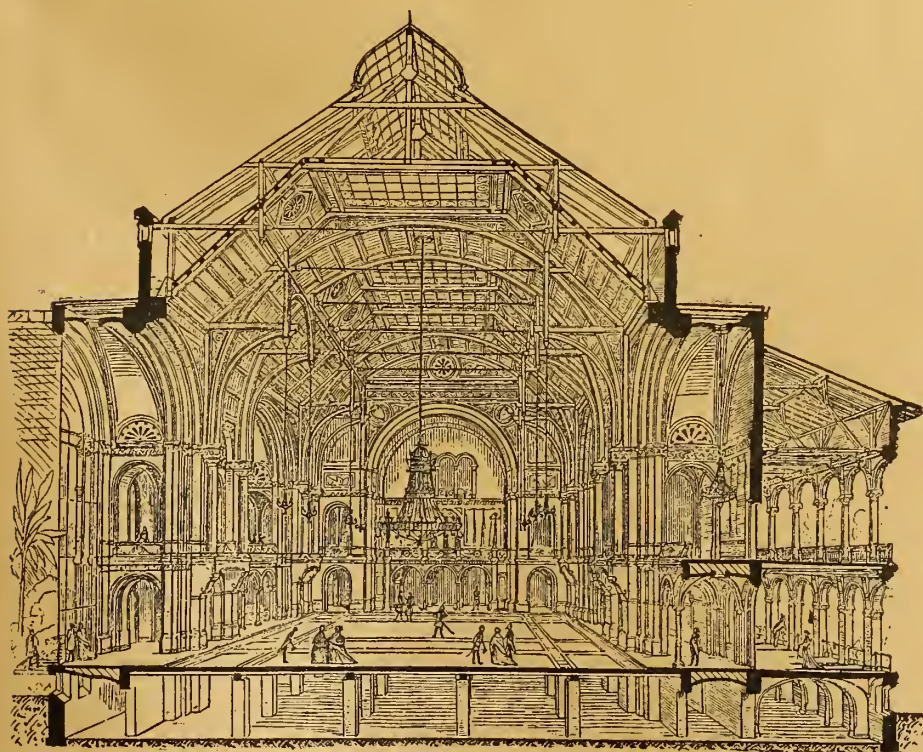


FIG. 4.

have already said, and this is a feature of the establishment and much frequented in the summer months, being easy of access from the auditorium. So much of the small available space has been taken up by the body of the hall that the stage is only 30ft. deep; this, however, is ample for the purpose for which the hall is intended, but would naturally be small for a theatre of equal proportions.

From the pillared vestibule containing the buffet there is an excellent view of the stage to be obtained, and this, considering the purpose for

the auditorium, especially over the stage opening and the adjoining stage-boxes.

Mr. G. Ebe, the architect, completed this building in 1894, at the cost of £25,000. Mr. Brandt, the celebrated stage engineer of the Royal Theatres, Berlin, designed the stage machinery, which is naturally limited, considering the purpose to which the hall is put. No stage effects are permitted, and the scenery which is used is all painted upon asbestos cloth. These precautions are taken to minimise the risk of fire, as the exits are not all that one would wish,

although it is stated that the entrance from the street is sufficiently wide to allow a fire-engine to be driven right up to the hall, and yet leave room for a good stream of people to pass. Yet this is the only way out, and cannot be regarded as satisfactory, as it passes under another building before reaching the street. The stage-entrance for performers and musicians is by vaulted passages passing under the hall, as there is no means of access from the back. The ventilation has been carefully looked after, and the hall has, of course, been lighted by the electric light. The effect as the spectator enters by the vestibule is said to be most elaborate, being specially pleasing when the area floor is used as a ball-room. At the rear of the seating on the first floor are a number of saloons and supper-rooms; but the refreshment-bar is in the vestibule at the back of the seats on the area level.

There is another type of German music-hall, as seen in the large hall or winter gardens of the Central Hotel, and to a certain extent the Flora Hall (Fig. 4) at Charlottenburg may be added to this class, for although in reality in connection with the Botanical Gardens, entertainments of all kinds are given in the building.

Of the halls devoted to variety entertainment which are also in connection with hotels, the Pfauen Hall, Zurich (Fig. 5) is an example. This was erected by the architects, Messrs. Chiodera and Tchiodera, of Zurich, who had to build a hall of the auditorium type upon the smallest possible

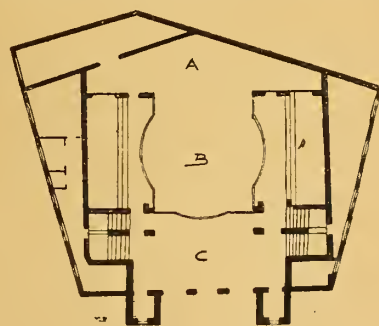


FIG. 5.—A, stage; B, auditorium; C, foyer.

area without interfering in any way with the light and air of the surrounding buildings. As, however, as many spectators as possible had to be accommodated upon this limited area, as will be seen by the plan, a view of the stage is obtained from the foyer, and the stage is reduced in depth to its utmost limit.

Before concluding this important section of my articles, I have to make some reference to the essentially French music-hall, which I propose doing in my next number. In the meantime, I wish to impress upon my readers that I have not dwelt so fully upon the details of the planning of music-halls as I think the importance of the subject demands, because I have so recently in this journal fully described the methods that should be adopted in planning and constructing theatres. As to exits and fire protection, the same rules may be applied to both class of buildings; but with regard to the internal arrangement the demands are quite different. A theatre must have an auditorium for a seated audience desiring to remain quietly in their seats to witness the drama or opera. A music-hall must be arranged for a constantly moving audience, and there must, therefore, be wider passageways, a greater width between the rows of seats, wider gangways, and essentially a promenade. Again, there must be very different arrangements with regard to foyers and refreshment-rooms. Where the authorities are not faddists, the refreshment-room should be so placed that a full view of the stage may be obtained. Another distinct feature of an assembly-hall of this type is the communicating staircases required between the various levels of the auditorium. The public like to be able to go from one level to another, and this can only be done in buildings where the want is met by good intercommunicating staircases. The L.C.C. rules insist that a staircase shall only serve one tier and not be entered by people at a lower level. This is, of course, with reference to the entrance and exit staircases, so what I have called the intercommunicating or promenade staircases must be in addition to these, or the authorities will not permit them.

THE TIMBERS OF AUSTRALASIA.—XIII.

By "J. G." ("DE LIBRA.")

THE SOFT WOODS: I.—ENDOGENOUS OR PINE TIMBERS (continued)—NEW ZEALAND AND AUSTRALIA.

THE following are the most important of the New Zealand pine timbers, and the tabulation enables a comparison to be made of the strength of such as I have been able to obtain the particulars of, with that of a few of the best-known European and Australian timbers:—

Native Name.	Vernacular Name.	Botanical Name.	W.*	S.†	Authority.‡
Kauri	Kauri	Dammara Australis	38'96	165'50	Balfour.
Totara	Totara	Podocarpus totara	35'17	142'50	Blair.
Matai	Black pine	" spicata	40'74	192'01	"
	Red pine				
Miro	Miro	" ferruginea	49'07	220'14	"
	Black pine				
Kahikatea	White pine	" dactyroides	30'43	106'00	Balfour.
	Red pine				
Rimu	Monao	Tacrydium cupressinum	39'25	175'44	Blair.
Manoao	Yellow pine	" Colensoi	—	—	—
	Tar-wood				
Ditto	Monao	" Kirkii	—	—	—
Ditto (?)	Barrier pine	" Westlandicum	—	—	—
Ditto (?)	Yellow silver pine	" intermedium	—	—	—
Kawaka	Red pine	Libocedrus Doniana	59'69	120'00	Balfour.
Pahautea	Arbor vitae	"	—	—	—
Kaikawaka	Cedar	" Bidwillii	39'69	99'98	Blair.
Tanekaha	Celery-top pine	Phyllocladus trichmanoides	—	—	—
—	English oak	—	51'72	176'40	Laslett.
—	English ash	—	46'00	188'50	"
—	English elm	—	34'87	86'00	"
—	Riga fir	—	33'81	131'20	"
—	New South Wales ironbark	Eucalyptus cerebra, &c.	70'92	282'70	Balfour.
—	West Australian Jarrah	Eucalyptus marginata	63'12	150'00	Laslett.
—	Tasmanian blackwood	Acacia melanoxylon	45'99	232'80	Balfour.
—	Tasmanian huon pine	Dacrydium Franklinii	33'40	137'40	"

* Weight in pounds per cubic foot when dry. † Weight in pounds required to break pieces 12in. long and lin. square, fixed at one end and loaded at the other. ‡ Mr. J. M. Balfour, C.E., marine engineer, New Zealand Exhibition; Mr. W. N. Blair, assistant engineer, Public Works Department, New Zealand; Mr. T. Laslett, timber inspector, British Admiralty.—D. L.

The totara (*Podocarpus totara*) is considered, next to kauri, the most valuable timber in New Zealand. Its average height is over 100ft., with a stem diameter of 8ft., the massive cylindrical trunks often growing 60ft. or 80ft. without a branch. The wood is of a full red colour, varying in depth, and often presents in appearance a close resemblance to Honduras mahogany. It is clean, straight in the grain, compact, and of great durability, though somewhat brittle; it neither warps nor twists, is easily worked, and takes an excellent polish. It is of great value for bridges, wharves, and other constructive works where large spans are not required, as it is also for railway sleepers; but it is not suitable for long beams. For marine piles it is almost unrivalled, on account of its resistance to the *teredo*; resistance both to the cobra and to natural decay is said to be increased by the timber being driven green directly it is hewn, but it is only the heartwood, not the sapwood, which is resistant. The mottled varieties of the wood are greatly esteemed. Totara is largely employed in its native colony, and to some extent in Australia; but, with the exception of kauri, the knowledge and appreciation of the valuable New Zealand timbers is very much smaller on the Southern Continent than might be expected. The broad-leaved totara (*P. Hallii*) resembles generally the timber just described, but is of smaller dimensions and less durable.

Matai (*P. spicata*) attains a maximum height of 90ft., with a trunk diameter rarely exceeding 4ft. The timber is of great value on account of its smooth and even texture, strength, and durability. Besides being heavy, it is close-grained, though easily worked. In colour it varies from a light to a full deep brown. It is the slowest-growing of the New Zealand timbers, and is estimated to take 400 years to arrive at maturity. It is, without exception, the least given of all the New Zealand pines to warping or shrinking, and is, in all probability, therefore, the most durable; while, next to miro, it is the heaviest and strongest. It is suitable for all the purposes for which totara is adapted, as well as for others where greater strength and durability are required. Besides its employment in heavy construction, for the bed-plates for machinery, and also for millwright's work, matai is used very extensively for the floors of public buildings, skating-rinks, and ball-rooms, for which it is the best of the New Zealand woods. The lowland timber of the North Island, however, is less durable than that

obtained from the mountain districts of the South. Miro (*P. ferruginea*) varies from 50ft. to 90ft. in height, with a diameter of from 12in. to 36in. It has been much undervalued and neglected, but it has often been fraudulently substituted by contractors for matai, which it closely resembles, but from which it is easily distinguished in cross section by the dark colour of the central heartwood. It is the strongest of all the New Zealand pines, and for marine piles, when completely immersed, it is of the highest value, as it is extremely durable, and not readily attacked by the *teredo*;

but it is not durable when used in contact with the ground or exposed to the partial action of water or damp. The wood is straight and even in the grain, compact, hard, elastic, and of a light dull red colour with darker markings which often form a beautiful figure. Miro is less easily worked than some of the other pines, but is suitable for all internal house framing; its especial value, however, is for beams required to carry a great weight, if under cover. The figured specimens are well adapted for the purposes of the cabinet-maker.

Kahikatea (*P. Dactyroides*) ranges from 60ft. to 150ft. in height, and from 12in. to 5ft. in diameter, with a trunk particularly symmetrical from base to apex. The wood is usually white, though sometimes of a pale yellow tint, firm, compact, strong, tough, straight in the grain, flexible, and little given to warping or shrinking, but not durable in contact with the ground or where exposed to damp. Towards kauri and totara it holds the same relative inferior position as the Baltic white deal and the red or yellow deal of Europe. Mr. Blair, however, in his "Building Materials of Otago" distinctly asserts the superiority of kahikatea to both these timbers when it is equally well seasoned, while it works more easily and takes a higher polish than either. It is an excellent wood for flooring-boards, dado work, panelling, and other building purposes, as well as for white wood furniture, while in the island colony itself it finds an enormous employment for a number of purely local purposes.

Rimu (*Dacrydium cupressinum*) is, from its great abundance, perhaps the most commercially important of all the New Zealand timbers. It varies in height from 40ft. to 80ft., with a trunk from 2ft. to 5ft. in diameter. The wood is handsome, of a deep red colour, with light or dark (occasionally yellow) streaks or markings, which sometimes form a very beautiful figure. The heartwood of rimu is thoroughly durable, but is often very small in size as compared with the bulk of the whole trunk, while not only is the sapwood perishable, but there frequently exists between the heartwood and the sapwood an open, spongy wood, which in many instances is taken for the heart-timber, but which is totally worthless, and rots more quickly even than the sapwood. Rimu is the chief timber employed for building purposes over fully two-thirds of New Zealand, sometimes conjointly with other timbers, but most frequently alone. It is used for every variety of carpenters' and joiners' work (though some of

the other pines make better flooring), and when worked up into dadoing, doors and other panelled work, office fittings, mantelpieces, and various articles of furniture its handsome figure, and the splendid polish it takes, render it a most effective material. In its proper sphere of use, rimu is a most valuable wood; but it should be regarded as specifically a building (as distinguished from an engineering) timber, though it has occasionally been satisfactorily employed in shipbuilding. It has been largely used for railway sleepers, but, of course, only the heartwood carefully obtained from old trees. Its record in bridge-work appears to be wholly unsatisfactory. Large knots and burrs with exceptionally fine markings are frequent in this timber, and are converted into valuable veneers.

The Monao consists of two species, *D. Colensoi* and *D. Kirkii*. The former is a small tree, rarely above 40ft. high, with a short trunk from 12in. to 3ft. in diameter, and yellowish-brown wood, straight in the grain, even and compact, destitute of figure, but silky and easily worked. The timber is of great strength and durability, especially when used for sleepers. It is employed for general building purposes and furniture under the confusing name of "yellow pine," though even in New Zealand to a far smaller extent than its value warrants. The *D. Kirkii* attains an extreme height of 100ft., with a trunk sometimes 4ft. in diameter. The wood is light brown, very compact, even, dense, strong, elastic and of extreme durability, with a minute figure, and taking a high polish. It is a timber of the very highest value, though, unfortunately, somewhat rare.

The Westland pine (*D. Westlandicum*) grows 40ft. or 50ft. in height, with a stem diameter of 18in. to 30in. It is one of the most durable of the New Zealand timbers, straight and even in the grain, dense, firm, compact, yet of low specific gravity; of great strength, toughness, and elasticity, shrinking but little, and taking a high finish. When first hewn it is white; but it gradually assumes a yellowish tint with a satiny lustre. The frequent specimens of mottled, waved, and figured wood approach the mottled kauri in beauty. The Westland pine is as durable as totara, though much smaller in dimensions. It is used in bridges, wharves, and other constructive works with the best results, while for marine piles it is almost imperishable. It is no less suitable for general building purposes, and is extensively used by the cabinet-maker. It is one of the few New Zealand timbers the excellent qualities of which are known and appreciated in Australia. The yellow silver pine (*D. intermedium*) resembles in quality and uses that just described, except that in colour it is reddish-yellow, while its durability is even greater, though its dimensions are smaller.

The kawaka (*Libocedrus Doniana*) is a noble tree, unfortunately rather rare. It often grows 100ft. high, with a straight, naked trunk 2ft. to 5ft. in diameter. The wood is of a dark-red colour with darker streaks, and often of singular beauty; it is straight and even in the grain, and of great strength and durability. It is an excellent timber for general building purposes, and is particularly prized by the cabinet-maker.

Pahautea is stated by the best authorities to be the correct name of the *L. Bidwillii*, though the timber is generally known by surveyors and bushmen as "kaikawaka." It bears a close resemblance to kawaka, but is a smaller tree, varying from 50ft. to 80ft. in height, with a trunk diameter of 18in. to 36in. The wood is red, remarkably straight in the grain, but rather light and somewhat brittle; it is extremely durable in all situations—more so even than totara, for which it may be substituted for all purposes except those requiring great strength. It is extremely uniform, never exhibiting the beautiful appearance often presented by kawaka. In structure it greatly resembles the Californian red-wood, possessing the same good qualities and the same defects, and good samples work as freely as clear pine. Pahautea is employed in the construction of bridges, and for piles and railway sleepers, telegraph-posts, weather-boarding, house-framing, and similar purposes where great strength is not required; but on account of its brittleness it should not be used for beams or flooring-joists.

The tanekaha (*Phyllocladus trichmanoides*) is one of the remarkable "celery-top pines" discovered by Banks and Solander during Captain Cook's first voyage, and so named from the celery-like appearance of the foliage, which is

quite unlike that of other conifers.* The tanekaha grows to a height of 60ft. or 70ft., with a stem diameter of 12in. to 36in. The wood is white, sound, straight in the grain, heavy, dense, and of great strength, presenting a considerable resemblance to the crown Memel of Europe, with the advantage of being finer in the grain. It possesses, further, the valuable quality of shrinkage only to an inappreciable extent when used without being fully seasoned. It is extensively employed for railway sleepers, for various building purposes, and especially for beams and flooring, and the planking of bridges, wharves, and jetties, for which it has been found particularly suitable.

AUSTRALIA.

The Australian pine timbers may be very briefly dismissed, since at the present time two only—both of them peculiar to Tasmania—could compete as constructional timbers with the European and American pines, though they are largely employed in their own country, especially in consequence of their resistance to the white ant. In the future, if the threatened giving out of the supplies from these great sources should become a reality, and when, meanwhile, Australia has been more thoroughly opened up, it may (and probably will) be different. But all that is necessary for the purpose of these articles is a concise description of the Tasmanian Huon and celery-top pines, with an enumeration of such other pines as even now should possess a special value as ornamental woods in the European markets, by reason of their highly decorative character.

The famous Huon pine (*Dacrydium Frankii*) is a magnificent timber—the most valuable of all the Australian conifers,* though indigenous to Tasmania only. It grows to a height usually of 60ft. or 80ft., but occasionally of 100ft. The wood is light and tough, possessing the characteristics of the very best white pines in colour, fineness and beauty of grain, and general appearance; it is easily worked, and extremely durable. It is largely used for interior building work, and is particularly adapted for boat-building. It is also one of the best of the Australian woods for carving. It is often exquisitely figured, when it somewhat resembles bird's-eye maple, and is admirably suited for the manufacture of pianofortes. The "Jurors' Reports, London International Exhibition, 1862," stated of this wood, that "the beautiful marking of the butt, roots, &c., is peculiar, and quite unrivalled for pale cabinet-work."

The celery-top pine (*Phyllocladus rhomboidalis*) is very like the tanekaha of New Zealand, already mentioned. It is another exceptionally fine timber, though not very large. Trees of 2ft. 6in. to 4ft. diameter, and 60ft. in height, are readily procurable in various parts of Tasmania, and the wood is of a rich white colour, clear and fine in quality, and, says Mr. Perrin, writing last October in *Arts and Crafts*, "equal to the very best from other parts of the world." It is fairly free from knots, does not tear or shred, wears smooth, and, "unlike most timbers, does not shrink at the sides, but only at the ends." It is eminently suitable for architectural and building work, joiners' fittings, and cabinet furniture.

The chief remaining Australian pine timbers noticeable for their figure, &c., are:—

Bunya-bunya (*Aracaria Bidwillii*), Queensland, strong, full of beautiful veins, easily worked, and taking a good polish. Well reported of at the Indian and Colonial Exhibition.

Moreton Bay pine (*A. Cunninghamii*), New South Wales and Queensland, strong and durable when kept dry, with a remarkable figure, working well, and taking as high a polish as satin wood. Well reported of at Lond. Int. Exhn., 1862, and Ind. and Col. Exhn.

Norfolk Island pine (*A. excelsa*), Queensland, nearly allied to *A. Bidwillii*, but remarkable for its enormous figured knots, solid, compact, of a semi-transparent hazel-brown colour, and working much like ivory.

King William pine (*Arthrotaxis selaginoides*), Tasmania, highly prized for its beautifully clean but strongly marked pinkish grain, which is sometimes figured. Extremely light, and works up splendidly for furniture and in boat-building.

Brown pine (*Podocarpus elata*), New South

Wales and Queensland, soft, tough, close, silky, fine in grain, often with mottling of surpassing beauty. Exhibited at Lond. Int. Exhn., 1862, but erroneously described through inadvertence.

Red or black cypress pine (*Callitris calcarata*, formerly *Frenela Endlicherii*), Victoria, New South Wales, and Queensland; Murray River or Desert Sandarac cypress pine (*C. verrucosa*), Victoria; Richmond River cypress pine (*C. columellaris*), Northern Australia generally, all durable, fine, and straight-grained, easy to work, and taking a good polish, but brittle and splitting readily. Usually of rich brown colour, mottled, striped or clouded with darker brown, black, white, and yellow. Reported of at Lond. Int. Exhn., 1862, as "of extraordinary beauty," and "indeed a superb and very peculiar wood." Well reported of at Indian and Colonial Exhibition.

(To be continued.)

ADAPTABLE SPECIFICATIONS.—III.*

"PRELIMINARY, Sundry, and General Clauses" having been dealt with in the BUILDING NEWS of July 24th, and "Excavating and Foundations" in our issue on July 31st, we now come to Bricklayers' Work.

BRICKLAYER: FACTS AND MEMORANDA.

Strength of Bricks to Resist Pressure.—

Red pressed bricks from the Adderley Park Co., Birmingham, crush with 140 to 180 tons per foot super.

Red pressed bricks from Coalville, Leicestershire, crush with 103 to 180 tons per foot super.

Red pressed bricks from Peterborough crush with about 179 tons per foot super.

Arlesey Gault bricks (white) crush with about 157 tons per foot super.

Berkshire red bricks crush with about 100 tons per foot super.

Common yellow stocks crush with about 60 to 100 tons per foot super.

Staffordshire blue bricks (from Rowley Regis) crush with 700 tons per foot super. (R.I.B.A. Journal, April 2, 1896).

Strength of Brickwork to Resist Pressure.—This is much less than the strength of the individual bricks, especially while the brickwork is new. In the recent experiments of the R.I.B.A. on brick piers built about 18 weeks, a pier of Sittingbourne stocks in lime mortar split and fell with a pressure of about 10½ tons per superficial foot. Two of Burham Gault bricks in lime mortar both crushed with about 22 tons to the foot. Two piers of hard red bricks from Ellerton, near Leicester, in lime mortar, crushed with about 30 and 31½ tons to the foot respectively; and two of Staffordshire blue bricks, from Rowley Regis, collapsed, one with 69 and the other with 19 tons to the foot super. In cement mortar, London stocks built 21 weeks before crushed in one case with 16 tons to the foot, and in the other with about 14 tons. Piers of Burham Gault brick of the same age collapsed with 17½ and 18 tons. Leicester red bricks (built 22 weeks) failed with 50 and 57 tons to the foot; and Staffordshire blue bricks of the same date crushed into a heap of rubbish with 84½ tons to the foot.

Some hitherto published experiments made on brickwork 11 years old, and tested at Mr. Kirkaldy's works, show, as might be expected, greater strength, but still much less than that of the separate bricks. This work was built in mill mortar, made of soft red brickbats ground up with Dorking lime. It was tested in blocks about 17in. by 14in. by 14in., carefully cut out from a wall. One block was of yellow stocks, faced on one side of the block with Coalville red pressed brick; the other of ordinary yellow stocks alone. Both crushed with exactly the same pressure—namely, with 66 tons to the square foot. The mill mortar scarcely crushed at this pressure, but simply broke across without separating from the bricks.

1	cube foot of stock brick weighs about	115lb.
1	" red facing " " "	130lb. to 140lb.
1	" blue " " "	142lb.
1	" London stocks in cement " "	132lb.
1	" " " in mortar " "	112lb.
1	" asphalte " " "	137lb.
1	" earth " " "	95lb. to 125lb.
1	" water " " "	63lb.

Concrete of 10 parts of gravel to 1 of Portland cement crushes with about 15 tons to the foot super. when three months old.

Concrete of 6 parts of Thames ballast to 1 of

Portland cement crushes with 54lb. to the foot super. when nine months old.

Bricks made of cement and sand (1 part to 5), and six months old, are said to crush with about twice the pressure required by a common stock.

PART III.: BRICKLAYER'S WORK.

III. 1. BRICKS GENERALLY.—All the bricks are to be sound, well burnt, square, and free from cracks and breakages. Those not otherwise described are to be [stock bricks from . . .] or others of equal quality approved by the architect.

III. 2. PICKED STOCK FACING.—Those parts of the exterior and interior walls coloured [buff] on the elevations and sections are to be faced with picked stocks of uniform colour approved by the architect, and similar and equal to a sample which may be seen in his office, marked "Sample of picked stocks."

III. 3. RED BRICK FACINGS.—Those parts of the exterior and interior walls coloured [Indian red] on the elevations and sections are to be of best [Suffolk] bricks, or other sand-moulded bricks approved by the architect, and equal and similar in colour to a sample which may be seen in the architect's office, and marked "Sample of red sand-moulded facings."

III. 4. PRESSED BRICK FACINGS.—Those parts of the exterior and interior walls coloured [light red] on the elevations and sections are to be faced with the best quality of red pressed bricks from the . . . works at . . . of good and uniform colour approved by the architect [and these bricks are to be made 2½in. thick, and not thicker, so as to bond with London stocks].

III. 5. BLUE BRICK FACINGS.—Those parts of the exterior and interior walls coloured [purple] on the elevations and sections are to be of [best] [seconds] Staffordshire blue bricks of uniform colour approved by the architect [from the . . . works at . . .] and of equal quality and similar colour to a sample which may be seen in his office, marked "Sample for blue bricks."

III. 6. RED RUBBERS.—Those parts of the exterior and interior walls coloured [carmine] are to be executed in best [red] [orange red] rubbers from [Messrs. Lawrence, of Bracknell, Berkshire], or others of similar colour and equal quality in all respects to a sample which may be seen in the architect's office, marked "Sample for red rubbers."

III. 7. BUFF PRESSED BRICKS.—The bands, facings, and other work shown on the drawings to be of buff pressed bricks are to be made by . . . or by some other firm approved by the architect, and are to be of a warm, full buff colour, and not of a whitish or cream-coloured tone. A sample of the colour and quality required may be seen at the architect's office, marked "Sample for buff pressed bricks."

III. 8. MORTAR.—The mortar to be composed of one part of good [Dorking stone] lime to three parts of clean, sharp [river] sand, quite free from loam, dirt, and salt. The lime and sand are to be thoroughly and uniformly mixed, and the mortar used as thick as possible. The mortar is not to be made up in larger quantities than will be used in the course of the day, and is on no account to be wetted and used after having once dried.

III. 9. MORTAR.—If the contractor provides a mortar-mill, and grinds up the mortar fresh at least twice daily, as it is needed for use, he may substitute soft sandy red brickbats, thoroughly ground up and evenly mixed with the lime and sand, for one-half the sand which would otherwise be required. In this case, the mortar will consist of one part of good [Dorking stone] lime to 1½ parts of sand and 1½ parts of soft red brickbats free from plastering. But stock-bricks and pressed bricks of any kind and old plastering must not be ground up for mortar; and the mill mortar must always be used quite fresh, and must on no account be kept from one day to another. Smiths' ashes approved by the architect may be ground up in the place of, and in the same proportion as, the soft red brickbats described in this clause.

III. 10. BOND AND SETTING OF BRICKS.—All the brickwork [except in 9in. walls visible on both sides] is to be in [old English] bond. Except as regards the closers necessary to preserve the bond, and as regards any other points where cutting the bricks is unavoidable in order to carry out design, it is to be entirely of whole bricks, both as regards backings and facings. The backings and facings are to be thoroughly bonded together, and snapped

* According to Prof. Balfour ("Class-Book of Botany," 1871), the genera *Dacrydium*, *Phyllocladus*, and *Podocarpus* belong to the Natural Order *Taxaceae*, not to the *Coniferae*. Australian authorities give them to the latter.—D. L.

headers will not be allowed. The vertical joints, as well as the beds, are to be thoroughly flushed up with mortar, and the brickwork is to be solid and compact, without chinks and "pockets."

III. 11. WETTING THE BRICKS.—All the surfaces of every brick, unless already perceptibly damp from the state of the weather or other causes, are to be well wetted before the brick is laid. All bricks which are to be bedded in cement are to be soaked in water for ten minutes just before the work is done.

III. 12. HEIGHT OF COURSES.—No four courses when laid are to measure more than [three-quarters of an inch], including four mortar-beds, beyond what the bricks did when dry.

III. 13. POINTING.—The external facing is to be pointed as it is built with a neat-struck weathered joint in the same mortar in which the bricks are laid. Should there be imminent danger of frost at any period during the execution of the works, the brickwork built at that period may be pointed afterwards.

III. 14. POINTING.—Where the work is in cement, or in red mill mortar, the joints are immediately to be raked out to the depth of $\frac{1}{2}$ in. at the least, and pointed on the outside with a neat weathered joint in mortar of lime and sand. Pointing injured by frost or other causes is to be similarly treated.

III. 15. INTERNAL POINTING.—The internal brick facings are to be very neatly pointed with a narrow flat joint in Parian cement.

III. 16. WALLS TO GO UP EVENLY.—Except with the written consent of the architect, no part of the walling, while the works are in progress, is to be carried up more than a scaffold height above any other unfinished part. The perpend everywhere must be truly kept.

III. 17. GROUTING.—Where the walls are thicker than 18 in., and also wherever they have a facing of rubble, ashlar, or parapet and a backing of brickwork, they are to be brought to a level every foot in height, and well grouted with lime and sand mortar mixed up with water so as to be as thick as is practicable for the purpose.

III. 18. BRICKWORK IN CEMENT.—Wherever the work is shown on the drawings, or described, to be "in cement," the cement is to be Portland cement of the kind and quality required by the London County Council's specification for that material, which was in force in July, 1896. The cement (unless otherwise stated) is to be mixed dry by hand, carefully and uniformly, with two parts of the best clean sharp sand, free from dirt, clay, salt, and all other impurities, and made up with water so as to be as thick as is practicable for use. Cement which has once begun to set is on no account to be "knocked up" again, or mixed with water and used. Axed or gauged arches set in cement, unless specially described, are to be so set except for a distance of $1\frac{1}{2}$ in. from the facing, but this $1\frac{1}{2}$ in. space is to be set in putty.

III. 19. ARCHES TO GO THROUGH THE WALLS.—All arches, except camber arches (which, except where otherwise expressly shown or described, are to be 9 in. thick on the soffit, and to be set in cement, with $1\frac{1}{2}$ in. of putty bedding next the face), are to go right through the walls, unless the drawings show a different treatment, or unless the nature of the design prevents it. They are to be built in headers and stretchers, the facing headers not being snapped, but bonding into the inner rings, which are to be of specially sound and hard bricks, and the whole thickness of the work is to be put together in the most solid and substantial way.

III. 20. ARCHES, &c., OF PRESSED BRICKS.—The arches, jamps, string-courses, and all other details shown or described to be of pressed bricks, together with all mitres, stoppings, returns, and similar features belonging to them, are to be made at the works, and are to be sharp, true, and well-burnt. In the case of jamb-bricks, they are not to be more than $\frac{1}{4}$ in. thicker than the facing bricks in the same part. The contractor must pay for any new moulds which are required in order to carry out the building according to the drawings. Where marked "list pattern" on the drawings, the moulding will be one of those which the brick-makers profess to supply from their own moulds. Bricks which are broken in transit, or which from any cause are imperfect, will not be allowed to be used, and mitres or similar features in cut or rubbed work will not be allowed in details composed otherwise of pressed bricks.

III. 21. CEMENTING BRICK STRING-COURSES.—These are in all cases to be set in and weathered with neat cement. The cement must not be allowed to run over the moulding or face of the string, but must be cut back to a regular line about $\frac{1}{2}$ in. behind the nosing. The string-courses to be of headers, with the vertical joints as thin as possible.

III. 22. CEMENTING BRICK SILLS.—Where a brick string-course forms the sill of a window, it is to be weathered with cement right back to and under the stonework, if a stone window stands on it. If there is a casement or sash window, the cement is to be weathered back right under the wooden window sill, and is to be tongued to this sill by an inch \times $\frac{1}{2}$ in. galvanised iron tongue, laid partly into the wood and partly into the cement.

III. 23. JAMBS, ARCHES, &c., IN RUBBERS.—To be executed to detail with the greatest care and accuracy, and set with fine joints in putty (except in the case of camber arches, which are before described). They are to be free from all defects, including flaws and repairs to damaged portions of a brick.

III. 24. COLOURING OVER OF BRICKS.—No bricks whatever are to be coloured over or patched up in any way, whether to hide defects, to give uniformity of colour, or for any other purpose. No facing bricks, except those in fine gauged work, are to be rubbed on the face; and any other bricks so rubbed, and any bricks whatever that have been coloured over, will have to be removed from the work, and their places made good with proper bricks of an approved natural colour.

III. 25. BLUE BRICKS IN CEMENT.—All blue bricks used as copings are to be set and pointed in neat Portland cement, and all other blue bricks are to be set in mortar composed of one part of cement to two of sand.

III. 26. BRICK PIERS TO SUPPORT GIRDERS.—To be of the hardest and soundest bricks, built with especial care, and thoroughly bonded to the walls to which they are attached.

III. 27. HOOP-IRON AND CEMENT BOND.—Each bond course shown on the drawings is to be formed by building the whole thickness of the wall in cement for a depth of [four] courses, and by building on through the entire length of the bond course one tier of stout hoop-iron bond, tarred and sanded, and properly lapped at all angles and at the end of each length, for every half-brick in the thickness of the walls.

III. 28. PROVISION OF BRICK IN CEMENT AND HOOP-IRON.—Provide to be used as the architect may direct, rods of reduced brickwork extra only in cement, and foot rim of stout hoop-iron, tarred, sanded, and lapped at all angles and junctions.

III. 29. IRONS TO FIX FRAMES.—Whenever there is an internal facing of brick provide to each door-frame, sash-frame, or casement-frame No. 6 strong wrought irons having proper screw holes for attaching the frames to one arm of the L, and build the other arm into the wall, and make good in cement. The irons to be 15 in. long altogether, 1 in. wide, and $\frac{1}{2}$ in. thick. Provide similar irons for fixing smaller frames, if any occur.

III. 30. FIXING BLOCKS OF CONCRETE.—Where the internal face of the brickwork will be concealed, provide and build in to fix each door and window-frame No. 6 proper fixing blocks of gas coke concrete and cement, and a smaller number for very small frames, if any occur.

III. 31. DISCHARGING ARCHES OVER LINTELS.—All lintels, unless expressly shown or described otherwise, are to have discharging arches over them, built in rings, of hard bricks in cement, with a radius to their soffit not greater than the span, and one-half brick in depth for every 2 ft. in the span. These arches are to be 5 in. wider at each end than the openings; they are to go right through the thickness of the wall, unless otherwise shown, and not to bear in any way on woodwork.

III. 32. FLUES, &c.—Carry up all flues with easy bends, putting a soot door in a position approved by the architect, wherever the flue forms a less angle with the horizon than 60°; and properly core and parget them. Unless otherwise figured, no flue except those from coppers and portable stoves is to be less than 14 in. by 9 in. in section, and no flue from a heating-apparatus boiler is to be less than 14 in. by 14 in., or its equivalent area.

III. 33. DAMPCOURSE.—Bring all the walls,

both internal and external, to a level at least 6 in. below the ground floor, and cover them with [a uniform layer of asphalt $\frac{1}{2}$ in. thick] [neat cement, and on this lay two courses of sound hard slates, breaking joint, and bedded in and covered with neat cement].

III. 34. HOLLOW WALLS.—The walls shown on plans to be hollow are to be of the thicknesses shown for the internal and external portions respectively. An even space of [two] inches is to be preserved between the two portions of the wall, which are to be tied together every four courses in height by wrought-iron ties made to dip towards the centre, and weighing 6 oz. each, of a pattern approved by the architect. These ties are not to be more than 3 ft. apart horizontally, and are to be well and securely fastened into the brickwork at each end. All woodwork, such as the heads of door or window frames, which projects into the cavity is to be covered on the top with 4 lb. milled lead, so arranged as to shelter it from any water which may find its way into the cavity. The cavity, and especially the base of it, to be protected and kept free from mortar droppings and rubbish of all kinds.

III. 35. FENDER WALLS AND TRIMMER ARCHES.—Build proper fender walls to all fireplaces on the floor next the ground, and half-brick trimmer arches to the others. Fill the fenders and cover the trimmer arches and their haunches with concrete composed of five parts of brick rubbish, broken small, to one part of Portland cement.

III. 36. CHIMNEY BARS.—Provide and build in cement to all fireplaces wrought-iron chimney bars, split and turned up at the ends, and 18 in. longer than the openings. Where the opening is wider than 3 ft. 9 in. these are to be 3 in. by $\frac{1}{2}$ in. In other cases they are to be 2 in. by $\frac{1}{2}$ in.

III. 37. PROVIDE AND SET STOVES.—Provide the sum of pounds for stoves [and the sum of pounds for a kitchen], to be selected by the architect, and set them all in the best and most effectual way, doing all cutting away and making good what may be required, and providing all necessary materials, including firebricks and fireclay if necessary.

III. 38. CHIMNEY-POTS.—Provide and fix to each flue a chimney-pot value shillings p.c. to be selected by the architect, and properly flanch it up with plain tiles and cement.

III. 39. AIR-BRICKS.—Provide and fix where directed No. terracotta air-bricks of plain square grating pattern, to be selected, each 9 in. by $\frac{1}{2}$ in. by 3 in., and where they are below the surface of the external ground, build 9 in. by $\frac{1}{2}$ in. flues down to them of half-brick in cement.

III. 40. HALF-BRICK WALLS.—All half-brick walls are to be in cement.

III. 41. BRICK PAVING.—Pave with hard [stocks in cement] those parts of the floors which are tinted [Indian red] on the plans. Pave with hard [stocks in cement] on edge those parts of the floors which are marked on the plans as "bricks on edge paving." Pave with best red Broseley paving tiles in cement those floors which are tinted [light red]. Pave with adamantine clinker-paving in cement all those floors and paths which are marked on plans. These must be on a 6 in. bed of cement concrete. Where no concrete has been provided on which to lay the other brick or tile pavings, the ground beneath them must be levelled and covered with good, clean, dry rubbish to the depth of a foot. The rubbish is to be well rammed and levelled.

III. 42. CEMENT PAVING.—Wherever this is indicated on the plans, form a horizontal bed of cement concrete 6 in. thick, consisting of five parts of rather small gravel, quite free from clay, dirt, and other impurities, thoroughly mixed dry with one part of Portland cement, and then wetted with a proper quantity of water. Before this concrete is dry lay on it and float to a smooth and even surface the finishing coat, which is to consist of one part of cement to one part of sharp sand. Where so shown or described, lay the cement floors to a fall, and form channels and gully-holes in them as required.

III. 43. SINK.—Provide and fix where shown a glazed stoneware sink of best quality, 4 ft. by 2 ft. 3 in., with holes and shelf, and carry it on half-brick walls.

III. 44. DRY AREAS.—Form the dry areas shown or described on the drawings with 9 in. walls in cement, with proper footings, leaving, wherever practicable, a clear space of 4 in. between the dry area wall and the walls of the building it is intended to protect. Just above the finished ground line turn a half-arch, one brick thick, in cement, rising from the area wall to the

wall of the building. Form proper skewbacks for it, and cover in thus every part of the fin. space. Where the dry area is deeper than 6ft. inside, the part of it below 6ft. is to be formed by a 14in. wall in cement, instead of a 9in. one.

III. 45. POINT AND LIMESWHITE.—Neatly point and twice limewhite the interior walls of [and any other internal brick walls in the basement which are not plastered or finished with brick facings].

III. 46. ENCAUSTIC AND MOSAIC TILE PAVING.—The floors of the are to be paved with [encaustic tile paving] [glass mosaic paving] to drawing, value prime cost [15] shillings per superficial yard. Carefully lay these pavements in the best and most accurate manner on a 6in. bed of cement concrete, and do all cutting, fitting, and other works needed to adapt them to the spaces they occupy.

III. 47. PROVISION FOR HEATING.—Provide the sum of pounds for a [low-pressure hot-water] heating apparatus to warm the following parts of the building—viz., and do all cutting away of brickwork, carpentry, and other materials which may be required in fixing it, and make good again at all points. The heating apparatus will probably be put up at a late stage in the progress of the works, and after the plastering is executed.

III. 48. PROVISION FOR GAS.—Provide the prime cost sum of pounds for gasfitter's work and fittings, and do all cutting away for, and making good after, the gasfitter's work which may be required in any part of the building. The gasfitter's work will probably be done at a late stage in the progress of the building, and after the plastering, or part of it, is finished.

III. 49. COPPER.—Provide and fix in the a [50-gallon] galvanised-iron pan, with bars, door, flue, and deal-ledged lid and handle complete. Properly set this pan in brickwork, and neatly cement the outside and top of this brickwork in Portland cement. [Put a $\frac{3}{4}$ in. brass tap to the lower part of the pan to draw off the water.]

III. 50. ROAD-SCRAPINGS IN MORTAR.—No road-scrappings or road sand may be used in any part of the bricklayers' or plasterers' work.

III. 51. SUNDRIES.—Bed and point all frames with hair mortar. Rake out for lead flashings, wedge them in, and carefully point the joints in cement. Black all grates requiring it. Neatly stop putlog holes. Reinstatate all work injured by frost, accident, and other causes down to the time of giving up the building complete for occupation, and leave all clean and perfect.

NOTES.

III. 4. In the Midland counties, where most of the pressed bricks are made, these bricks are commonly from $\frac{1}{2}$ in. to $\frac{3}{4}$ in. thicker than London stocks, and consequently will not bond with them in jambs. For the sake of getting close joints in mouldings, this clause specifies that they are to be made slightly—but only slightly—thicker than the ordinary stock.

III. 8 and III. 9 are alternative clauses for mortar. Mill mortar prepared as here specified becomes as hard in six months as ordinary mortar of sand and lime does in two years or more. The danger with a mortar mill is that any sort of rubbish which is at hand may be ground up for mortar, and, again, that this mortar may not be used fresh, as it ought to be. Cement should not be ground up with sand, but should be mixed by hand.

III. 47 and III. 48. It is stated that hot-water work and gas-fitting "will probably be done after the plastering is finished," in order to prevent a claim for extras on the ground that it might have been done sooner.

CAST IRON IN BUILDER'S AND CONTRACTOR'S WORK.—XXXI.

By JOSEPH HORNER.

IN the foregoing formulæ the neutral axis of the section is the axis about which the body is supposed to revolve, and this coincides, or should coincide, with the centre of gravity. The whole weight or mass of a beam is also conveniently supposed to be located at the centre of gravity of the section. In all regular figures or solids the centre of gravity coincides with their geometrical centres. For some other figures the centres are given in books of reference. For many irregular figures the centres have to be obtained by dividing the figures up into convenient

parts, then finding a common centre for any two of these parts, then a common centre for those two and a third, and so on. For plane figures a model may be made and suspended from any one point near the edge, and a plumb-line drawn upon the face. Then the body is suspended from another point, and another plumb-line marked. The point of intersection of the two lines is the centre of gravity.

The nature of the load which is imposed upon beams, whether dead or live, is an important factor in calculations affecting their design. The effects of live and dead loads on the deflection and the strength of beams have been the subject of numerous experiments. Live or impulsive loads tax beams more severely than quiescent or dead ones. It is found that deflection which occurs in a beam under a suddenly applied load is twice that which occurs if the load is applied gradually. Deflection further varies as the cube of the length, and inversely as the cube of the depth, so that a beam must be deeper in proportion to its length to be stiff enough to resist a live load than to resist a dead load, because strength to resist the latter varies simply as the square of the depth. The loads in question are always taken as being within the elastic limit of the material; that is, loads which do not cripple the material or cause it to take an injurious amount of permanent set.

The factor of safety represents the difference between the breaking strength or load of a structure and its safe working load. It takes the form of a multiplier, or divisor of the former. That is, the breaking strength is multiplied by the factor of safety to obtain the working or actual strength of the structure; or, the breaking load is divided by the factor to get the working load. The amount of this factor is determined by the whole of the conditions which are known to exist in any given instance, such as the character of a casting, the particular nature of the stresses to which it is subjected, liability to deterioration, and so on. The principal direct element in its determination is the nature of the load imposed, whether quiescent or impulsive. It is never safe to allow a lesser factor than 4 or 5 in the first case, or from 8 to 10 in the second. Some formulæ embody the breaking load, others the safe working load. Note must be taken of these differences when using formulæ.

When we remember that factors of safety varying between 4 or 5 and 8 or 10 are allowed on cast-iron work, the differences between the results given by various formulæ sink into comparative insignificance. There is probably not as much as one hundred per cent. of variation in the most extreme results given by the many methods of calculation; perhaps about twenty five per cent. would be near the mark. But even supposing a difference of 100 per cent. to exist, that is but one-fifth of the common factor for a dead load, and but one-eighth or one-tenth of that allowed for a live load. Moreover, the practical conditions of moulding and casting will sometimes make as great a difference in strength as the differences embodied in formulæ.

Since, then, the engineer has so many elements of uncertainty to contend with, the practical result is this:—When large numbers of cast-iron beams, or columns, or other structures are required, it is advisable and customary to test one or more castings to destruction, in order to arrive at certain results. Or, what is more convenient in many instances, and less costly, is to make a proportional model of any convenient size, and test it to destruction. This affords a reliable indication of the strength of larger beams of the same proportions. The caution given in a previous paper, to the effect that small castings are stronger than larger ones poured from the same metal, must, however, be borne in mind, and allowance made accordingly. The strength of such beams is as the cubes of their cross-sections. Thus if a beam were cast of a cross-section four times greater than that of the experimental beam, its strength would be $4 \times 4 \times 4 = 64$ times greater, the span remaining unaltered. But if the span differs, then the strengths will be proportional to the spans, according to the law of inverse proportion. The strength will be calculated first as though the spans were the same. Then say:—As the span required: the span of the experimental beam:: the load of the experimental beam: the load required.

If a test beam is not cast, there are records of many experiments on beams of various sections and lengths given in various works of reference, and by making use of the above rules the strengths

of beams of almost any section likely to be wanted can be calculated, provided the quality of metal used and the conditions of casting are about identical.

The weight of a beam should be considered in some calculations for strength. In a short beam the leverage is so slight that its weight may be disregarded. In a long beam the weight becomes considerable, and must be added to the external load. It is more necessary to do so when the load is distributed than when it is concentrated at one spot.

In columns, the method of loading is different from that of beams, and the formula given for beams do not apply. When a long column fails, however, it fails by cross-breaking finally. But before that happens, other stresses, partly compressive, partly diagonal, and cross-breaking, depending on proportion of length to diameter and on methods of fixing, come into play. So that though a long column fails finally as a beam, the problem of its stability before it passes its limit of elasticity and becomes crippled cannot be explained by the theories which apply to beams. Hence most calculations affecting these are based upon formulæ deduced wholly from experiments.

The calculation of the strength of short columns which yield wholly by crushing offers no difficulties, being a question of sectional area and of load. Most columns used, however, will range between 10 or 12 and 40 diameters in length. The strength of pillars with rounded ends, as also of hinged pillars in cast iron, does not come within the range of builders' work. They apply in the cases of crane jibs, and of connecting-rods and struts.

We owe nearly all our information relating to the relative strengths of columns to the experiments of Mr. Hodgkinson. The principal conclusions deduced therefrom may be summarised as follows:—

That the strength of solid columns with both ends perfectly flat, and when the length exceeds 30 times the diameter, varies as the 3·6 power of the diameter nearly. When the diameters remain the same, the strength varies inversely as the 1·7 power of the length. Euler and Stoney make the strength of very long pillars vary directly as the fourth power of the diameter, and inversely as the square of the length; but the 3·6 and the 1·7 powers are considered to accord more nearly with actual experiments. Tables of these powers are given in engineers' books of reference.

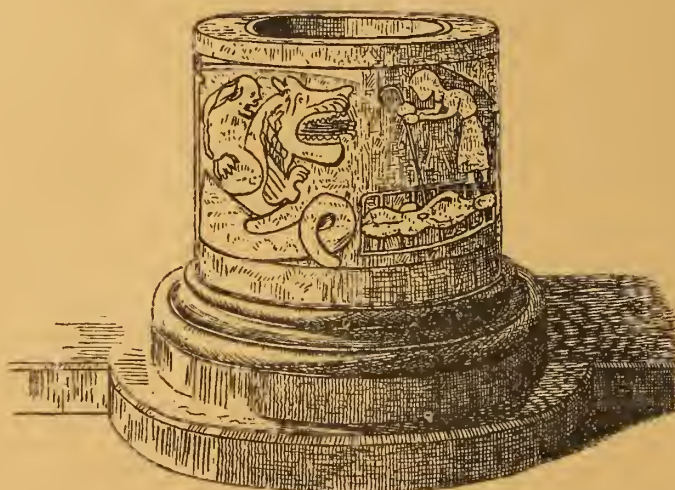
In hollow columns, when both ends are perfectly flat, and when the length exceeds 30 times the diameter, the strength varies as the difference of the 3·6 power of the external diameter, and the 3·6 power of the internal diameter, divided by the 1·7 power of the length. The strength of hollow columns of the same diameter varies as the 1·7 power of the length, as is the case with solid columns.

In short columns, or those whose length is very slightly in excess of their transverse diameters, the material fails by simple crushing only. Again, when the length exceeds from three to eight times the diameter, rupture takes place partly by crushing, partly by bending. But when the length exceeds by from 25 to 30 times the least transverse dimension, failure will take place by bending only, as in a simple beam when subjected to a transverse load. Hence the weight that produces moderate bending in a very long column is near the breaking weight, so that the strength in the case of these is dependent more on the coefficient of elasticity of the material than on the actual crushing strength. Hence wrought iron, from its want of stiffness, is unsuitable for columns, unless stiffened properly with bracing.

The relative strength of long columns, assuming the standard or unit column to be flat and firmly fixed, is: For columns with both ends rounded, or fixed with pins passing through the ends, $\frac{1}{2}$ of the unit strength; for columns having one end flat and the other round, $\frac{2}{3}$ of the unit strength.

The strength of a solid square cast-iron column is 50 per cent. more than that of a round column of the same diameter. The strength of hollow columns nearly equals the difference between that of two solid columns the diameters of which are equal to the external and internal diameters of the hollow one.

The strength of a column of double-flanged section is only $\frac{3}{4}$ that of a uniform hollow cylinder of equal weight; that of a column of cruciform section is less than $\frac{1}{2}$. A column so fixed that the thrust is in a diagonal direction has only $\frac{1}{3}$ of the strength it has when squarely fixed. The



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reason for the practice of putting broad flanges at the ends of columns at right angles with their longitudinal axis, and well sustaining them with brackets, is apparent, and also the economy of the hollow over the solid forms. The strength of taper columns is to that of cylindrical columns as $D^2 D'^2$ to D^4 , the extreme diameters of the taper column being D and D' . If the two columns be the same length and solid contents, the cylindrical one is the stronger. The putting of entasis on a column increases its strength by about $\frac{1}{2}$.

Mr. Hodgkinson's formulæ for pillars not less than 30 diameters in length and up to 120 diameters, flat-ended, are:—

Hollow columns—

$$W = 41 \cdot 31 \frac{D^{3.6} - d^{3.6}}{L^{1.7}}$$

Solid columns—

$$W = 44 \cdot 16 \frac{D^{3.6}}{L^{1.7}}$$

In which—

W = breaking load in tons.
 D = external diameter in inches.
 d = internal.
 L = length.

For short columns, which fail partly by crush-

ing and partly by cross-breaking, the strength is deduced thus. Taking—

W = the breaking weight, obtained by the previous formulæ.

W^1 = the breaking weight desired.

C = the ultimate resistance of the metal to compression = (about 49 tons) \times sectional area in square inches.

Then—

$$W^1 = \frac{Wc}{W + .75c}$$

Gordon's formulæ, deduced from Hodgkinson's experiments, are given below. In these—

W = breaking weight in tons.

a = the sectional area of the material in inches.

r = the ratio of the length to the diameter — the diameter taken being the least.

For solid or hollow round cast-iron columns:—

$$W = \frac{36a}{1 + \frac{r^2}{400}}$$

For solid or hollow rectangular cast-iron columns:—

$$W = \frac{36a}{1 + \frac{r^2}{400}}$$

One important inference, at least, must, I think, have been drawn from the foregoing summaries—namely, that the designing of cast-iron structures is not to be accomplished by the sole use of any formulæ. These, however good and valuable in themselves, are like a workman's tools—they must be used with skill and experience, qualifications which are derived from practice alone. A matured judgment is of the first importance, and this is of great value to its possessor, giving him skill not only in the handling of formulæ, but also in putting greater or less strength to certain portions of castings than the formulæ alone would indicate. Theories of stress the correctness of which are not gainsaid become very difficult of embodiment in practical formulæ. A mathematician smiles at the formulæ of the practical man, because he observes that they are so often of an empirical character, assuming something or another which is not capable of mathematical demonstration. Nor is the case very different when empirical formulæ, deduced in the main from experiments by eminent engineers, are made the subject of comparison. Some of these would give results varying widely in the same example. The engineer who is personally responsible for the stability of



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the work which he is commissioned to execute has no alternative but to have an ample margin of safety. Theorists may smile at this practice, but nevertheless it is sound engineering. Better have metal in excess, and as it seems to waste, than cut so finely as to endanger property and life. If metal were always of uniform strength and elasticity, always homogeneous, castings sound, designs perfect, workmanship good, greater exactitude in calculation would be possible. But the very great elements of uncertainty which always exist in relation to these matters, and of which the engineer is fully aware, introduces a variable corrective factor of great uncertainty into all formulæ. The discrepancies also which exist in formulæ deduced from direct experiments are due in the main to the different conditions under which the various experimentalists labour. Hodgkinson, Fairbairn, Barlow, Clark, Shields, Gordon, Stoney, Box are names well known in this branch of work, and each has given carefully-prepared formulæ for the strength of cast-iron beams, and columns of different types and differently loaded. They are all of service as finger-posts to the engineer. But much of his work lies outside beaten tracks, and then he is largely thrown back on his own practical instinct for guidance. His skill and judgment becomes, therefore, a variable quantity, a personal factor, which cannot be permanently embodied in any algebraical expression.

FONTS AT COTTAM AND COWLAM.

COTTAM and Cowlam are situated on the Yorkshire Wolds, about six miles N.W. of Driffield, and are within about a mile of

each other. Both churches are modern, but happily the ancient fonts survive. The dedication of both churches is unknown. The carved panels on the Cottam font represent:—(1) The Martyrdom of St. Lawrence (the meaning of the dragon with human figure on its back, and another disappearing down its throat, will admit of several interpretations), (2) The Eagle of St. John, (3) The Crucifixion of St. Andrew, (4) The Fall, (5) The Tree of Knowledge of Good and Evil. The carved stone below this font is one of the few stones remaining of the old church, and is probably the remains of a Runic Cross. The subjects on the Cowlam font are:—(1) The Fall, (2) Herod giving Orders for the Slaying of the Innocents, (3) The Wise Men presenting their Gifts, (4) A Bishop in the Act of Blessing, (5) probably Jacob Wrestling with the Angel, (6) probably The Angel with the Flaming Sword.

JAMES BAYLY.

BOOKS RECEIVED.

Animal Symbolism in Ecclesiastical Architecture. By E. P. EVANS. (London: William Heinemann).—An interesting subject to all students of ecclesiastical art and ornament has been comprehensively treated by Mr. Evans, who has attempted to trace the evolution of symbolism in Christian art and its transition to satire. Every student knows how much in sculptural ornament is due to this desire to symbolise or satirise. The subject is well handled, and the author delights to trace the origin of many Christian symbols to Pagan ideas of cosmogony, distasteful as some of these analogies are. Many

writers on this and kindred subjects scarcely appear to realise that the Church of the Early and Middle Ages purposely appropriated and made her own all that Greek and Roman mythology left to her. It was her best policy to do so, the same as it has always been her object to consecrate and Christianise the social life and amusements of the age, rather than reject them and make them a power outside and independent of herself. There was a wise policy in this—worldly perhaps, but still useful. The author shows how the Hebrews allegorised Nature. Origen, too, allegorises and explains the creatures that fill the earth, water, and the air. These creatures became transfigured in the artistic decoration of the Early Church. With the rise of the sceptical spirit, this symbolism became satire. "Medieval humour was coarse rather than keen," and the author justly says, "the satire of the period of the Reformation was of the same bitter and abusive style. Luther's wit was notoriously nasty, and even the gentle Melancthon was capable of indulging in a strain of sarcasm which any cultivated man of to-day would reprobate as extremely vulgar." The author points to many of these coarse satirical examples in sculpture and carving. He describes a sow with two Jews as sucklings, in one of the carved stalls in Bâle Minster, and in a chapel to the Virgin in the Cathedral of Magdeburg is a similar representation. In another Gothic edifice of the 13th century "is the figure of a Jew sucking a sow, and pushing aside a little pig which is anxious to have its turn at the maternal breast." As Mr. Evans says, the Jew suckled by a sow was one of the great Anti-Semitic jokes of the Middle Ages—"a matchless stroke of Christian wit and

satire." The diabolification of the dog was due to the Hebrew misconception of his character, while the Jew endowed rapacious and offensive creatures like the vulture with fictitious virtues. This most useful and sagacious of domestic animals was represented as an incarnation of evil. At a later period, the dog at the feet of a woman symbolised undying love and fidelity, and this was the substitution of the Aryan for the Semitic idea, which reversed the meaning of the symbolism. All students know the Christianisation of Pagan deities, as the eagle, emblem of Jupiter, was converted into the emblem of St. John the Evangelist, Poseidon and Pallas were mistaken for Adam and Eve, and the goddess of love, Venus, was soon translated into the Virgin Mary. We need not refer to other changed symbols, which are numerous, but refer to Mr. Evans's interesting book, which is illustrated.—

Journal of the Sanitary Institute. Part II. July. (London: Edward Stanford, Cockspur-street), comprises a paper on "Factory and Workshop Acts, and the Powers and Duties of Sanitary Authorities," by JOHN F. J. SYKES, M.D., and several articles and reviews of books. Those engaged in building factories and workshops will find all the necessary provisions summarised in Dr. Sykes's paper, and in his appendices of the leading sections.—*Application of Graphic Methods to the Design of Structures*, by W. W. F. PULLEN, Wh.Sc., M.I.Mech.E., &c. (Manchester: The Technical Publishing Company, Ltd.)—The author has compiled a very useful manual on the graphic methods as applied to structures. The chapters deal with the graphical determination of the bending moment of beams, shearing force, which are first treated. These are well illustrated by diagrams, clearly drawn. Flexible linked structures hinged, and roof trusses, girders, struts, plate girders are dealt with. The chapters on masonry structures, on the stability of walls and pillars, chimney-stacks, arches, &c., will be found of use, and the examples are worked out numerically. The student will find Mr. Pullen's handbook a very useful introduction to the subject of graphic methods in their various applications.—

London City Churches, by A. E. DANIELL. (Westminster: Archibald Constable and Co.)—We have so recently noticed this interesting volume of the City churches that it is needless to say more. Mr. Daniell, in this new edition, has added a very useful map at the end of the book, showing the position of the various churches described. The illustrations include many excellent photo. interior views, reproduced by permission of the London Stereoscopic Co., Cheapside, and other blocks by Leonard Martin. Though a few of them might have presented more important parts of the edifices, they serve to illustrate the text and to give the general reader a very good idea of these interesting structures designed by Wren and others after his time. The volume is of moderate price and size, handsomely bound and well printed, and will serve as a useful handbook to visitors and others. It may serve also to awaken an interest in these buildings, and stem the tide of desecration and demolition which threatens some of them.

During the work of rebuilding St. Brigid's Cathedral at Kildare, an ancient baptismal font of granite, and oblong in form, with roughly-bevelled angles, has been discovered built into the walls. It will be utilised in the restored cathedral.

A window, from the studio of Mr. Taylor, of Berners-street, has been erected in the church of Hollymount, Co. Mayo. The three subjects are "Mary at Jesus' feet," "The Ascension, with St. John in the Foreground," and "Our Lord and the Syro-Phœnician Woman."

It has been decided to construct a light railway in Montgomeryshire, from the Cambrian system near Four Crosses, between Llanymynoch and Welshpool, to Llanfair Caereinion. Mr. J. E. Thomas, C.E., Wrexham, has been appointed engineer, and will at once commence the preparation of plans, sections, and estimates, with a view to an early application to the necessary authorities under the new Act.

Messrs. Aston Webb, and Ingress Bell's revised plans for the buildings for new Christ's Hospital school, at Horsham, have been approved by the council, and will be now submitted to the quantity surveyor, with a view to the quantities being taken out, when a limited number of builders will be invited to tender for the work of erecting the new schools. We illustrated Messrs. Webb's and Bell's design, when selected in competition, in our issue of July 6 and 13, 1894.

Engineering Notes.

BARKING-ROAD BRIDGE.—The new Barking-road bridge over the River Lea was opened to the public on Friday. The old bridge was a very inconvenient and dangerous structure, formed of cast-iron arches resting on four pieces in the river bed, and was only 28ft. wide, with very steep gradients. The work of building the present bridge, which is partly under the control of the London County Council, was commenced in January, 1893. It consists of one arch in steel, 150ft. span, with no piers in the river. Its width between the parapets is 55ft., and while the gradients on the Poplar side are 1 in 30 to 1 in 36, those on the West Ham side are about 1 in 30. The London County Council constructed the bridge and Poplar approach, but the corporation of West Ham contributed towards the cost and constructed at their own expense the eastern approach. After the letting of the contract, the Council paid an additional sum of upwards of £5,000 in order that the workmen should be paid the full scale of wages laid down by that body; and the total cost of the bridge was £54,000. The design was prepared by Mr. A. R. Binnie, engineer to the L.C.C., and the contractors were the Thames Ironworks and Shipbuilding Company.

NEW Kew BRIDGE.—The Surrey County Council adopted at their last meeting the report of Mr. J. Wolfe Barry, C.B., recommending that the bridge at Kew be reconstructed as a stone structure. Mr. Barry submitted alternative designs for the bridge in steel and in stone. The bridge will consist of three arches, which, in the case of the stone bridge, would be elliptical, and in the case of the steel bridge, should be segmental. With regard to the stone bridge, the whole of the arches and all external portions of the piers and abutments would be of granite. In the case of the steel bridge, also, the piers and abutments would all be faced with granite. The cost of the stone bridge was estimated at £92,000, and that of the steel bridge at £80,000. The approaches would be the same in either case, and he proposed that the retaining walls which uphold them should be faced with granite, at a cost on the Middlesex side of £8,500, and on the Surrey side of £11,500, exclusive of additional land and buildings. In addition £6,000 would be required for a temporary bridge for use during the reconstruction. Upon this the committee reported that it appeared the designs submitted would allow of a space between the parapets of 45ft., so as to permit of a roadway 30ft. in width, and footpaths on each side of 7ft. 6in.; that the foundations of the proposed bridge would be from 18ft. to 20ft. below the present bed of the river; and that the bridge would take about two years to construct. The committee recommended the council to approve of the adoption of the design of the bridge in granite, at an estimated cost of £92,000, and also to approve of the construction of the Surrey approach at an estimated cost (exclusive of additional land and buildings) of £11,500, and of the construction of a temporary bridge at an estimated cost of £6,000. They further recommended that Mr. Wolfe Barry should be authorised to proceed upon the terms already reported to the council, and estimated at £2,450, with the working drawings and detailed specifications, for the purpose of obtaining tenders for the bridge. The recommendations were adopted.

PORT TALBOT.—A new railway is being constructed from the head of the Garw Valley through the Dyffryn Valley to Port Talbot, where the present inadequate and shallow dock is also to be reconstructed as a first-class coal port. The company has acquired the existing harbour and dock, together with additional properties, giving a total land area for dock and warehouse purposes of 300 acres. The railway starts from the coal sidings in the docks and crosses the main line of the Great Western Railway by a girder bridge of 82ft. span. Continuing its course through the Dyffryn Valley the line reaches Bryn, where the first passenger station will be located. About two miles from this point a tunnel about 1,000 yards long occurs. It is cut through rock, and is of egg section with five rings of brickwork. The work of tunnelling is being carried on from both ends, 500 yards being completed, and at the present rate of progress the tunnel should be completed by the end of October. Emerging from the tunnel, the line proceeds to Maesteg, in the Llynvi Valley, where will be the second passenger

station. Passing up the Garw Valley the railway terminates in a cluster of leading collieries. The line is a single one, 17 miles in length, and will be laid on the ordinary 4ft. 8½in. gauge. The first instalment, now in course of construction, consists of a dock 17 acres in extent. It will be connected with the existing dock by the present lock. The new lock will be 450ft. long by 60ft. wide, and will have a depth of 33ft. on the outer sill at high water of spring tides and 28ft. at neap tides. The new dock will be 1,000ft. long and 600ft. wide at the foot of slopes, and the total length of coal-sidings in the docks will be 20,000 yards. The entrance to the lock of the present dock is protected on the south side by a breakwater 1,100ft. long, constructed of timber piles and rough stone heaving. This breakwater is being extended 1,000ft. out seawards by a solid concrete structure, whilst on the north side of the entrance a new breakwater 1,460ft. long is being constructed of timber piles and rough stone heaving. There will be a clear width of 780ft. between the heads of the breakwaters. The works were commenced on March 1, 1895, and it is expected that the railway will be completed by March 1, 1897, and the docks by March 1, 1898. The cost of the railway will be about £200,000, and that of the docks £350,000, exclusive of rolling stock, coal-tips, machinery, and warehouses. The estimated total cost of everything will be about £800,000. The engineers responsible for the design and commencement of the works were the late Mr. M'Connochie, Mr. P. W. Meik, of Westminster, and Mr. T. Forster Brown, of Cardiff. Since Mr. M'Connochie's death, in December last, the work has been under the superintendence of the two remaining gentlemen, Mr. Havelock Case acting as resident engineer. The contractors are Messrs. S. Pearson and Son, of Westminster, their engineers being Mr. Hay for the railway and Mr. Hopkinson for the docks.

WEST HARTLEPOOL.—The Union Dock Extension at West Hartlepool is on the eve of opening. The works contracted for by Mr. T. D. Ridley were completed some weeks ago, and the barrier between the existing dock and the extension is being dredged away. The new work gives an additional water area of five acres and 1,130ft. of quay. A mole, 500ft. long and 135ft. broad projecting into the dock gives quay accommodation, the sides of the extension itself being sloped. The works have been carried out from the designs and under the supervision of Mr. W. J. Cudworth, the engineer-in-chief of the Darlington section of the North-Eastern Railway, assisted by Mr. W. H. Kinch, the Company's district engineer at West Hartlepool.

CHIPS.

The city council of Leeds, on Wednesday, decided to raise the salary of Mr. George Hewson, principal waterworks assistant in the engineer's office, from £250 to £300 a year.

St. Philip's Church, Dorridge, near Knowle, is being enlarged at a cost of £2,300, from plans by Mr. J. A. Chatwin, of Birmingham. The work is being carried out in red brick, with Bromsgrove stone dressings, and the western section and tower are to be added hereafter.

For the position of borough surveyor of West Bromwich, which has been rendered vacant through the resignation of Mr. J. T. Eayrs, a joint committee have decided to recommend the town council at their next meeting to appoint Mr. A. D. Greatorex, M.Inst.C.E., of Sutton, Surrey, at a salary of £350 per annum. There were altogether about eighty-two applications.

Mr. Justice Kekewich authorised the Governors of the Small-pox and Vaccination Hospital at Highgate, on Tuesday, to sell the institution to the Guardians of St. Mary, Islington, for a sum of £52,500. The building is to be converted into a workhouse infirmary.

The chapel which has just been erected at the Clergy School in Clarendon-road, Leeds, to the memory of the Rev. G. H. Fowler, a former Principal of the school, was dedicated on Tuesday—the twentieth anniversary of the opening of the institution. The building, which has been erected by Councillor Hannam, of Leeds, from designs prepared by Mr. Temple Moore, architect, of London, is of red brick in the Early Jacobean style. It will accommodate 100 worshippers. The ceiling is of plaster plaques, and the walls are to be wainscotted in oak. The sanctuary will be enriched with a reredos, sedilia, and an altar table, and the body of the chapel will be fitted with stalls in oak. An organ gallery is also provided. The total cost of the building will be £1,700.

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PRESBYTERIAN THEOLOGICAL COLLEGE, CAMBRIDGE.—ARCHITECTURAL ASSOCIATION EXCURSION SKETCHES.—HOUSE AT ZURICH.—OFFICES OF THE CARDIFF GAS-LIGHT AND COKE COMPANY.—TECHNICAL INSTITUTE AT EPSOM.—“THE LAURELS,” HASTINGS.—QUEEN ANNE AND EARLY GEORGIAN FURNITURE.—FONTS AT COTTAM AND COWLAM.—VILLA AT SHANKILL, CO. DUBLIN.

Our Illustrations.

PRESBYTERIAN THEOLOGICAL COLLEGE, CAMBRIDGE. This is the second premediated design for the new College at Cambridge, in connection with which a limited competition was recently held among a few architects invited to send in designs. Mr. H. T. Hare's plan was chosen, but we understand is to be modified considerably for execution. The authors of the design which we now illustrate are Messrs. W. Howard Seth-Smith and Arthur R. G. Fenning, acting conjointly in this matter. The plans show the arrangements intended. The college library and the dining-hall make pleasing features in the design, the students' houses being contrived round a quadrangle to the rear of the main buildings.

ARCHITECTURAL ASSOCIATION EXCURSION.

(See article on p. 176.)

HOUSE AT ZURICH.

THE accompanying perspectives are the first sketches of a house, now in course of construction, for Mr. E. Koch-Vlierboom. The final drawings have been much improved by leaving out the corner tower which was at first desired, and by simplifying the gables. The ground plan has been made to suit the site, which is long and narrow, and has houses on either side. There is left only a passage on the N.W. (hall and staircase side), so as to obtain as much room as possible on the S.E. (drawing-room and boudoir side). The street front has been treated as a town house, to accord with the adjoining residences; but the S.W. front being quite private, and looking on to an extensive garden, has been designed in character with it. The accommodation includes, in addition to rooms for Mr. Koch-Vlierboom, on the first floor a bachelor's suite for his brother, comprising sitting-room (with ingle-nook, bedroom, and bath-room, &c.) The house is to be built with a granite base, the superstructure being of brick with stone dressings, and half-timber work. The hall and staircase are to be of marble, with oak dadoes, the former to have a gallery on first-floor level. Mr. Alexander Koch, of London, is the architect.

THE CARDIFF GAS OFFICES.

THESE offices, for the Cardiff Gas Light and Coke Co., which were opened last Wednesday, replace those which had stood upon a portion of the site for a good many years, and had become entirely inadequate for the business of the company in Cardiff and its district. Mr. H. Morley is the engineer and manager. The elevation published, facing Bute-terrace, is in the Free Renaissance style of architecture, and is built of local grey

stone, hammer-dressed in courses, relieved with Bath and Forest of Dean stone dressings. The amount of the expenditure on the whole of the work is about £16,000. The contractor for the erection of the building was Mr. James Allan, of Cardiff. The whole of the work has been designed by and carried out under the superintendence of Mr. John H. James, M.S.A., F.I.A.S., architect, 22, St. Mary-street, Cardiff.

TECHNICAL INSTITUTE AND ART SCHOOL, EPSOM.

LORD ROSEBURY opened this building the other day. The Technical Institute is entered through a vestibule. Only two classrooms have at present been built; they are each about 32ft. by 18ft., and lighted by large three-light windows. Provision has been made for the erection of either one or more additional rooms at the back when required. Lavatory and w.c. accommodation is conveniently placed off the entrance-hall. The Art School is placed on the first floor, and is approached by an arcaded corridor and wide stone staircase. The accommodation consists of elementary and advanced class-rooms, each about 26ft. by 20ft., having waggon roofs with framed principals; modelling-room, 18ft. by 18ft.; and master's room. Lavatory and w.c. accommodation is provided on the ground floor, and space for storage over large lavatory. It being essential that there should be a room capable of seating about 300 people for lectures, the two large class-rooms are divided by a movable partition. The exterior is designed in the Renaissance style, with red brick and buff terracotta dressings to doors, windows, and string-courses. Mr. J. B. Potter, builder, of Sutton, has satisfactorily carried out the work, under the superintendence of Mr. J. Hatchard Smith, F.R.I.B.A., of 41, Moorgate Station-buildings, E.C.

HOUSE AT HASTINGS.

THIS drawing shows additions and alterations recently carried out at the “Laurels” for Mr. W. Stubbs, J.P. The additions considerably increase the size of the dining-room, and convert what was formerly a reception-room into a handsome hall, with garden entrance, ingle-nook, and cosy corner designed in keeping with the exterior. The work has been carried out by Messrs. Barker and Gasson, under the direction and from the designs of Mr. H. Ward, architect, of Hastings.

QUEEN ANNE AND EARLY GEORGIAN FURNITURE.

THE period to which the furniture (sketches of which will be found in our present issue) belongs, was very rich in graceful and elegant forms, being contemporaneous with that epoch, so prolific of sumptuous and costly furnishings, which embraced the reigns of two of the representatives of the French House of Bourbon—Louis XIV. and Louis XV. The Settee at the bottom of the page is a fine specimen of Early Georgian work, and anything like angularity or massiveness is carefully eschewed. Its form is that of a dual armchair, in which the backs are placed side by side together, the arms being abolished—the seats merged into one—and one leg back and front fulfilling the essential requirements of support in the centre. The shaping of the “splads” in the back, the carving at the top, the shell ornaments on the legs and seat-rail are delicate in design and execution. The wood is plain Italian walnut left the natural colour, which age has considerably enriched; the seat is upholstered in blue velvet. The total length is 5ft.; the measurement from front to back is 1ft. 10in., and the height to top of back 3ft. 6in. It belongs to Vincent J. Robinson, Esq., C.I.E. The Toilet Chest is made after the fashion of a bureau, and is surmounted by a swing mirror, the glass of which is bevelled. The slightly sunk shell in the frame, and the inner member of the moulding round glass are gilt: it is made of figured walnut highly polished, and stands nearly 6ft. high to top; the lower portion is 2ft. 11in. high, 2ft. wide, and 1ft. 4in. deep. Miss E. G. Tanner is the owner of this desirable boudoir adjunct, which belongs to the same period as the settee. The Armchair, of the Queen Anne period, belongs to Mr. C. H. Talbot, and is a fine specimen of the old Windsor type of chair, as comfortable as it is dignified. It stands 3ft. 6in. to top of back, and has a spread between the arms of 1ft. 10in. The graceful little Table, very charming in the shaping of the top (which is made to tilt up) and in the curves of its three legs, terminating in the quaint shell-like feet, is made in mahogany, and may belong to a time anterior to that of Queen Anne, probably to that of Dutch William. It

belongs to Sir Spencer Ponsonby-Fane, and, together with the foregoing pieces, is included in the Loan Exhibition at Bethnal Green Museum. Its dimensions are: height, 2ft. 2in.; length of top, 2ft.; width of ditto, 1ft. 6in.

COMPETITIONS.

ABERDEEN.—The competition for the new municipal buildings must be added to the long list of abortive proposals. A committee of the town council considered at their last meeting the report by the assessor, Mr. Young, and on its recommendation awarded the first premium of £50 to No. 4 design, and the second of £25 to No. 5 design. On opening the envelope it was found that the authors of No 5 plan were Messrs. James and J. Augustus Souttar, and that No. 4 was prepared by Mr. A. Marshall Mackenzie, A.R.S.A., of Aberdeen. The committee, however, considered none of the designs suitable, and have asked Mr. Young to suggest what course should be taken by them under the circumstances.

PRESTON.—The result of the competition for the new Congregational Church Schools at Preston is as follows:—1st, “Vim,” Mr. E. J. Andrew, Preston; 2nd, “Light,” Mr. W. H. Dinsley, Chorley; 3rd, “Lux,” Messrs. Briggs and Wolstenholme, Blackburn.

PRIZE FOR INDUSTRIAL HYGIENE.—The Council of the Society of Arts are prepared to award, under the terms of the Benjamin Shaw Trust, a gold medal or a prize of £20. The medal is to be given “For any discovery, invention, or newly-devised method for obviating or materially diminishing any risk to life, limb, or health, incidental to any industrial occupation, and not previously capable of being so obviated or diminished by any known and practically available means.” Intending competitors must send in descriptions of their inventions not later than the 31st December, 1896, to the Secretary of the Society of Arts, Adelphi, London, W.C.

CHIPS.

At the new Church of Our Most Holy Redeemer, in Upper Cheyne-row, S.W., opened last October, two altars to the Sacred Heart and to the Holy Infant of Prague and St. Anthony have been designed and erected by Mr. F. J. Curley, of Flood-street. An altar of St. Joseph has also just been given by Colonel and Mrs. Oughton Giles, and the designs have been prepared by Mr. F. J. Curley.

A bankrupt named William Williams, described as a timber merchant in Cannon-street, applied, on Tuesday, for his discharge. Debts had been proved to an amount exceeding £25,000, and his assets were under £1,000. Mr. Registrar Linklater said the bankrupt had been engaged in fraudulent bill transactions. He must be regarded as a bird of prey, whom it was necessary to keep caged. Therefore his discharge was refused.

The Royal College of Science at South Kensington has been closed till October 7, for the purpose of reconstructing the sanitary arrangements, at a cost of about £3,000.

M. Girault, who won the Grand Prize of Rome, and has obtained honours in the salons, has been selected as architect to superintend the construction of the great palace of the Exhibition of 1900. The works are to begin about Sept. 15 next, when operations will begin on the river banks by the Cours-la-Reine. The demolishers are to attack the Palais de l'Industrie, in the Champs Elysées, towards the end of October next.

A statue erected to the memory of Mary Campbell, Burns's “Highland Mary,” was unveiled by Lady Kelvin at Dunoon on Saturday. The statue, which is of bronze and stands 10ft. high, occupies a commanding position on Castle Hill, the site being within a mile from Highland Mary's birthplace. The sculptor is Mr. D. W. Stevenson, R.S.A., of Edinburgh. The figure is attired after the fashion of the period when Mary lived. A Bible is clasped in the left hand, and the figure is represented gazing across the water in the direction of the Ayrshire coast.

At Lyncombe cemetery, on Saturday, the funeral of the late Mr. Alfred Amor, quantity surveyor, of Octagon-chambers and Bloomfield-avenue, Bath, was attended by a large number of friends. The Bath Master Builders' Association was also represented by Mr. E. Wooster (president), Mr. E. J. B. Mercer (secretary), and several members.

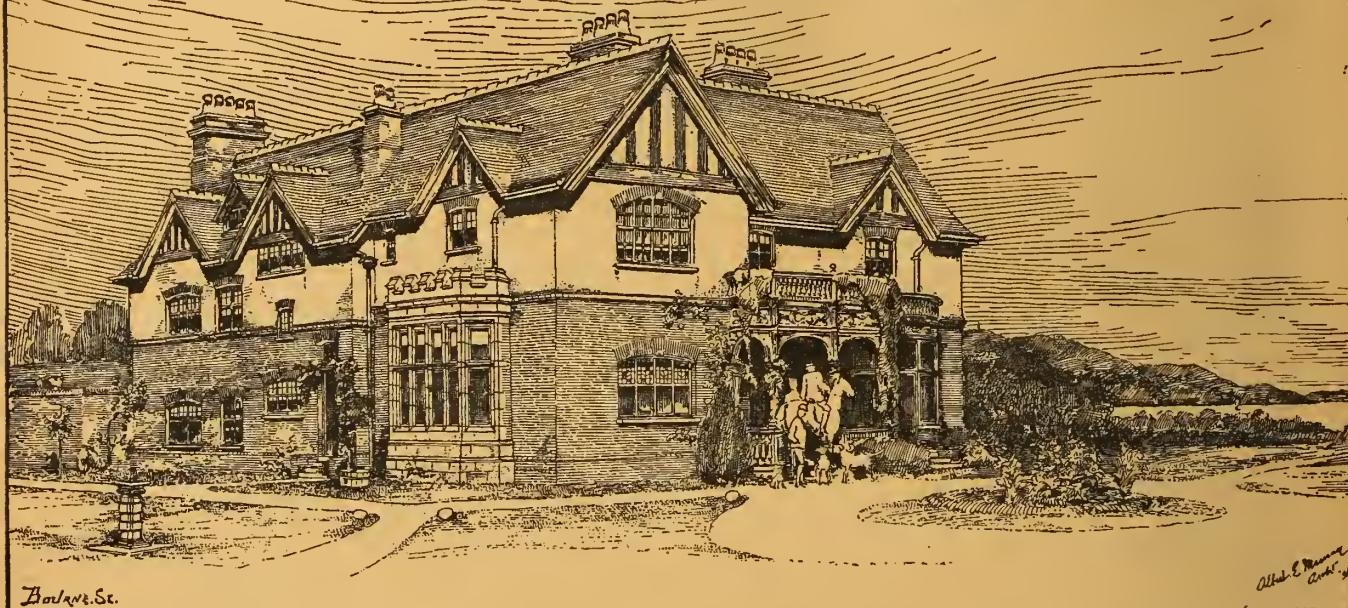
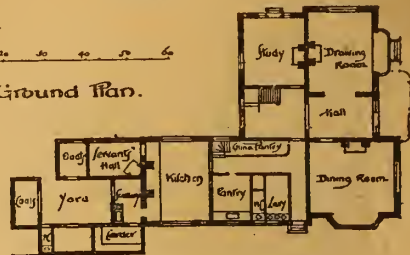
The Bishop of Salford laid last week at Colne the foundation-stone of a new Roman Catholic church, to be dedicated to the Sacred Heart. The church is to be built from plans by Mr. Simpson, of Bradford, at a cost of £3,000.

Villa at Shankill co/ Dublin.
for T. Falls, Esq^r

A.E. Murray, A.R.H.A., F.R.I.B.A., Architect.
Dublin.

Scale of feet
0 20 40 60 80

Ground Plan.



Bank St.

VILLA, SHANKILL, CO. DUBLIN.

THIS house has been erected at Shankill, for Mr. T. Falls, from designs by Mr. A. E. Murray, A.R.H.A., F.R.I.B.A., of Dublin. Ruabon bricks and Portland stone have been used for the ground-floor story, the upper portion being rough-cast with half-timbered gables, and the roof covered with Ruabon tiles. The contractor was Mr. Kiernan, while the grounds have been laid out by Mr. Sheppard, both of Dublin.

CHIPS.

The partnership hitherto subsisting between John Peacock Kay and Joseph William Twist, architects and surveyors, of Leeds, has been dissolved.

For the ventilation of the Lanchester workhouse (Mr. J. W. Rounthwaite, of Newcastle-on-Tyne, architect), Messrs. Cousland and Mackay have supplied a number of their patent direct-acting turret ventilators of an ornamental pattern.

At Bath the question of river pollution by sewage is attracting attention, and the city council have approved of the erection of a pumping station at Twerton, and the conveyance thence of the sewage by means of a culvert to a site below Saltford, where the precipitation and coke-breeze filtration system will be adopted.

The memorial-stones were laid in Nelson, on Saturday, of a new Baptist Sunday-school. The building is calculated to accommodate about 800 scholars, and the estimated cost is £4,280.

The Select Committee appointed to inquire into the question of sites available for the erection of the new buildings required for Government offices expresses the opinion that it is desirable to acquire, as soon as possible, the various interests in the property bounded by Whitehall on the west, Whitehall-place on the north, Whitehall-avenue on the east, and Whitehall-yard, or Horse Guards-avenue, on the south, and to proceed with the erection of a new War Office on the Carrington House site.

Mr. William Williams, J.P., died at his residence, 6, Litfield-place, Clifton, Bristol, on Monday last, within a few days of completing his 79th year. The deceased, who had been in failing health for some time past, was for many years in business as a timber merchant at Newport, Monmouthshire, of which town he was mayor and J.P. He retired from business more than twenty years ago, and has since resided at Clifton.

Messrs. Collen Bros., Ltd., builders, Portadown, have obtained the contract for the erection of a lunatic asylum for County Dublin. The site of the new building is at Portreene, near Donabate, a station on the Great Northern line. The firm's tender was £167,000. This is the largest building contract that has ever been placed in Ireland.

A freehold ground-rent of £160 per annum, secured upon the premises No. 23, Paternoster-row, in the occupation of Messrs. Simpkin, Marshall, and Co., was sold by auction last week by Messrs. Weatherall and Green for £12,400, being 77½ years' purchase.

The foundation-stone of the High School for Girls at Truro was laid last week in Falmouth-road. The joint architects are Mr. E. R. Robson, of Westminster, and Mr. Silvanus Trevail, of Truro, and the contractor is Mr. John Colliver, of Truro. It will accommodate about 130 girls. The exterior is faced with squared Plymouth limestone, and the mullions, transoms, and other dressings are of finely-axed granite. The buildings will consist of a central hall 48ft. by 26ft., dining-hall, three music-rooms, and various classrooms.

At the Chester Consistory Court a faculty has been granted to the vicar and wardens of Christ Church, Chester, to take down the nave, transepts, vestry, porch, and organ-chamber of the said church, and to build new nave with north and south aisles, tower, side chapel, organ-chamber, and vestries for the clergy and choir. The proposed works will increase the accommodation by about 167 sittings. The cost was estimated at £3,500.

At the Liverpool Consistory Court, a faculty was granted to the vicar and wards of St. Luke's, Formby, for enlarging the building, by the addition of a chancel and transepts, at a cost of £1,400.

A group of public offices, with a council chamber, are about to be built for the Neath rural district council in Orchard-street, Neath. The architect is Mr. David Davies, M.S.A., of Water-street, Neath.

The Leeds City Council decided at their last meeting to adopt a scheme for laying out City-square, submitted by Ald. Harding, and prepared by Mr. William Bakewell, with the exception of the central figure and bronze ornaments on the balustrade, at the estimated cost of £5,000. Ald. Harding has now offered to provide the central figure, and pending the approval of the council, has conferred with an eminent English sculptor as to the preparation of a model to be submitted to the committee.

At the Rhyl Police-court, on Friday, James Bramwell Smith, of Rhyl, described as an architect and builder, was remanded on bail, on a charge of unlawfully obtaining credit, without disclosing that he was an undischarged bankrupt.

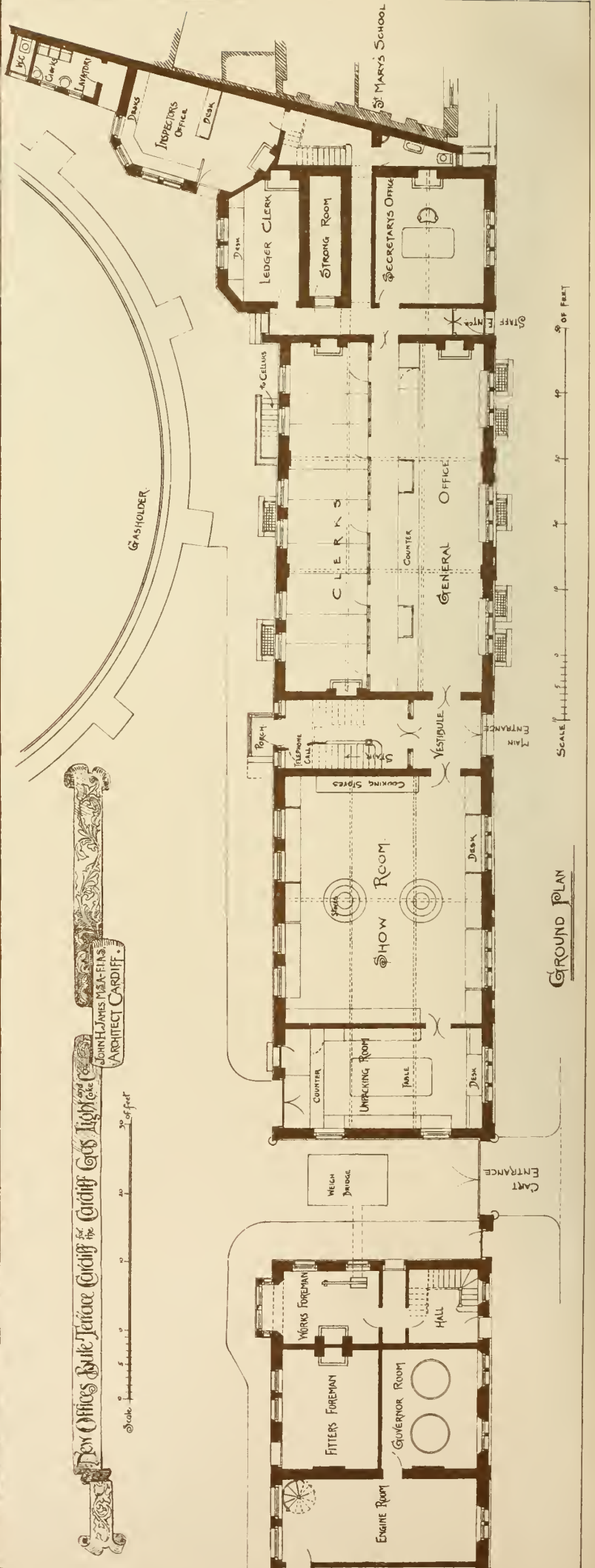
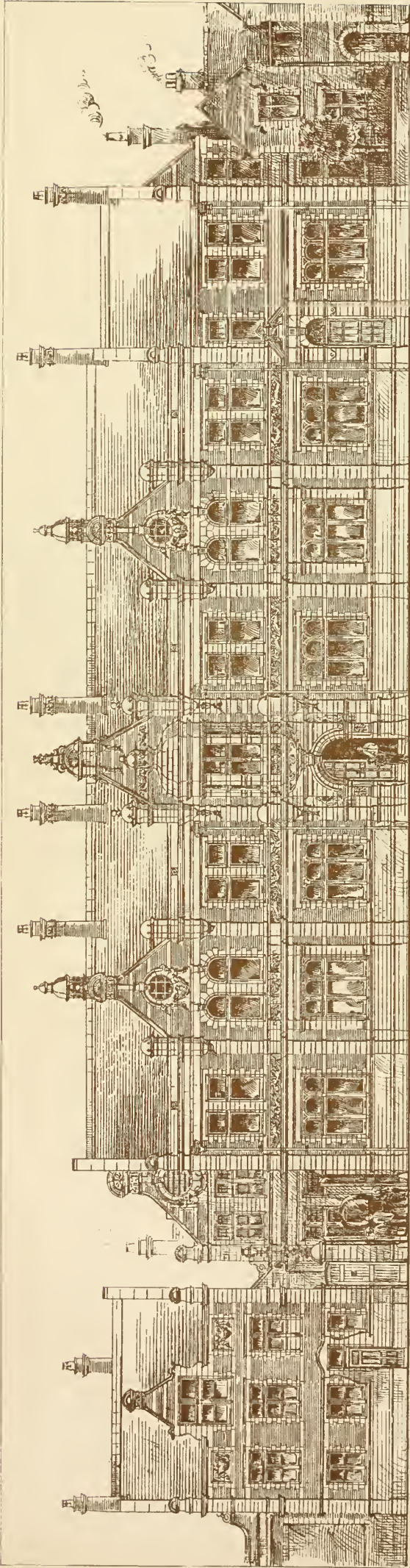
Miss Verdin laid on Friday the foundation-stone of the new technical schools and gymnasium, which her brother, Sir Thomas Verdin, Bart., is erecting for the benefit of the town, at a cost of £8,000. The designs were prepared by Mr. Joseph Cawley, architect, Northwich. Provision is being made for a chemical laboratory and classes in art, iron and woodwork, and cookery and laundry work.

The Bishop of Manchester consecrated on Friday the new church dedicated to St. Lawrence, at Barton, near Preston. The church has been erected to replace the old one, which was in existence in 1577, and was inadequate to the needs of the parish. The structure is in the Decorated style, and has a spire 94ft. high. The walls are of Yorkshire parpents, with Runcorn red stone dressings. It will accommodate 336 persons, and has been erected at a cost of about £5,000. Mr. R. Knill Freeman, of Bolton and Manchester, is the architect, and Mr. T. Croft, of Preston, the contractor. We illustrated the church by perspective and plan in our issue of October 18, 1895.

The following have been elected officers of the Joiners' Company for the ensuing year:—Mr. Thomas Murray Jones, master; Mr. Roger Henry Abbott, upper warden; and Mr. John Larkin, renter warden.

In 11 years (1885-95) railways in Germany have increased from 22,704 miles to 27,445 miles, an increase of 4,741 miles. The total length of rails in 1895 was 48,155 miles, an increase of 10,626 miles over 1885, and 967 miles over 1894. There were in 1895, 9,457 miles of double track lines, and 17,988 miles of single track lines, 66 miles with three tracks, and 41 miles with four tracks.

A committee of the Liverpool Corporation, after considering three high-level schemes, have finally recommended scheme S, as amended, and recommended the city council to adopt it, and make application in the next session of Parliament for powers to carry it out. By this scheme, which has been prepared by the corporation surveyor, Mr. Sheldermine, the roadway will commence at the northern end of St. George's Hall, and run as a high level street 60ft. in width to the junction of Dale-street and Manchester-street, and will be carried over the Old Haymarket by a bridge in one span of 100ft.



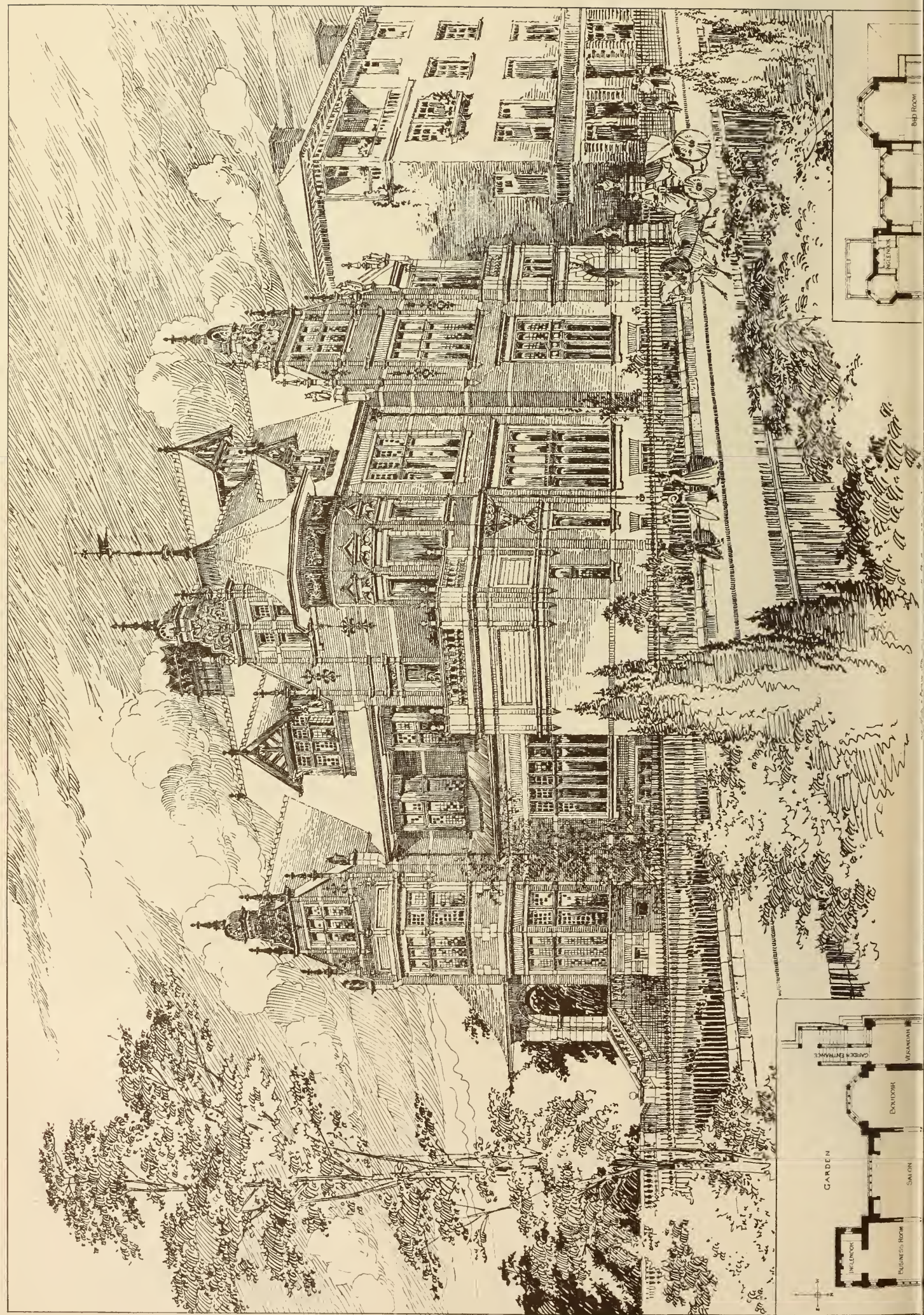
JOHN H. JAMES M.B.A. F.R.S.
ARCHITECT CARDIFF.

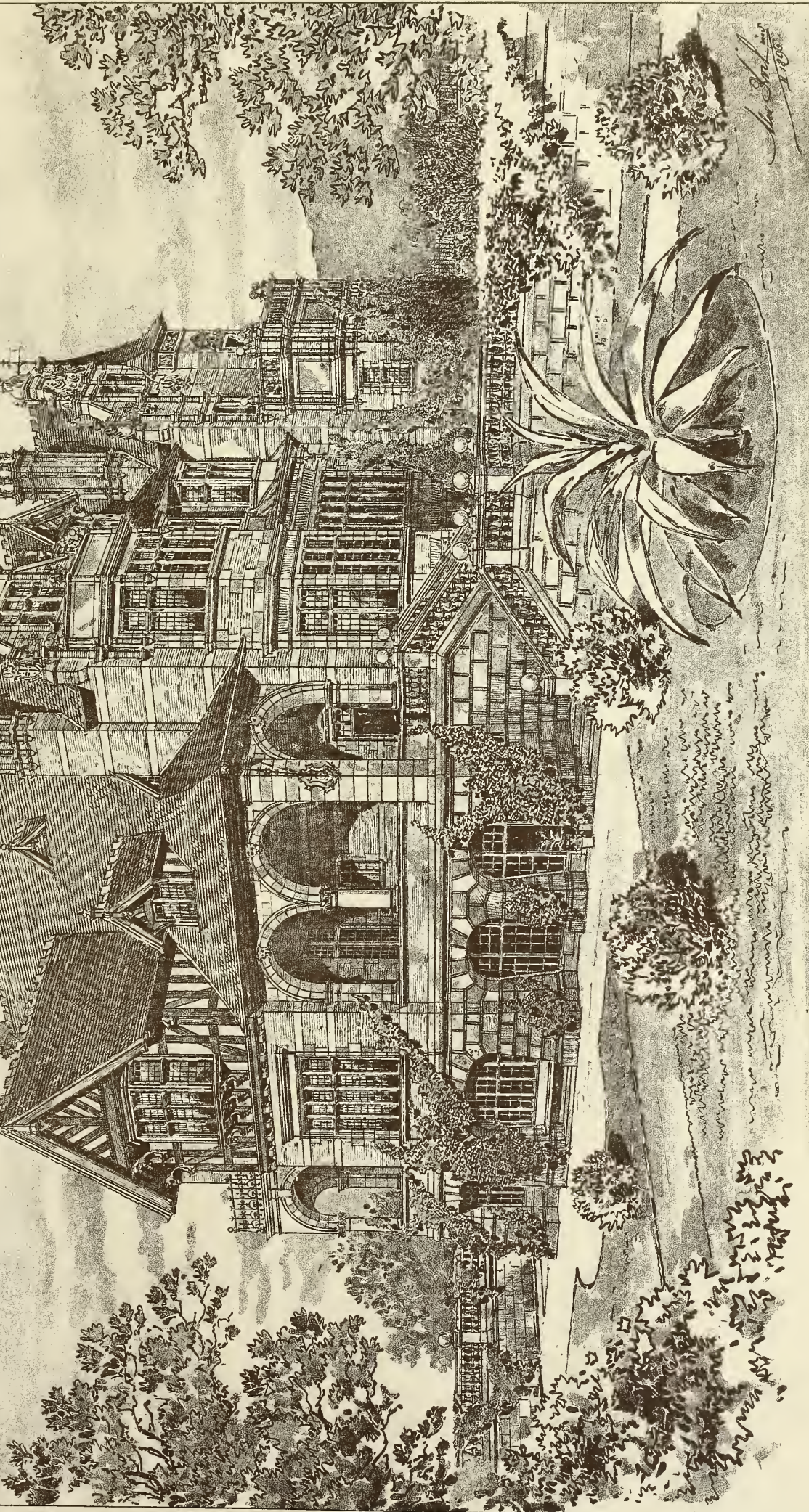
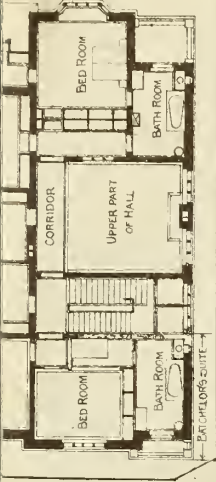
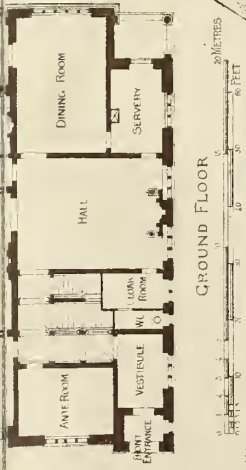
New Offices Route Tenace Cardiff for Cardiff Gas Light and Coke Co.
Scale 0 10 20 30 of feet

GROUND PLAN

SCALE 0 10 20 30 40 50 OF FEET

THE BUILDING JEWS, AUG. 7, 1896.





HOUSE AT ZURICH. ALEX. KOCH, ARCHITECT

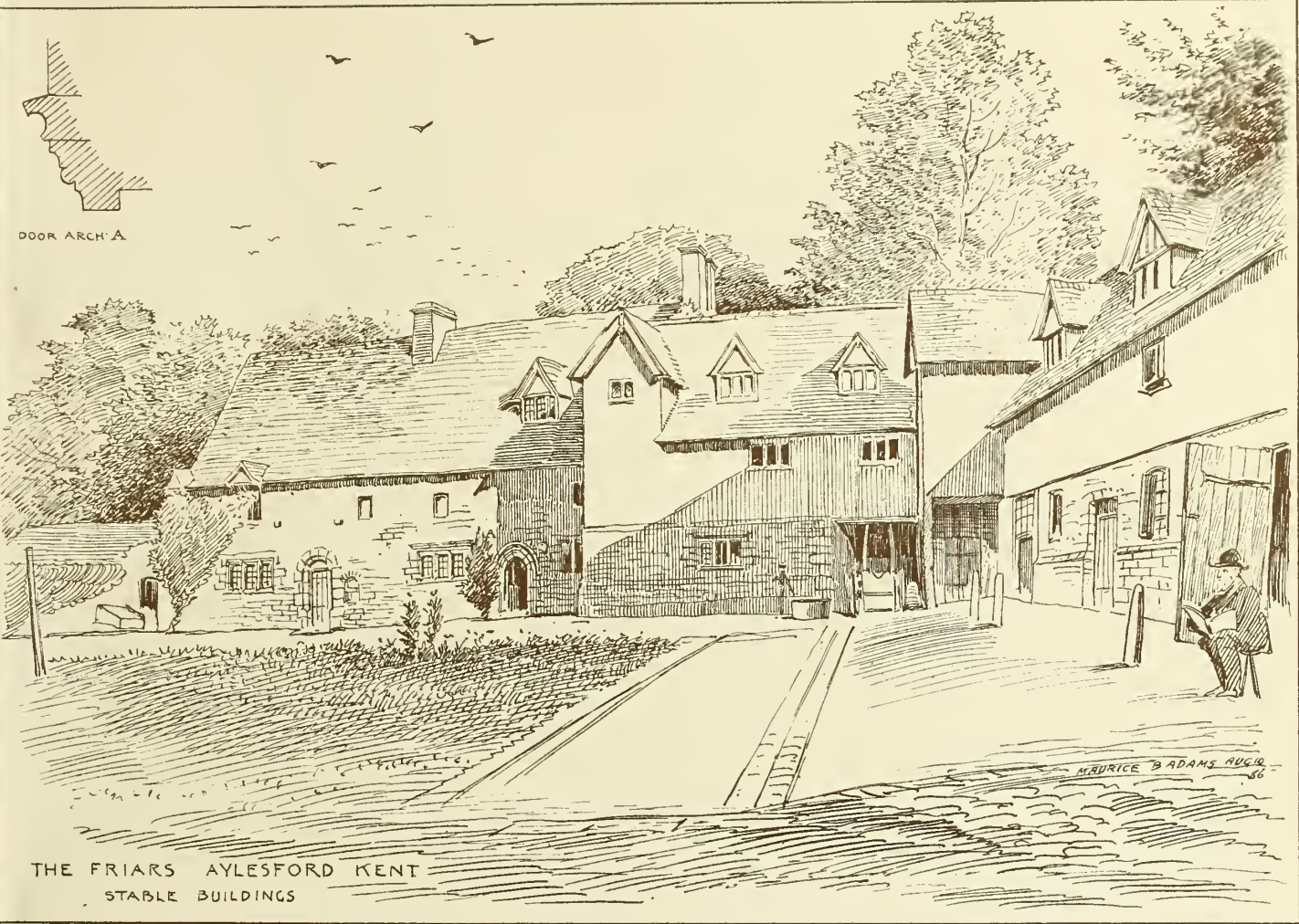
"PHOTO-TINT" by James Abernethy, Queen's Square, London, W.

EAST SUTTON CHURCH KENT



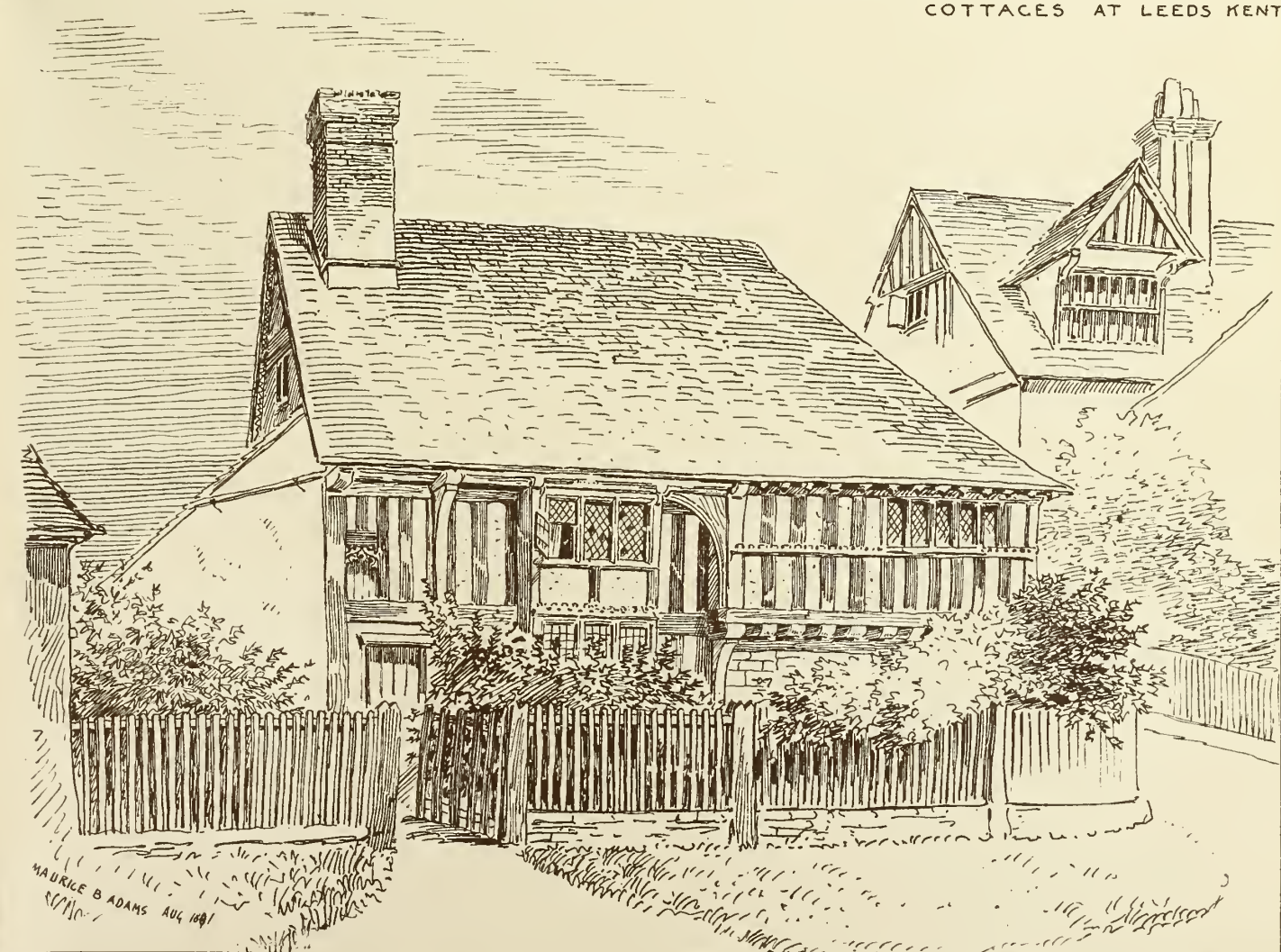
ICHTHAM VILLAGE KENT

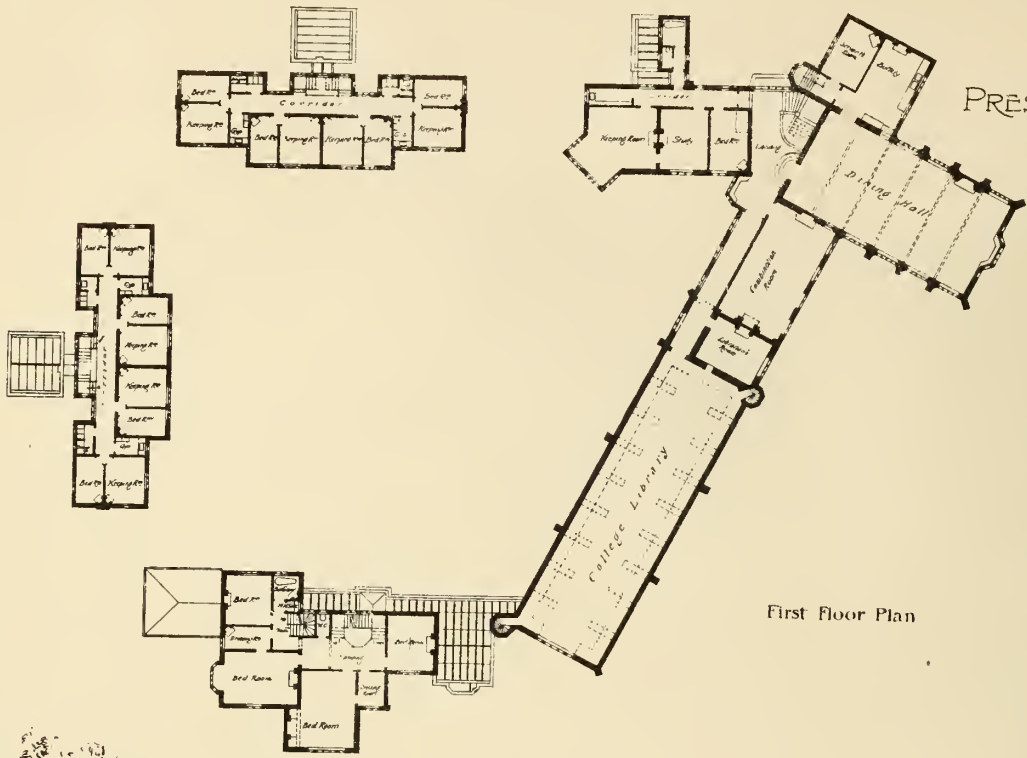
AUG. 7. 1896



THE FRIARS AYLESFORD KENT
STABLE BUILDINGS

COTTAGES AT LEEDS KENT





PRESBYTERIAN THEOLOGICAL

SECOND PREMISES

W. HOWARD SETH-SMITH
& ARTHUR R. G. FENNER

First Floor Plan

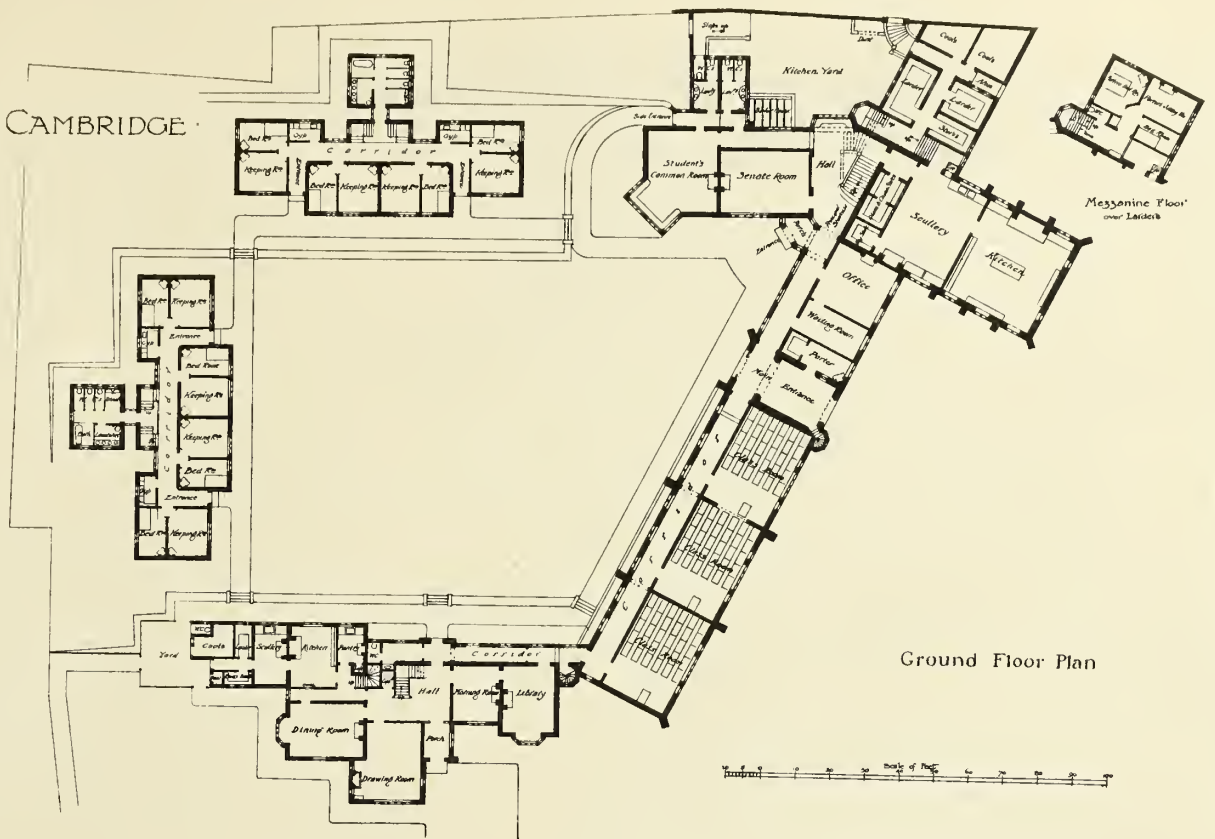


Aug. 7, 1896.

COLLEGE CAMBRIDGE

DESIGN

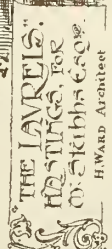
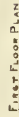
JOINT ARCHTS



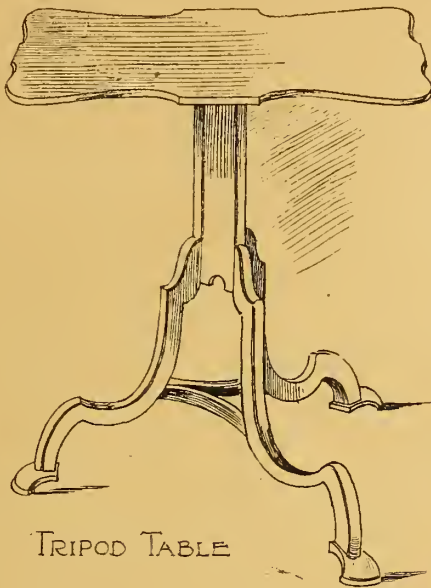
Ground Floor Plan



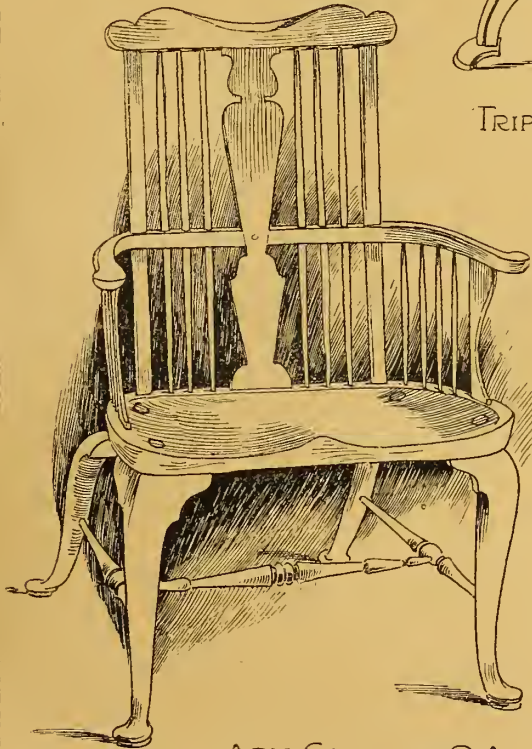
J HATCHARD SMITH ARCHITECT



QUEEN ANNE AND
EARLY GEORGIAN
FURNITURE.

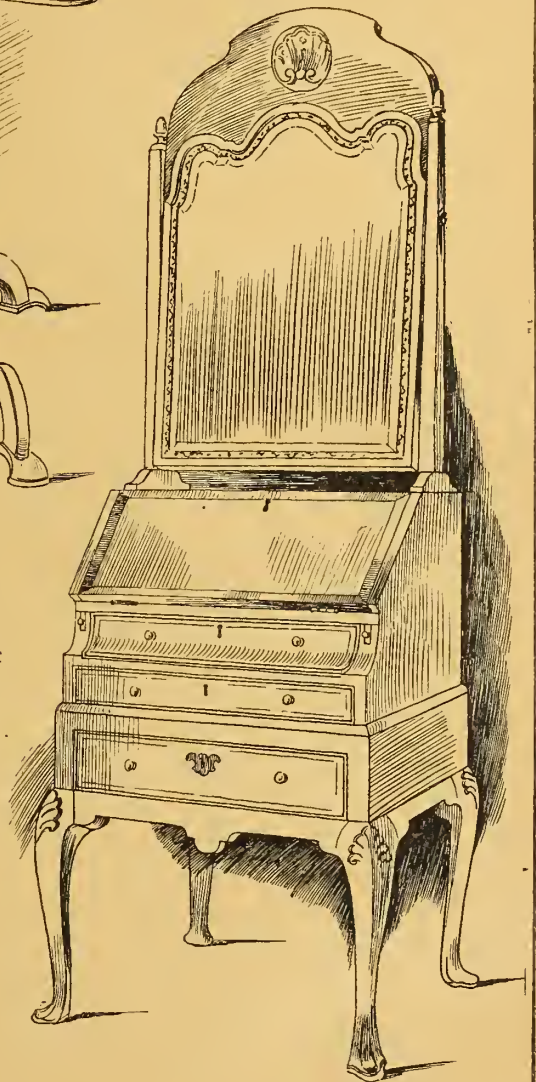


TRIPOD TABLE



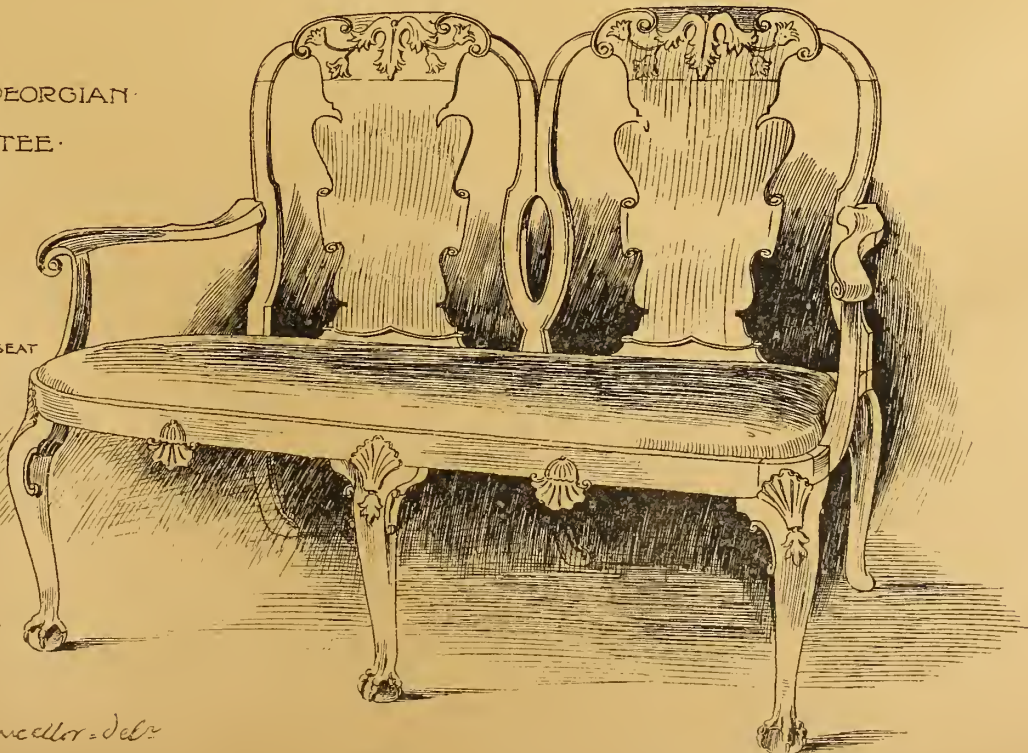
ARM CHAIR OF Q. ANNE PERIOD

GEORGE 1ST
ROSEWOOD
TOILET CHEST



EARLY GEORGIAN
SETTEE.

MADE IN ITALIAN
WALNUT.
WITH BLUE VELVET SEAT



A. Prior Chancellor - del.

OBITUARY.

MR. CLIFTON WILKINSON WHITTENBURY, of the firm of Bird and Whittenbury, architects, Mount-street, Manchester, died at his residence, Meadehurst, Glebelands-road, Prestwich, on Thursday in last week, in his 51st year. He was the younger and only surviving son of Robert Dinwiddie Whittenbury, who occupied for a long time the position of manager and cashier at Messrs. Grant's Square Works, then used as a calico-print works, and who afterwards was estate agent of the Grants, and filled that position till his death.

CHIPS.

In Trinity Episcopal Church, Keith, a memorial three-light stained-glass window has just been erected. The figures represent the Saviour, Moses, and the Apostle Paul. The artists were Messrs. A. Ballantine and Gardiner, Edinburgh.

A stained-glass window has been placed in the chancel of Strensall Church in memory of the Rev. J. Hodgkinson, M.A., the late vicar. The principal figure in the window is that of St. James. The work has been executed by Mr. Knowles, of Stonegate, York.

At New Glamire a new church is being built, from designs by Mr. S. Hynes, of Cork. It will consist of a nave, 102ft. by 22ft. 6in., north and south aisles and sacristy, and accommodation is to be provided for 1,000 persons at a cost of £6,000. Mr. J. J. Coffey, of Middleton, is the contractor, and Mr. Charles O'Toole the clerk of works.

Major-General Crozier, inspector to the Local Government Board, has held an inquiry at Birmingham concerning the application of the Birmingham Tame and Rea District Drainage Board for permission to borrow £11,716, for the purchase of land for the extension of the sewage farm.

Application having been made to the Local Government Board by the Hemel Hempstead District Council for sanction to borrow £200 for works of sewerage within the parish, an inquiry was held by Colonel A. G. Durnford, inspector under the Board, at King's Langley on Friday.

The scheme mooted some time since for rebuilding the grammar school at Ludlow has been abandoned on the score of expense, and the Charity Commissioners have now approved a plan for expending not more than £1,500 in converting the late head-master's house into class-rooms. Mr. John Thompson, of Peterborough, will carry out the work.

The York Consistory Court granted on Friday facilities for the insertion of stained-glass windows in the parish churches of Skelbrooke and Easingwold, and to the rector and churchwardens of Wombwell to take down the nave, aisles, and tower of the present church, and to erect a new nave, aisles, and tower.

A light railway is proposed for a district in Western Essex hitherto unserved. The railway will commence at Elsenham Station, keep south of, but close to, Henham, pass through Chawreth Green, Cutler's Green, and on to Thaxted and Little Bardfield, run by Hawkspr Green, and terminate midway between Great Bardfield and Finchingfield. The distance will be ten miles, and there will be seven sidings. Mr. Hopkins has submitted two estimates, one for a line of the ordinary standard gauge and the other for a 2ft. 6in. gauge. The cost of the 2ft. 6in. gauge is estimated at £25,000, or £2,500 per mile, to include sidings, small goods sheds, platforms, and shelters, and the fencing of the line all through. For the 4ft. 8½in. gauge £500 per mile is added, bringing the cost per mile to £3,000, and the total cost for the line to £30,000.

The Watford Urban District Council having applied to the Local Government Board for sanction to borrow £15,000 for works of sewerage and sewage disposal, to be carried out in accordance with plans by Messrs. Shone and Ault, a local inquiry was held at the Council Chamber, Upton House, by Major-Gen. H. D. Crozier, R.E., an inspector appointed by the Board, on Tuesday week.

The foundation-stone of a new Unionist club for Chester was laid last week. The building, which is situated in Newgate-street, will be Classic in character, and will cost £7,000. It will be faced with Ruabon brick, with stone for dressings, and will cover an area of 54ft. by 145ft. in depth. Messrs. Beswick and Davies, of Chester, are the architects; and Mr. Parrott, of the same city, is the builder.

It has transpired that, at the election of a Royal Academician a fortnight since, two candidates, Mr. Ernest Crofts and Mr. Thomas Graham Jackson, tied at the last ballot, and it devolved on Mr. Calderon, who was in the chair, to give the casting vote, which he did for the senior candidate.

Building Intelligence.

ABERDEEN.—The University Buildings extension sites and plans committee have instructed Mr. A. Marshall Mackenzie, A.R.S.A., their architect, to procure tenders for the construction of a south wing for a distance of 80ft. at a cost of about £11,000. Accommodation will be provided for Natural Philosophy department. The wing will at present end beside Greyfriars Church, and the erection of a terminal tower will afterwards have to be arranged.

CHELTEMHAM.—The town council of Cheltenham discussed at great length on Tuesday the proposal of a committee who recommended, on the advice of Mr. J. M. Brydon, of London, that the ground floor of the Winter Garden be transformed into municipal buildings, that the upper part of the structure (which is a huge glass erection) be converted into a palm-house and orangery, and that the kursaal and baths be erected at the south end of the Winter Garden, the estimated outlay being £18,000. This amount, several members thought, would be inadequate for the purpose of erecting buildings of an attractive appearance, and after lengthy arguments the amount of estimate was struck out, and the committee were empowered to employ an architect to prepare precise plans and elevation, with estimate of cost, for the consideration of the council.

EDINBURGH.—Part of a scheme for the decoration of the chancel of St. James's Episcopal Church, Inverleith-row, Edinburgh, has just been completed. It is the work of Mr. Hole, R.S.A., a member of the congregation, who, on being asked about three years ago for advice on the subject, offered, as a labour of love, to decorate the chancel himself in his spare time. He has diligently plied the brush since then in odd hours, which otherwise would have been devoted to reading or recreation. The part completed is the whole of the north wall of the chancel, the spaces over the arch which separates the chancel from the nave, and those above the great window of the chancel. The method adopted has been the spirit fresco process, and the treatment is in pure flat decoration without high lights, shadows, or perspectives. The second portion of the scheme is to be immediately proceeded with by Mr. Hole.

LEEDS.—The new chapel for the Leeds Clergy School was consecrated on Tuesday. The new building is designed in the 17th-century style, and is built with local bricks, with stone windows and dressings. The barrel ceiling is divided into panels by moulded ribs, the panels being of plaster covered with a vine-leaf enrichment in low relief. There is a clerestory of four three-light windows on each side, a circular window at the west end, and a large five-light window above the altar. The organ will be placed in the gallery over the ante-chapel, which is to be divided from the body of the chapel by an oak screen. The side walls are to be panelled in oak for a height of about 8ft., and a fine oak reredos is in course of construction. The floors are laid with grey and white marble, with marble steps. With the exception of the altar, all the internal fittings are of a temporary nature. The chapel is connected by a corridor with the hall of the clergy school. Mr. T. Hannam, of Leeds, is the contractor, who has carried out the work from designs of Mr. Temple Moore, architect, of Hampstead.

PAISLEY.—The new swimming-pool and Turkish baths which have been added to the corporation baths in Storie-street, at a cost of £8,000, were formally opened last week. The new building is constructed of compressed brick with Giffnock stone facings. The end nearest High-street is two stories in height, and is occupied on the first floor by the entrance passages and offices, and on the second floor by the keeper's house. The pond is 75ft. long by 40ft. broad, and is 8ft. deep at one end, and 4ft. at the other. The walls and bottom have been laid with white tiles bordered with blue. Sprays, foot-baths, wash-basins, and lavatory accommodation have all been provided, and a row of trapeze rings will be fitted up the centre of the building. The dressing-boxes are ranged round three sides of the building, and have been set on wheels, with the object of making them easily removable. A three-tiered gallery runs round the walls, and accommodates 800 people. Four large revolving ventilators and

18 opening windows have been placed on the roof, and four ventilators on the side walls. The Turkish baths consist of five apartments. The Turkish room proper is octagonal shaped, and measures 24ft. on each side: it is paved with encaustic tiles, and has a domed roof. The other chambers are the shampooing, cooling, hot, and Russian bathrooms. It is proposed to remove the office, club-room, and washhouse in connection with the old premises, and to erect 12 hot-water baths in their place, thus bringing the total up to 20. Four hot baths for ladies are at present in course of erection on the west side. The club-room is 27ft. by 24ft., finished in pitch pine, and having a high glass roof. In the rear of the house are the boiler-house and the washing-house. The chimney-stalk stands 100ft. high. Mr. Andrew Stewart has acted as inspector during the building operations, and Mr. J. W. Moncur, master of works, supervised the whole.

SHOOTER'S HILL.—The Metropolitan Asylums Board threw open for inspection on Friday their new fever hospital at Shooter's-hill. The hospital is situated on high ground. It is constructed to hold 488 patients and a staff of 325 persons, and consists of a series of two-storied pavilions built in terraces on the slope of the hill, and connected by roofed but open gangways. The buildings with their appurtenances and connections cover 21 acres; but the site contains eight additional acres, which could be used for temporary purposes during severe epidemics. There are twelve men's ward pavilions, each two stories in height, with an open space beneath the ground floor. The eight wards for scarlet fever each contain 20 beds, and are 120ft. long; while the four other wards for enteric cases contain 12 beds, and are 120ft. in length. All the wards are 13ft. in height and 26ft. in breadth. The floors are of teak, and the walls are plastered with Keene's cement. All internal angles are rounded, and the internal faces of the window frames are flush with the face of wall. The ward windows consist of double-hung sashes to three-fourths the height, the remaining portion being a hopper-hung fanlight, hung to open inwards, with hopper checks going up to ceiling. These windows extend from 2ft. 6in. above the floor up to close under the ceiling. The lower sashes are glazed with plate-glass, and the upper ones are double glazed with sheet-glass. The ward furniture is of solid birch throughout except the table-tops, which are of American maple-wood. There are six isolation pavilions, two containing four single-bed wards each, and four having each one ward for four beds. The building contractors employed upon the works were Mr. C. Wall, of Chelsea (who had five-sixths of the whole); Messrs. H. Wall and Co., of Kentish Town; and Messrs. Shillitoe and Son, of Bury St. Edmund's. The heating apparatus, hot-water supplies, and boiler-house fittings were supplied by Messrs. Benham and Sons; the laundry machinery by Messrs. J. and F. May; the external water, steam, and gas mains by Messrs. Sugg; the ventilating radiators and cases by Messrs. W. G. Cannon and Son; the joiners' fittings by Messrs. Norris and Son, of Sunningdale; the electric-lighting dynamos by Messrs. Siemens; and the wiring and fittings by Messrs. Julius Sax and Co. Mr. Thomas W. Aldwinckle, F.R.I.B.A., is the architect. Mr. E. T. Larkin has acted as chief clerk of works.

St. James's Church, Burnley, has just been enriched by the addition of a two-light stained-glass window (erected by Messrs. Jones and Willis), having "Dorcas, the Good Woman of Joppa," as the subject, she being represented in the act of clothing the poor.

A report has been submitted to the vicar and wardens of the Middleton parish church, near Manchester, by Mr. G. F. Bodley, of Messrs. Bodley and Garner, ecclesiastical architects, of London, on the proposed restoration of the ancient fabric. The report has been adopted.

At a meeting of the Newcastle-on-Tyne Town Improvement Committee, held on Wednesday week, the vendors' plans for the new West Jesmond estate, were finally approved. The land to be developed lies on the east and west side of the railway, and faces the Town Moor on the latter side, access to which is to be by means of a new 40ft. road. A new railway station is also a part of the scheme, and a large main sewer is now in course of construction under the superintendence of Mr. Laws, the city engineer of Newcastle. The portion approved embraces upwards of 400 houses, and the architect is Mr. Charles S. Errington, A.R.I.B.A., Victoria Buildings, Grainger-street West, Newcastle.



FIG. 12.—Ground Floor Plan.



FIG. 13.—First Floor Plan.



FIG. 14.—Ground Floor Plan.

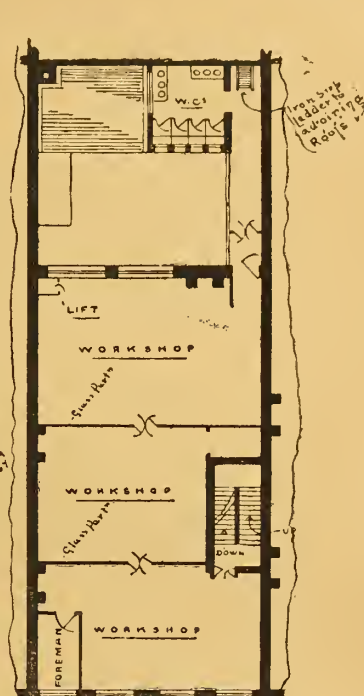


FIG. 15.—First Floor Plan.

FACTORY CONSTRUCTION AND FACTORY ACTS.—VI.

By GEORGE H. BIBBY, F.R.I.B.A.

PLANNING.

SHOULD any sanitary authority, after causing a survey and inspection to be made of any factory or workshop, be of opinion that structural alterations or additions should be made thereto, with the view of providing sufficient means of exit on the upper floors for the workpeople therein employed, and should a difference of opinion arise between the owner of the factory and the sanitary authority, the difference may, on the application of either party, be referred to arbitration; and if the owner alleges that the occupier of the factory ought to bear or contribute to the expenses of complying with the requirements, he may apply to the county court having jurisdiction where the factory is situate, and thereupon the county court, after hearing the occupier, may make such order as appears to the court just and equitable under all the circumstances of the case.

Such a difference of opinion, for instance, might arise in respect of the ground and first-floor arrangements of the factory shown in Figs. 12 and 13, where the means of exit are obviously insufficient and badly arranged, and which, the sanitary authority may be of opinion, should be improved as shown in Figs. 14 and 15, and while the sanitary authority would be well justified in condemning the plans shown on Figs. 12 and 13, yet the owner, on the other hand, might reasonably point out that the proposed new staircases would not be, for various reasons, convenient for the purposes of his manufacture; that the staircase, although protected by brick walls on all sides from risk of fire, would be so placed that he would have to use artificial light there during the day-time, or that costly machinery would have to be removed or disorganised to make space for the proposed staircase; or the owner might advance the theory that if the public authorities were not satisfied with his factory that the expenses of the alterations advised or required should be made at the public cost (regardless of the probability that other factory owners who had provided good exits to their well-arranged factories, would, as ratepayers, naturally be disinclined to admit the justice of the suggestion).

To secure that the provisions of the Factory and Workshop Acts of 1891 and 1895, shall be complied with, the course to be pursued by the sanitary authority of any district appears to be, in the first instance, to direct a survey by a thoroughly competent surveyor, possessing not only considerable architectural experience, but also an intimate acquaintance with machinery, and a very good knowledge of the dangers to be avoided in the event of a fire or

panic, and a capability for suggesting those means of escape which in each case might be reasonably required; plans of the factories and workshops would usually be required, and when a factory is found with obviously insufficient means of escape for the workpeople, it appears to be only just that the cost of those plans, as well as of all architectural works connected with the alterations, should be borne by the owner, who in bad cases might not unfairly have been charged with the cost of the survey of his factory by the officials of the sanitary authorities, whose expenses in these matters are at present defrayed as expenses incurred in the execution of the Public Health Act, 1875, as regards the provinces, and, as specially provided for, in the County of London.

When the sanitary authorities, after due consideration, have come to the conclusion, from the evidence of their surveyors, and the plans and reports before them, that any factory or workshop within the district is improperly constructed as regards exit doors, staircases, and other matters, the next course to pursue is to serve on the person (being within the meaning of the Public Health Act, 1875, the owner of the factory) a notice in writing specifying the measures necessary for providing such means of escape as the sanitary authority may consider necessary, and requiring him to carry out the same before a specified date, and thereupon such owner, notwithstanding any agreement with the occupier, would have power to take such steps as are necessary for complying with the requirements, and unless such requirements are so complied with, such owner will be liable to a fine.

Under no circumstances should the storage of petroleum and other dangerous matters be permitted under or near to staircases or exits. In some establishments dangerous oils are stored in tanks below the level of the ground, and are pumped from thence by means of a pump placed in a room or closet built of brick and detached from the main buildings. The oils are then conveyed by hand, and distributed to the workpeople requiring them, in the smallest quantities that can be conveniently arranged for.

A further precaution in reference to rooms or places where dangerous oils and other matters likely to assist in the spread of fire may be stored or used, is to avoid, if practicable (at those points), the use of any fans driven by steam or electric power. These, however desirable in some portions of factories and workshops, might act upon the occasion of a fire with bad results. In a factory or workshop, where grinding, glazing, or polishing on a wheel, or any process is carried on by which dust is generated and inhaled by the workers to an injurious extent, if it appears to an inspector that such inhalation could be to a great extent prevented by the use of a fan or other mechanical means, the inspector may direct that

such means, of a proper construction, be provided within a reasonable time; and if these are not so provided, the factory or workshop will be deemed not to be kept in conformity with the Factory and Workshop Acts.

(To be continued.)

THE ANCIENT IRON INDUSTRY OF SUSSEX.

MR. SIDNEY H. HOLLANDS, in the *Anti-quary*, says:—The modern ironmaster from the Midland or the Northern "black country" travelling South through Sussex to Brighton, Eastbourne, or Hastings, on the coast, or to any of the numerous inland health-giving Sussex towns to recuperate, is seldom aware, perhaps, that in this county he is in the ancient home of the iron-mine, the blast-furnace, the foundry, and the forge; that he is travelling over soils still richly ferruginous; that the long-famed medicinal waters of Tunbridge Wells on the Sussex border derive their chalybeate properties from those now abandoned beds and strata of iron-ore;* and that the surrounding peaceful and pastoral country was—little more than a century ago—a pandemonium of fiery industry, while the now-teeming iron-smelting works of Cleveland, Lancashire, and Wales were in a very infantile stage, and remarkably few in number. For the Sussex furnaces the fuel was grown and made in the county, giving a livelihood to numerous charcoal-burners. Here the ore was dug and smelted; and here the iron was manufactured, both forged and cast, in a district where the only forge now to be found is that of the humble and harmless, but necessary, village blacksmith. The environs of the Sussex villages, Ashburnham, Ardingly, Mayfield, Framfield, Heathfield, Maresfield, Waldron, Robertsbridge, Buxted, Lamberhurst, Cowden (on the Kentish border), and of the towns, East Grinstead, Hailsham, Hastings, Lewes, Battle, Three Bridges, Hayward's Heath, and others, all now more or less given up to the incidents of agricultural life, were then devoted to the production and manufacture of iron, abounding with "hammers" and furnaces.

The earliest authentic record we have seemingly of this industry in Sussex was in the 13th century, in which it is stated that in 1290 a payment was made—to one Master Henry of Lewes—for the ironwork of the monument of Henry III. in Westminster Abbey. Some years previously this same "Master Henry" had supplied ironwork for the King's chamber, wrought of Sussex iron at Lewes. According to Camden, "Sussex is full of iron mines everywhere, for the casting of which there are furnaces up and down the country (county), and abundance of wood is yearly spent (for fuel), many streams of water are drawn into one channel, and a great deal of meadow-land is turned into ponds, for the driving of mills, which, beating with hammers upon the iron, fill the neigh-

* Dr. Babington's analysis of this mineral water showed the presence of 1.25 per cent. of oxide of iron.

† It is known, however, that the Romans smelted iron in Sussex under the governorship of Agricola.

bourhood night and day with their noise. In an inventory taken of the possessions of the Lord High Admiral Seymour on his impeachment for high treason (temp. Edward VI.) are included a number of "furnaces" and "forges" owned by him in the Forest of Worth, North Sussex, with the number of men who worked them. These latter—in the archaic spelling which characterises the whole of this curious inventory—are described respectively as "Coleyers," "Fflyers," "Gon-founders," founders and miners.

Early in the sixteenth century the iron copings of old Rochester Bridge were cast at the Mayfield Furnace, and were presented to the city by Archbishop Warham of Canterbury. This picturesque old bridge, with its numerous pointed arches, has long departed. The first maker of cannon in Sussex was John Owen in 1535. Soon after him came Peter Baude and Ralph Hoge, who, in 1543, cast at their foundry at Buxted a curious triple cannon for Henry VIII., which is now to be seen at the Tower of London. The ancient residence of Ralph Hoge still stands at Buxted, and is known locally as the "Hog House," bearing a rude carving of the unclean animal on the front as a rebus on the original owner's name. It was from the Sussex furnaces that the armament was cast—both cannon and shot—for the use of the sturdy fleet of Elizabeth against the so-called invincible Armada of Spain, to their wholesome discomfiture. Seventy years or so later these Southern furnaces supplied the second Charles with cannon and shot in the troublous times when Prince Rupert, the Duke of York, and Admiral Monk thundered day after day against the fleets of the old Dutch admirals, Van Tromp and De Ruyter, sinking some of their ships in the Medway. Early in Elizabeth's reign* (about 1560) there were in one limited district alone—viz., the Manor of Framfield—two blast-furnaces and one forge.

CHIPS.

It is proposed to construct a girder highway-bridge over the Wansbeck at Stokeford, near Bedlington, to replace a dangerous existing ford. Mr. D. Balfour, of Houghton-le-Spring and Newcastle, is the engineer.

The Leopold Institute at Slough was reopened last week after renovation, repair, and redecoration, a work carried out by Mr. G. W. Bennett, of William-street, in that town.

The House of Lords, in an appeal by the Corporation of Manchester, decided on Monday that free public libraries are exempt from Income-tax assessment, being "literary institutions" within the meaning of the Income-tax Act, 1842. The Lord Chancellor differed from the majority of the judges.

Various alterations are in progress at the work-house at West End, Southampton, for the South Stoneham Board of Guardians. Messrs. Mitchell, Son, and Gutteridge, of Southampton, are the architects, and Mr. Rashley the contractor.

A new country police-station is approaching completion at Herne Bay, and will be occupied early in September. It has been built from plans by Mr. F. W. Ruch, county surveyor for Kent, Mr. T. W. Porter being the contractor.

The town council of Wrexham have instructed Mr. T. Lockwood, architect, Chester, to draw up a special report and survey of the Willow Brewery property (as offered for sale to the corporation at the price of £8,000) for the consideration of the council, with a plan to show his views of the adaptability of the whole of the property for the various purposes contemplated by the town council, including space and sites which could be appropriated for electric lighting installation station and plant, a public swimming bath, with caretaker's dwelling, gymnasium, public room for meetings, and stables for corporation horses.

The Wolverhampton Town Council received on Tuesday a report from the general purposes committee relative to the decay of the stonework at the Art Gallery and School of Art. According to a report of the borough surveyor, the stonework of the building, which was erected during the years from 1882 to 1884, is an oolitic limestone from the Bath stone quarries, and is now badly decayed and crumbling away. He recommended that the work of renovation, estimated to cost £392, should be commenced at once, as if the stonework was allowed to remain in its present condition through another winter the damage done might be very serious. The borough surveyor suggested that the stonework should be washed over with a preservative solution, which would become as hard as the hardest stone, and prevent further expense. The motion was agreed to.

TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. All communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondents.]

It is particularly requested that all drawings and all communications respecting illustrations or literary matter should be addressed to the EDITOR of the BUILDING NEWS, 332, Strand, W.C., and not to members of the staff by name. Delay is not unfrequently otherwise caused. All drawings and other communications are sent at contributors' risks, and the Editor will not undertake to pay for, or be liable for, unsought contributions.

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The charge for advertisements for "Situations Vacant" or "Situations Wanted" is ONE SHILLING FOR TWENTY-FOUR WORDS, and Sixpence for every eight words after. All Situation Advertisements must be prepaid.

NOTICE.

Bound copies of Vol. LXIX. are now ready, and should be ordered early (price Twelve Shillings each), as only a limited number are done up. A few bound volumes of Vols. XXXIX., XL., XLI., XLVI., XLIX., LI., LIII., LIV., LVIII., LX., LXI., LXII., LXIII., LXIV., LXV., LXVI., LXVII., LXVIII. may still be had, price Twelve Shillings; all the other bound volumes are out of print. Most of the back numbers of former volumes are, however, to be had singly. Subscribers requiring any back numbers to complete volume just ended should order at once, as many of them soon run out of print.

RECEIVED.—Chas. F. Downes.—C. H. and Co.—W. E. P.—L. R. (Chester).—M. E. L. and Co.—F. J. S.

Correspondence.

SOME ECCENTRICITIES OF GENIUS.

To the Editor of the BUILDING NEWS.

SIR,—The editor of the *Builder* is so fond of setting other people right in his guileless way, that I hope you will give me an opportunity of calling attention to one or two egregious blunders which have appeared recently in the pages of the journal he conducts.

In the issue for July 18, p. 50, it is stated that the meeting of the Society for the Protection of Ancient Buildings was held "in the rooms of the Society of Antiquarians [*sic*], Burlington House," and on p. 52 of the same number, Mr. Somers Clarke is reported to have made the extraordinary announcement that "Centuries and persecution have induced the Cops [*sic*] to conceal the churches as far as possible from the outer world." Again, in the *Builder* for August 1, p. 94, Mr. G. E. Fox is said to have read a paper on the Roman Fortresses in Kent "at Reculver, Richborough, and Lympne [*sic*]"; and on p. 101, the Cambrian Archeological Association is called the "Cambrian Archeological Society [*sic*]."

To make use of the term "antiquarian" at all is bad enough in all conscience; but for a newspaper man of any pretensions to education to call one of the leading scientific bodies in London the "Society of Antiquarians" is, like "Charley's Aunt," enough to make a cat laugh. How would the *Builder*, for instance, like to be addressed as the "Buildist"? Or how would it do to speak of the Royal Welsh Fusilierians?

With regard to the poor Cops (whoever they may be), I think they are quite right to conceal themselves as much as possible from the outer world, lest the *Builder's* reporter should attempt to dig them up.

The Roman fortress of Lympne pleases us

muchly; but we should like to know whether the word rhymes with "trombone" or with "symphony."

Lately the editor of the *Builder* has, with characteristic modesty, taken to printing his own opinions in unnecessarily large type, and those of his contributors and others in correspondingly small type. The leading article in the number for August 1, entitled "Among Dykes and Deserted Churches," might, with greater appropriateness, have been headed "The Amateur Sanitary Inspector at the Seaside." The author of this article is just the sort of cheery individual who would smell smells even when visiting the Parthenon for the first time, and would certainly call on the sanitary authority to know if the drains were in order, and, as at Southwold, would no doubt equally certainly find him "not at home."

—I am, &c.,

J. ROMILLY ALLEN.

28, Great Ormond-street, W.C., Aug. 3.

FROM THE BATTLE-FIELD.

SIR,—Despite the fact that it is wise sometimes to suffer uncomplainingly, yet there comes a time when such a course is not only *unwise*, but absolutely wrong. Therefore, if any excuse be necessary for the following statement, let that excuse be mine.

Surely the architectural profession, I cannot refrain from saying, stands alone among the professions as an example of unsympathetic and non-cohesive atomic membership!

It is my lot to be in practice in a certain well-known town, and having recently had that sad experience of that greatest bereavement that can come to man—the death of a dear and talented young wife—I can speak with no uncertain tongue of the utter want of that brotherly feeling which, be it said to their credit, I know exists in other professions.

For months it was my bounden duty to watch by the sick-bed of my dear one; and the loss of rest, combined with the tremendous strain in other ways, incapacitated me for some length of time. This was well known to the other members of the profession in the town, and not one of them volunteered to help me with my work.

It cannot be suggested that they were afraid of offering help lest I should think they wished to supplant me, for indeed one or two of them seized upon the time when I was in the deepest trouble as a convenient one to give me a "help" in the wrong direction.

To one in particular (and *he* one to whom I looked as a man above such a mean action) am I indebted for as gross a breach of professional etiquette as it is possible to conceive—one which, I think, when it becomes known to the thoughtful members of the profession, will force upon them the great necessity of governing the entrance to, and of sustaining by proper means the future dignity of, the profession and practice of architecture.

One has not to look far for the reason why many people point the finger of scorn at the profession when some of its members are guilty of acts more typical of the ravenous propensities of the hyena or wolf!

After a somewhat lengthy experience, I am sorry to say I have found a greater moral obliquity in many practitioners I have come in contact with than I could have imagined possible. When one is assured by men of position that "There are many things that builders do it is as well to wink at," no wonder, I say, that the public generally are losing confidence in the profession: it is inevitable.

Then the matter of illicit commissions—I see the members of the R.I.B.A. have been discussing it—needs urgent and drastic action, and I am strongly of opinion that the receipt of any such commission should be made a penal offence. Again and again I have been offered commissions by different firms, and, upon my refusing to accept, I have been told, "Why, all the others have it." A man who receives a 5 per cent. or more from manufacturers can well afford to work for 2½ per cent. to be paid by his client. I do not mince matters!

Whatever else an architect may be, he should be upright and honourable, and above all such pilferings as those to which I have alluded. There are many temptations in his path—many threatnings breathed upon him if he dares to do right, and there is no use disputing the fact.

One has only to call to mind many incidents that have occurred all over the country, to see with distinctness that unless a strong and deter-

* The industry reached its height towards the close of this reign, when it became so prosperous that instead of importing iron it was exported in considerable quantities in the shape of ordnance to Spain and elsewhere. At this time the weight of some of the Sussex cannon exceeded three tons each.

mined stand be made by the members of our profession, they will simply become mere machines for drawing designs, instead of active spirits having control over the erection of the buildings themselves.

During the last few months I have had a somewhat lively experience of the attempted "persuasive" (otherwise coercive) efforts of a rather violent-tempered builder, who, when I objected to certain inferior work and unjust charges in the accounts, threatened untold things to be done to my anatomy, and would actually have assaulted me had he not been prevented. Truly, one's path of duty is not always a smooth one.

These experiences of mine, during a period when I felt sorely the need of brotherly support and sympathy, have indicated to me very clearly indeed the—dare I say it?—lamentable core-rotteness of the profession, its lack of sympathy, and its brutal selfishness—traits that would disgrace anyone or anything.

Nothing is to be gained by "hushing up." There needs a thorough purging of the profession, and, to my idea, the best means of celebrating the longest reign (about which we are now hearing so much) would be to form such an association of architects that all proceedings of the kind it has been my painful task to mention would be firmly dealt with; and one could think with pride that to belong to such an association would be a great honour—indeed, more honourable than "many tails."—I am, &c.,

VIDE ET CREDE.

THE "R.I.B.A."

SIR,—Referring to the meeting of the Fellows and Associates of this Institution on the 27th ult., and the remarks made thereat, and your pertinent comments thereon in your issue of the 31st ult. regarding the acceptance of illicit commissions, the writer could not but be struck with the eloquent, able, and cogent applicability of the discourse that was delivered by Canon Wilberforce on Sunday morning last at Westminster Abbey, on the subject of the Parable of the Unjust Steward, St. Luke xvi. 9—"And I say unto you, Make to yourselves friends of the mammon of unrighteousness, that when ye fail they may receive you into everlasting habitations"; and though the preacher's remarks were pointedly made against land-agents in particular, still, from some very pertinent deductions, possibly he had this Institute in his mind also, as it is somewhat singular that they were so applicable to it, and coming as they did on the Sunday following that of the meeting of the R.I.B.A., and the comments thereon in your issue of the 31st ult. Be this as it may, it was, to the writer's mind, a somewhat singular coincidence. Assuming the accuracy of the accusations, or a tittle of what are reported, as to some of the Fellows and Associates, of the Institute to be true, as to their receiving illicit commission (and which legitimately belongs to their clients), they do not even in the manner of the Unjust Steward make themselves friends with the mammon of unrighteousness, as referred to in the text. Would it not be well, for the sake of the profession in general, and of the Institute in particular, for the latter, without delay, to issue a written affirmation, signed individually by its Fellows and Associates, that they have not at any time taken, nor will in the future take, illicit commissions from tradesmen, surveyors, and others, and thus remove the stigma at present lying upon the Royal Institute of British Architects as a body, and upon the innocent as well as the guilty? And the sooner this is done the better, if it is desired that the Royal charter under whose cloak they are so acting be no longer tarnished by such accusations if they are not true; and, further, why does not the Institute take the lead, and purify the profession generally (and the noble art of architecture) by proteeting them with an Architects' Registration Bill of some kind or another? and at the same time protect the profession from encroachments that are being made upon it by auctioneers, estate agents, and such-like, who naturally look to their commission rather than to their qualifications for practising, as does—

AN ARCHITECT.

A CORRECTION.

SIR,—In your report on the proceedings of the meeting at the R.I.B.A. on Monday, July 26th, you state, "Colonel Edis favoured the meeting, &c.," whatever this may mean. Will you be good enough to allow me to state that I was not

present at the meeting in question, and therefore could not possibly have taken part in the discussion?—I am, &c.,

ROBERT W. EDIS, F.S.A.

14, Fitzroy-square, W., Aug. 4.

[This is one of the evil consequences of the exclusion of reporters by the Institute. We have to depend on members for information, and were informed by a Fellow that Col. Edis was present and spoke. We apologise to Col. Edis for being misinformed.—ED.]

Intercommunication.

QUESTIONS.

[11534].—**Cleaning Old Stonework.**—Twenty-two years ago Hanover Chapel was cleaned down successfully by the French steam-jet process, patented in Paris by M. Nivet, and the work was carried out under the direction of Mr. Edward C. Robins, by Mr. Whitehead. I am now wanting to use the same method to clean down a Portland stone façade in London, and am unable to find out particulars other than those published at the time, which are hardly sufficient. Can any of the readers of the BUILDING NEWS furnish me with information as to price, or would Mr. Whitehead oblige with his address? The knowledge I am seeking would no doubt be useful to many others like myself. Hanover Chapel, now in process of demolition, was fronted in Bath stone.—F.R.I.B.A.

[11535].—**Styles.**—Will "F. J. W." or someone inform me of any work, either in loose sheets or other form, suitable for teaching a class in the styles of architecture, as forming a part of the Honours course in Building Construction, and very greatly oblige?—SLICING.

[11536].—**New Baths at Walsall.**—In your issue of the 25th ult. you published the ground plan of the new baths at Walsall, upon which you have a few remarks to make. The arrangements appear to me, as remarked by you, to be very good; but when I looked for dressing-rooms or boxes for persons using the Turkish baths I could not find same. I should very much like to know where they are, if it is proposed to have any. Can the architect inform us?—W. H. E.

[11537].—**Snails.**—In a kitchen recently formed out of a scullery we are troubled with a plague of snails behind the cupboards. I shall be glad if any of your readers will suggest a remedy.—N. H. H.

STATUES, MEMORIALS, &c.

CHICHESTER CATHEDRAL.—The design for the memorial to the late Bishop, Dr. Durnford, prepared by Messrs. Bodley and Garner, has been provisionally approved by the executive committee, and the Dean and Canons Residentiary have since given the necessary sanction both for the site and design recommended by the committee. The execution of the design will be placed in the hands of Messrs. Farmer and Brindley. The estimated cost of the monument, including the honorarium for the design, is £2,000. The monument will be erected under the easternmost arch of the south-east chapel of the nave, between the chapel and the south aisle. It will consist of an altar tomb of eluneh stone, having squared tracery panels divided by panelled niches of Purbeck marble containing shields bearing emblems of the Passion. The tomb will have a moulded base and slab of Purbeck marble, and upon the slab will be a recumbent effigy of the Bishop in Episcopal habit, executed in alabaster. Above this will be a rich canopy of eluneh, consisting of cusped arches and groining, supported at the ends by shafts and in the centre by pendants carved with angels. Each end of the tomb will have a traceried panel partly pierced, and having a small niche and figure of St. Richard at one end and of St. Wilfrid at the other. The whole canopy will be crowned with a carved cresting and pinnacles. The length of the tomb will be 7ft. 6in., and the width 3ft. 6in. The height will be about 11ft. or 12ft. The spaces left at each end of the tomb will be filled in by a light screen work of eluneh; the lights being filled in with iron-work. This screen work will be about 2ft. lower than the tomb.

The new Technical School and Free Library, built by the Corporation of Widnes, were opened on Friday by the Earl of Derby. The building, which has cost £11,000, is in keeping with the town hall and other adjacent structures. The elevations are faced with Ruabon bricks, with dressings in terracotta. There are two main entrances, one to the library and another to the technical school, both in the principal façade. The whole of the work has been carried out by Mr. I. Dilworth, Liverpool, from the designs of Messrs. Woodhouse and Willoughby, Manchester.

An effort is being made to raise £5,000 for the building of a county museum at St. Alban's, a site for which on the Hatfield-road has been given by Earl Spencer. The institution is to consist of four departments—natural history, geology, archaeology, and arts and crafts, and the nucleus of a collection already exists, and is exhibited in two rooms in the market-place of St. Alban's.

Legal.

COVENANT TO REPAIR.

AN under-lessee is bound to fulfil his covenant to repair, or pay damages for the breach, although it may be pretty well certain that the freeholder will, at the end of the term, pull down the premises and use the land for other purposes. This is the short result of the very important case of "Conquest v. Ebbetts" (*Times*, Aug. 1), just decided in the House of Lords. The action arose out of the Grecian Theatre in the City-road. The original lease of premises was granted for sixty-one years, from 1837 to one Rouse, who in 1857 granted an underlease to one Oliver for the rest of the term, less the last ten days! This underlease, of course, contained the same covenants to repair as did the lease itself. Conquest had assigned the underlease to General Booth, and the place was used for the Salvation Army. The action was brought by those representing the under-lessor as plaintiffs, and Conquest and Booth, successors of the under-lessees, as defendants, for damages for breach of the covenant to repair. The real point at issue was the principle upon which these damages were to be estimated and calculated.

For the plaintiffs it was contended that the proper measure of damages was the sum it would cost to put the premises in proper repair according to the covenant, with the allowance of a discount for the three years or so which the term had still to run; and upon this basis it was agreed that the sum would be £1,305. For the defendants it was argued, on the other hand, that the true test was the amount of depreciation to the value of the reversion caused by the breach of covenant to repair. They declared that at the end of the term the buildings would be of little or no use, and that the owner would pull them down. Therefore they maintained that the proper measure of damages was the difference between the selling value of the buildings as materials as they now stood, and what would have been their value after the repairs were executed, and this came to about £200. The House of Lords, however, supported the view taken by both Courts below, and dismissed the defendant's appeal. They declined to go into a speculation as to what the owner of the freehold would do with his property at the end of the term. They held that the plain duty of the defendants as under-lessees was to fulfil their covenant to repair, and had they done so the dispute would not have arisen, and as between themselves and the plaintiffs the measure of damages was the cost of such repairs, with the discount as allowed, or £1,305.

FRED. WETHERFIELD, Solicitor.

1, Gresham Buildings, Guildhall, E.C.

NOTE.—All questions for reply in this column must be headed "BUILDING NEWS," and must reach my offices, as above, by *Tuesday morning* to insure answer same week.

J. H. W.—LANDLORD AND TENANT.—DISUSED PIPE.—If it is clear that the landlord knew of this pipe when he let the house, and that the tenant could not with ordinary precaution see it, he might be made responsible for the damage; or otherwise he would not be liable.

T. L.—SHEDS.—The regulations differ in different localities. If such a shed as you propose to erect were erected in London, the Building Act would apply, and it could be assessed to rates and taxes.

LEGAL INTELLIGENCE.

THE NATIONAL OPALITE GLAZED BRICK AND TILE SYNDICATE (LIMITED) v. THE CERALITE SYNDICATE (LIMITED).—The plaintiffs in this action, tried on Wednesday before Mr. Justice Grantham, without a jury, are the registered legal owners of Letters Patent No. 13583 of the year 1892, granted to Carl Lewy for an invention of an "improved method and means for securing glass plates to walls, ceilings, and the like," and of Letters Patent No. 12472 of the year 1893, granted to Anthony Shelmerdine for an invention of improved or improvements in connection with fancy or ornamental bricks, tiles, slabs, wallings, ceilings, and the like. They claimed damages for infringement and an injunction. The particulars of breaches complained of were the manufacture and sale of glass-faced bricks and glass wall facing, called "ceralite patent glass-faced bricks" and "ceralite wall-facing," to certain persons. The defendants denied that the letters patent were valid and subsisting, or that they had infringed them. In their particulars of objections the defendants said (1) that the inventions had been anticipated, (2) that they were invalid for want of subject matter, (3) that the inventions were of no utility, and (4) that the

second of the above-named patents was invalid by reason that the specification contained no sufficient directions for producing a granular backing, and had been anticipated in former patents. Mr. Bousfield, Q.C., in opening the plaintiffs' case, said they were patentees under two patents that had reference to the manufacture of fancy or ornamental bricks which would reflect light. Attempts had been made to attach pieces of glass to the face of the brick; but the difficulty had always been to get a firm attachment. Owing to the smoothness of the surface it was necessary to have a keying, and the secret of the plaintiffs' success was that they attached the tile by means of fragments of glass scattered or dusted over its back surface, previously coated over with a flux, which melted at a much lower temperature than the glass itself. The first of their patents contained the principle of attaching rough pieces of glass, with a plain surface upon the face which was to come in contact with the tile, by a flux, while the second one was for attaching a granulated back to the glass as above described. Mr. James Swinburne was called, and said he was an engineer. Sheldermine's invention consisted of applying a keying to glass plates, the keying being formed by a granular flux. It was important that the temperature at which the flux took place should be low, in order not to spoil the surface of the glass. In using facing to cover walls or bricks, it was important that it should be possible to cut the glass with a nice edge. The plaintiffs' patent complied with this. The keying did not interfere with bending the glass for use on curved surfaces. He had not found the plaintiffs' invention described in the specifications mentioned in the defendants' particulars of objections. The appliance was an exceedingly useful one. Cross-examined: Lewy's specification described a flux as the best way of keying. To that extent it anticipated Sheldermine's patent. The size of the pieces of glass used for keying was not the essence of Lewy's invention, but the flat surface against the glass was. If the pieces in Lewy's invention were very small, the flat surface would be immaterial. Apart from the size, there was no difference between Lewy's and Sheldermine's patents but the flat surface. Sheldermine used granular pieces, Lewy flat pieces. The purpose of both was the same. The flux in both acted in the same way. Sheldermine's specification claimed a tablet of glass having a granular back of broken glass fixed thereon by a fluxing material. The difference between the two specifications was only in the size of the pieces of glass. Petre's specification of 1858 was, except for the flux, the same as Sheldermine's. What Sheldermine did was to combine Lewy's flux with Petre's granules. Re-examined: None of the earlier specifications referred to suggested the idea of a sheet of glass with a granular back incorporated with the glass by means of a flux. Mr. F. T. Wood, a builder, was called, and said he had bought from the defendants for covering walls the material called ceralite. There was no appreciable difference between the material sold by the plaintiffs and defendants. Before he had seen the material in question there had been nothing of the kind on the market. It made extremely neat joints, and had a better surface than any other material. Cross-examined: All the advantages he had spoken of arose from the glass facing. Evidence was then called, including that of Mr. Bannister, the engineer to the Corporation of Manchester, to show the value and utility of Sheldermine's process. Mr. Terrell, Q.C., then opened the defendants' case, contending that there was no novelty in Sheldermine's process, and that it was no invention ("Morgan v. Windover," 7 R.P.C.). In course of counsel's argument, the learned Judge said the real issue between them was whether the application of old principles to a new process was good subject-matter for a patent. The learned counsel referred to "William v. Nye" (7 R.P.C., 62), in which it was held that joining two old-known machines together was not a good subject-matter for a patent. On the question, Was this an invention? the Court must, he submitted, be guided by the principles of law decided in that connection. "Blakie v. Latham" (5 R.P.C.) decided that mere utility was not enough to make the subject-matter good. Invention was distinct from utility ("Elias v. Gravesend Tin-Plate Company, Ltd.," 4 R.P.C.) The learned counsel also stated that he relied upon anticipation, as shown in Lewy's, Abel's, Boulton's, and Petre's specifications. Mr. Boulton, of Messrs. Boulton and Wade, chartered patent agents, of Hatton-garden, E.C., was called, and said he was a member of the Institute of Civil Engineers, as well as a patent agent. He gave evidence that, in his opinion, there was nothing new in Sheldermine's patent process. Lewy's specification disclosed more of this particular art than Sheldermine's had. He did not agree with Mr. Swinburne that the main point of difference between Sheldermine and Lewy was in the size of the glass used for keying; the former did not claim that any particular size was essential. Sheldermine had merely applied well-known means to procure the same object, and, in his

opinion, his was no invention. In cross-examination, he admitted the value and utility of the opalite, as produced by the Sheldermine process, and that this was very much cheaper than the old methods. He could not say why, if Sheldermine's process was not novel, no one had ever done what both the plaintiff and defendant companies were now doing until after that patent. The learned Judge pointed out, when witness was being cross-examined upon prior knowledge, that the difficulty in the defendants' case was that in none of the prior specifications was "fluxing" spoken of; some mentioned "fusing," but that was quite another thing. After some further evidence, Mr. Terrell summed up the case for the defendants. He said that up to that moment he had not gathered what was the subject matter claimed by the plaintiffs for their patent. He was entitled to all the public knowledge at the date of Sheldermine's patent, and he submitted that there was enough information disclosed in the several prior patents to have enabled a workman of ordinary skill to have procured the same result as that for which the plaintiffs now claimed a monopoly. The object to be obtained was old, the keying was old, and the way of fastening these keys on to the glass was old. Then Lewy came and did this by means of a flux. What more could Sheldermine claim? What was advantageous in his process? He merely used granulated particles of glass as his keys, and this granular shape was old too. He submitted that it was clear on the facts that Sheldermine's process was no invention. Mr. Moulton, in reply, said that it was now confessed that the Sheldermine process was most valuable, and that it exactly hit a great want, and they had the fact, too, that both the companies had begun manufacturing these glazed tiles, as described by Sheldermine, within two years of his patent becoming known. The inference was clear, and supported his contention that Sheldermine's patent was both useful and novel and of commercial value. There was a great fallacy in his friend's contention as to prior publication. The question of novelty and the question of the public right to do what was claimed in a patent, was one of fact—viz., was the invention within the then knowledge of the public? And on this point one could not put the contents of several specifications of varying dates together and argue that these were all within the knowledge of the public at any particular date. There was no such presumption of public knowledge. The point was, Was the world in fact told how to do the particular thing prior to Sheldermine's patent? Lewy's patent was clearly different from Sheldermine's; with his process one could not bend or cut the tiles as one could in Sheldermine's. It was clear that Sheldermine's process was an invention on the facts, and that being so, could it be said that any of the principles of the patent cases negated these deductions of fact? Upon this point he referred to "Thompson v. the American Braided Wire Company" (6 R.P.C., 528). If the process was new, cheap, and effective, it was good subject matter ("Crane v. Price," per Tindall, C.J., 4 M. and G., 580, and Goodeve's Patent cases). The cases cited for the defence were in no way analogous. In conclusion, he referred to "Hayward v. Hamilton" (G.P.C., 113), and submitted that, as the infringement of the Sheldermine patent was admitted, and they had proved utility and novelty, the plaintiffs were entitled to an injunction and damages. Mr. Justice Grantham at once gave judgment for the plaintiffs, holding that Sheldermine had done a thing simple enough in itself, but which had never been done before. It was clearly useful and novel and an invention, and was not anticipated in Lewy's, Abel's, Boulton's, Petre's, or Stuart's patents. There would be an injunction against the defendants using the Sheldermine process further, and damages subject to an inquiry on an account, and certificates of the validity of that patent and of the breaches thereof. Mr. Graham asked for a stay of judgment until Wednesday next, pending steps for an appeal, which, after some discussion, was granted subject to mutual arrangements being come to between the solicitors of the parties as to security for damages, it being understood that in case no arrangement could be arrived at the injunction was to issue forthwith; otherwise it was to remain in abeyance until the hearing of the appeal. Mr. Walter later on informed the judge that up to then they could not arrange terms. Mr. Terrell said they were willing to do anything reasonable. Mr. Justice Grantham: What do you say to your paying £500 into Court pending the result of appeal? Mr. Terrell said he was quite prepared to do that. Mr. Walter accepted these terms, and the matter dropped.

AN ARCHITECT AND HIS RATES.—At the Marylebone Police-court, on Saturday, Mr. Ricketts, solicitor, attended before Mr. Plowden, and applied, on behalf of the Vestry of St. Pancras, for an order of committal against Henry Hewitt Bridgman, of 1, Camden-square, for default in the payment of rates. Mr. Bridgman, he said, was a Common Councilman for the City of London, an architect, and a member of the St. Pancras Vestry. The rates in question, which amounted to £44 11s. 11d., were

in respect of some Turkish Baths in Kentish Town-road and some tenement houses in Union-terrace, Kentish Town. Mr. Bridgman was summoned before the Court for the non-payment of the money on April 16, and a distress warrant was then issued against him. That warrant had since been returned marked "No effects." Every endeavour had been made to get the money, but to no purpose. Mr. Plowden: I don't like issuing these warrants if I can possibly avoid it. You hope the warrant of committal will result in payment?—Mr. Rickett: I think it will, sir. What term will you fix? The maximum is three months' imprisonment.—Mr. Plowden: You may take an order for one month.

WATER SUPPLY AND SANITARY MATTERS.

LEEDS.—A Committee of the House of Commons sat on Saturday to dispose of the Leeds insanitary area scheme. The scheme proposes to clear away rookeries in the neighbourhood of the parish church of Leeds, and covering upwards of 16 acres. The Right Hon. W. L. Jackson, M.P., Mayor of Leeds, gave evidence strongly in support of the scheme. The opposition came from the owners of three out of the 15 public houses in the area proposed to be cleared. They claimed compensation beyond that which would be allowed under the Housing of the Working Classes Act, which Act was the basis of the proposal of the corporation. In the result the committee passed the preamble of the Bill.

UPPERMILL.—The chairman of the Uppermill Urban District Council (Mr. T. J. Wild, J.P.) was, on Wednesday, July 29, called upon to perform the interesting function of opening the sewage purification works recently completed after the design and under the direction of Mr. T. S. McCallum, A.M.Inst.C.E., of Manchester. Messrs. Fotherby and Son, Burnley, have been the contractors for the works.

CHIPS.

The new Borough Gardens in Cornwall-road, Dorchester, recently acquired by the corporation at a total cost, including laying out, of about £6,000, were opened on Thursday in last week.

The foundation stone has been laid by the Countess Spencer of the chancel of a permanent mission church to be built at Barnard's Heath, St. Alban's. The building will be of a simple character, and will consist of a chancel, with organ-chamber, choir, clergy vestry, and morning chapel. The style will be Early English, and the church will be built of red St. Alban's brick, and the interior will be faced with Flinton bricks. The stone in the caps and bases of the pillars will be of Bath stone, and the other stonework inside will be of Ancaster.

At the graduation ceremonial in connection with Edinburgh University on Saturday, the degree of LL.D. was conferred on Sir D. Brandis, F.R.S., late Inspector-General of Forests in India.

Mr. Charles James Blomfield, elder son (and partner) of Sir Arthur W. Blomfield, A.R.A., was married on Thursday in last week at Little Horkesley Church, near Colchester, the bride being Eleanor, daughter of Mr. William Macandrew, J.P., of Westwood House, Essex.

Major-General H. D. Crozier, R.E., held an inquiry at Heath Town, near Wolverhampton, on Friday, relative to an application by the Heath Town Urban Council to the Local Government Board for permission to borrow £12,000 for sewerage works, to be carried out from plans by Mr. Berrington, of Wolverhampton.

A new hall—Shaftesbury Hall—is being erected at Swansee, and special consideration has been given to the ventilation, which is being carried out on the Boyle system.

A large turret clock has just been erected in the college tower of the Training College, Cheltenham, as a memorial to the late principal. It strikes the hours, and shows time on two dials, and is fitted with all the latest improvements. The work has been carried out by John Smith and Sons, Midland Clock Works, Derby.

The Training College, Cheltenham, is being warmed and ventilated by means of Shorland's patent Manchester grates and special inlet tubes, the same being supplied by Messrs. E. H. Shorland and Brother, of Manchester.

Leinster Hall, in Dublin, is about to be reconstructed as a theatre, from plans by Mr. Frank Matcham, of London.

The Armenian Martyrs' Memorial to be erected at Hawarden will take the form of a cross in the churchyard, in addition to the stained-glass window which is to be placed in the south aisle of Hawarden Church. The materials for the pedestal will be contributed from quarries in England, Ireland, and Wales, and the cross itself will be of Scottish granite.

Our Office Table.

THE trustees of the National Portrait Gallery have received from Mr. G. F. Watts, R.A., as a further gift, a portrait of the late Lord Leighton, P.R.A., painted by Mr. Watts in 1881. The trustees have acquired by purchase a portrait of William Pitt, Earl of Chatham, by W. Hoare, R.A., formerly in the collection of Viscount Bridport, and engraved in Lodge's "Portraits of Illustrious Personages"; a portrait of Thomas Flatman, the poet, painted by Sir Peter Lely; and a selection of drawings by the late George Richmond, R.A., including portraits of Sir George Gilbert Scott, R.A., Earl Canning, Viscount Hill, Sir R. H. Inglis, Sir G. Cornwall Lewis, Canon Liddon, Archbishop Longley, Sir Charles Lyell, Cardinal Newman, Dr. Pusey, and Samuel Wilberforce as Bishop of Oxford.

THE London County Council have recently sanctioned the expenditure of several sums of money upon street improvements in various parts of the Metropolis, to meet grants from local authorities. In one case they have agreed to contribute £3,600, three-fourths of the net cost of widening Robin Hood-lane, Poplar, at its junction with High-street. The eastern side of Robin Hood-lane is about to be set back by the Council in connection with the formation of a northern approach to the new Blackwall Tunnel, and it has now been decided that the houses on the western side of the road at its junction with High-street shall be also set back, so as to increase the width of the road from 30ft. to about 50ft. The Council has agreed to expend £300 on widening High-street, Tooting, and £600 on widening Merton-road, Tooting. A suggestion has also been made, the consideration of which has been postponed, that the Council should expend £1,760 on the acquisition of sufficient land on the eastern side of Wellington-street, Strand, at Nos. 138 and 138A, Strand, to widen the thoroughfare to 80ft. It has already been agreed to widen the Strand at the corner of Wellington-street, and the present suggestion is in continuance of that improvement. It is proposed that in the event of the National Telephone Company, who have acquired these premises for increasing the size of their building at the corner of Wellington-street, being unwilling to sell at a reasonable sum the land necessary for the widening, the Strand District Board should be asked to acquire it compulsorily under Michael Angelo Taylor's Act on behalf and at the cost of the Council.

THE Paddington Vestry will consider, at their meeting in October next, the report of a special committee on the relative merits of hard and soft wood for the paving of roads. The general description of wood-paving in the parish is with soft wood and Portland cement joints. The tables prepared by the surveyor show that the life of soft-wood pavements is not so long as formerly. This seems due to three reasons—(a) traffic on the roads has increased; (b) the standard of roads, being higher, causes more frequent renewals; (c) the wood, owing to greater demand, is not so good as formerly. Hard-wood roads have been extensively tried in London for about seven years, and although at first they are more expensive than those made of soft wood, in the long run they are less costly, particularly when the traffic is heavy; in addition to which, the great advantage of having heavy-traffic streets less frequently closed for renewals is of considerable importance. If the life of hard wood as against that of soft wood be estimated by its wear, the committee consider that at least fifteen years may be taken for hard wood against a life of six years for soft wood on roads subject to heavy traffic, and they strongly recommend the vestry to follow the example of other London parishes, and in future discontinue the use of soft wood for paving purposes. Assuming the average life of the present soft wood to be seven years, its renewal necessitates an estimated yearly expenditure of £8,750. Allowing the hard wood a life of twelve years only, the yearly renewals would cost £8,070, showing a saving of £680 per annum. A longer life would show a larger saving. The committee consider that a sum of £8,000 should be allowed yearly for the maintenance of wood roads. In conclusion, the committee recommend—"That the wood roads ordered to be renewed in 1896 be paved, as soon as practicable, with the best Jarrah wood."

THE City council of Birmingham proceeded,

last week, to elect a city surveyor in succession to Mr. J. S. Till, who, after many years' faithful and efficient service, has retired. The Public Works Committee reported that they had advertised for a city surveyor at a salary of £500 per annum, stating that the person selected would also be appointed deputy engineer to the Birmingham Tame and Rea District Drainage Board, at a further salary of £300 per annum. In reply to the advertisement thirty-four applications were received, and a joint committee of the Committee and the Drainage Board considered the applications and selected the following four candidates as most eligible for the appointment—viz., Messrs. A. W. Cross, borough surveyor, Loughborough; H. C. Marks, borough engineer, Dewsbury; John Price, assistant city engineer, Liverpool; and J. E. Swindlehurst, borough surveyor, Burton-on-Trent. A deputation also visited Liverpool and made inquiry as to Mr. Price's suitability for the office, and inspected the district of Toxteth Park, of which Mr. Price had had sole charge as engineer and surveyor for twelve years, prior to its annexation to Liverpool in November last. Mr. Price is, the Committee added, forty-one years of age, has had a varied practical experience in civil and municipal engineering extending over twenty-four years, was one of the selected candidates for the office of city engineer of Liverpool in 1890, and one of the final four for the office of city engineer of Manchester in 1894, and was at present the principal assistant and second in command to the city engineer at Liverpool. Mr. Price had also had experience in the construction of works of sewerage and sewage disposal, and the laying out of sewage farms. The Committee, therefore, recommended him for appointment by the Council as city surveyor, at a salary of £500 per annum. The Drainage Board have approved of the selection of Mr. Price, and, if elected by the Council, they would appoint him as deputy engineer to the board. In the course of a long discussion, a persistent endeavour was made by some members to throw over the candidate selected by the Public Works Committee, in favour of one who was supposed to possess local claims. The Council, however, finally adopted, without an adverse vote, the recommendation of the Committee.

THE summer meeting of the Institution of Junior Engineers is about to be held in Scotland, and an attractive and varied programme has been drawn up. The London members will leave St. Pancras Station in next week, the 14th inst., and will spend Saturday and Sunday in Edinburgh, visiting the Castle, Holyrood Palace, Arthur's Seat, &c., as well as the gas-works and electric-lighting stations. On the Monday they will visit the Forth Bridge, and in the evening proceed to Glasgow. On Tuesday morning, the 18th inst., the following works in Glasgow will be open for visiting, the selection being left with the members:—Hydraulic Pumping Station; New Howe Machine Co.'s Cycle Works; Mr. J. White's Optical, Nautical, Electrical, Telegraphic, and Surveying Instruments Factory; Sewage Purification Works; Messrs. Neilson and Co.'s Locomotive Works, Springburn. In the afternoon the members will be received in the Municipal Buildings by the Lord Provost and the Corporation, afterwards being entertained to an excursion to visit one of the new reservoirs of the Glasgow Corporation Waterworks. An excursion to Dumbarton will form the feature of Wednesday's programme, an inspection of the Leven shipyard, belonging to Messrs. Denny, being the principal point of interest. A steamer excursion on the Clyde or Loch Lomond will take place on the Thursday, and on the Friday, various works in Glasgow will be open for visiting. The Institution's summer dinner will be held at the Alexandra Hotel, Glasgow, in the evening, the president, Mr. Archibald Denny, in the chair, and Lord Kelvin the guest of the evening.

THAT a "manufacturing" district may be freed from manufacturing smoke is the outcome of six years' investigations by practical men, as given in the report just issued by the Committee for Testing Smoke-preventing Appliances. The committee was formed at the suggestion of Mr. A. E. Fletcher, the chief inspector under the Alkali Works Regulation Act, and was brought together by the Manchester and Salford Noxious Vapours Abatement Association, which had for many years been actively at work endeavouring to effect an improvement in the atmosphere of the two towns. It was decided to organise a co-operative effort for the solution by the highest scientific authority of the problem how to burn

coal smokelessly under various conditions. Included in the committee were the mayors of nearly a dozen smoky towns, the Duke of Westminster, the Earl of Derby, and more than a hundred manufacturers, engineers, chemists, medical officers of health, and others, with Lord Egerton of Tatton as chairman. Independent committees are still at work in the Glasgow and Sheffield districts on the same lines. The object of the Manchester committee was to discover, by actual investigation, if it is possible to avoid the smoke nuisance hitherto deemed inseparable from manufacturing districts. Theoretically, it has been admitted that it is easy to devise means whereby all smoke may be consumed in the making; but the means have been so varied, and so complicated, that manufacturers have, for the most part, run the risk of incurring penalties rather than bear the cost of structural alterations to their furnaces. With the idea of testing all the smoke-consuming schemes before the public, the committee went to those who had them in actual use, and were not content with the assurances of patentees and makers. Efficiency, cost, and economy were the tests applied, and every system was tried, first under everyday conditions, without the knowledge of those interested in its success, and, second, by way of special examination from the points of view of the chemist and the engineer.

THE report goes into great detail as to the tests employed, and the way in which factory chimneys have been watched during the last two years. The outcome is that the committee express their conviction that "in the great majority of cases the black smoke thrown into the air during the combustion of coal is preventable, either by hand or mechanical firing, and without great cost to the consumer. Often the prevention of smoke is accompanied with a saving of expense; and where the firebars have an automatic reciprocating motion, an inferior and cheaper quality of coal can be used, and thus a further saving of expense effected." The consumption of fuel was lower in boilers fired by machine than in those fired by hand, other conditions remaining equal. The committee avoid naming for recommendation any of the various appliances, but leave those interested to draw their own conclusions from the results of the comparative trials published in their report. Under the Public Health Act of 1875, the discharge of black smoke is made criminal, so that it remains only that the law shall be so far supported by public opinion that its application may be more general.

THE committee formed in Glasgow, as the result of their investigations, report as follows:—"The committee are of opinion that, whilst future experiments and inventions may be the means of introducing new and better methods of treatment in the combustion of fuel, enough is known at present to enable steam users to work their boilers with a fair degree of economy, and practically without smoke." The Sheffield committee, in an interim report, give the caution that no one appliance can be declared suitable for all furnaces, and that, whatever device is applied, its success will "in a great measure depend upon the intelligent handling and management which it receives on the part of those to whose care it is intrusted."

AN important action was concluded at Birmingham Assizes on Wednesday, in which the executors of Thomas Smith, brother of a former Mayor of Birmingham, sued the King's Norton District Council for £10,000 damages in respect of his death, which resulted from blood-poisoning, the alleged consequence of a defective sewer ventilator carried up a chimney of his house. The local authority had, on request, stopped the connection with the sewer; but plaintiffs alleged that the work was done in an imperfect manner. The defence was that the house was insanitary from private causes. The jury found for the plaintiffs, £3,500 damages.

A TEREDO-PROOF pile is described and illustrated in the *Engineering Record*. It is composed of a core 6in. by 6in.; the remainder of the pile is built of 1in. lumber, with butt joints, each board being nailed and covered with coal-tar and sand. All the layers or boards, of which there are four, are nailed with tenpenny nails driven in rows 2ft. apart, two nails in each row. Underneath the outside layer of boards a strip of ship-felt is laid, 4ft. from the top of pile, and extending to low-water mark, well tacked. The pile, after the outside boards are put on, is nailed with 6in. wire nails driven in rows 1ft. apart,

three nails in each row; after which, the pile is wrapped round with two turns of hoop steel, 6in. below head of pile.

The origin and development of steel-frame buildings is just now attracting attention amongst our Transatlantic brethren, who are discussing this question. It is stated by one writer that Montauk block in Chicago, built in 1881 by Burnham and Root, architects, was the first of the tall buildings. To reduce the thickness of the foundation or footings, steel rails were employed. The walls carry the floor loads. In subsequent erections, as in the Produce Exchange, New York, built in 1882, the iron cage construction was employed applied to the court walls. In it the walls of the court are carried by the ironwork story by story. The same principle was applied to the outer walls of the building in the Tacoma Building, Chicago, Messrs. Holabird and Roche being the architects. This building is 12 stories in height, and the columns are of cast iron, the outer walls carried story by story upon the iron construction, with a light veneer of terracotta. The walls which stay the building are placed in the rear and inside.

The employment of iron skeletons for other buildings than the "tall office building" is becoming common. The *Engineering Record* describes another church (Methodist) which has been constructed partly of a braced steel framework at Pittsburg, Pa. It is planned as a Greek cross with short arms, and with a central octagon tower crowned by a pyramidal roof, and treated in the Franco-Romanesque style. The "auditorium" has a seating capacity for 1,000, and is unobstructed by columns, covered by the tower dome, the ceiling of which is 70ft. high, formed by the intersection of 50ft. arches of the nave and transept. The intrados of the arches is a plastered surface of expanded metal, moulded to the required form and sustained by a lightly-braced steel framework, suspended from the concealed rafters and girders above,"—a construction which proved convenient for the complicated and involved surfaces of double curvature at the four angle corners of the main walls above. The dome and tower are of stonework like the walls of the church, and are supported by four steel corner columns, carrying steel box-plate girders, upon which and corner diagonal beams the masonry rests. The construction is said to give great strength, rigidity, and thorough bracing to the structure.

A receiving order in bankruptcy has been granted in the case of Harry Daniel Earl Earl, of the Strand, and Richmond-avenue, Streatham-hill, S.W., architect and surveyor.

Special services were held at St. Stephen's parish church, Exeter, last week, in commemoration of the completion of the restoration of the fabric. The work, which has been carried out by Mr. Edward Mudge, under the direction of Mr. C. Cole, architect, includes the strengthening of the tower, the removal of the plaster, and the re-pointing of the stones; the provision of new seats (obtained through Mr. Harry Hems from St. Matthias' Church, Torquay); the removal of the western gallery; new choir stalls (given by Mr. E. Mudge); the cleansing and decoration of both nave and chancel, the repair of the organ, and the lighting of the church by incandescent-gas lamps.

With the August Bank Holiday, the summer season at the Auction Mart practically came to an end, and the tide of business will gradually ebb until the beginning of October, when operations will be actively resumed. Last week was one of the best of the year, the large aggregate of £242,321 representing the sum of the business done. The tone of the estate market has shown such marked improvement that the results accomplished have borne a far higher proportion to the supply on offer than has been known for some years.

The Edinburgh and Leith Master Builders' Association entertained on Wednesday in last week the National Association of Master Builders of Great Britain, who had just closed a two-days' conference in Edinburgh, by conveying them to the Forth Bridge, and, on their return, providing dinner in the Waterloo Hotel. At the dinner Mr. Peter White presided, Mr. D. Heron was croupier, and the company numbered about fifty. The chairman proposed prosperity to the National Association, a toast acknowledged by Mr. Tom F. Rider, the president, in a vigorous and humorous speech. Mr. J. C. White, Liverpool, proposed prosperity to the Edinburgh and Leith Association. Mr. Heron, in replying, said that a year ago a federation of Master Builders of Scotland was formed, and already they had about thirty-six affiliated. Mr. A. Krauss, Bristol, invited representatives from Edinburgh to attend the meeting of the National Association in Bristol next summer.

Trade News.

WAGES MOVEMENTS.

NORTH WALES SLATE TRADE.—Mr. Young, the chief manager of Lord Penrhyn's Carnarvonshire slate quarries, has increased the wages of the loaders at Port Penrhyn Quay by 7½ per cent., an addition being also made in the case of labourers. Here, as at Llanberis, Nantlle, and Festiniog, the slate trade keeps very brisk.

DUBLIN.—The Amalgamated Society of Carpenters and Joiners have taken the initiative with the view of bringing about a settlement in the strike in the Dublin building trade, which has for many months paralysed the most important of Dublin's few trades. Negotiations took place between the representatives of the Carpenters' Society and the master builders on Monday at the Grosvenor Hotel, Dublin, and as a result the following announcement has been made on the part of the masters:—"We are happy to state that an agreement has been come to and rules signed by the committee of the Master Builder's Association and the managing committee of the Amalgamated Society of Carpenters and Joiners, by which the strike is terminated." The masters then go on to express a desire that all the men who formerly worked for them should resume their old places. They also requested the deputation, as the representatives of the men, to use their influence for the promotion of good feeling after this prolonged dispute. It is believed that the result of this conference will have an important effect in bringing about an arrangement in other outstanding cases.

The corner stones of the Miller Arcade at Preston were laid on Thursday in last week. It is in the centre of the borough, near the town hall, and is to be constructed from plans by Messrs. Essex, Nicol, and Goodman, of Birmingham. Mr. John Walmesley is the contractor, and Mr. Sparling the clerk of works.

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TENDERS.

Correspondents would in all cases oblige by giving the addresses of the parties tendering—at any rate, of the accepted tender: it adds to the value of the information.

ACTON, W.—For the erection of eight houses on the Shalimar Estate. Mr. Edward Monson, F.R.I.B.A., Acton Vale, W., architect:—
Nichols, R., Acton, W. (accepted)... £3,120 0 0

BOLTON-ON-DEARNE, YORKS.—For the erection of school buildings, for the School Board. Mr. H. L. Tacon, F.I.A.S., Rotherham, architect. Quantities by the architect:—

Snell, Robert, Masbro'	£2,239	0	0
Snell, Richard, Rotherham	2,219	10	0
Tradewell, J., Rawmarsh	2,210	0	0
Cooper, J., Rotherham	2,140	5	6
Bower, J. A., Swinton	2,140	0	0
Smith, G. H., Mexbro' (accepted)	2,103	3	0
Wade, J., Wath-on-Deerne	1,835	0	0

* Withdrawn.

CRADLEY.—For the erection of three cottages, Colley Gate, Cradley, for Messrs Bird and Hodgetts. Mr. A. Ramsell, Dudley, architect:—
Danks, J., Old Hill (accepted) ... £455 0 0

CRANBROOK.—For outside painting and general repairs at Cranbrook Police-station, for the Kent County Council. Mr. F. W. Ruck, county surveyor:—
Marshall, F., and Son, Cranbrook... £47 0 0
Pryer, A. N., and Co., Maidstone... 43 0 0
Jenner, C. E., Cranbrook (accepted) ... 27 5 0

DUDLEY.—For the erection of a cottage, St. John-street, Dudley, for Mr. Thomas Goer. Mr. A. Ramsell, Dudley, architect:—
Whittaker and Co., Dudley... £248 0 0
Deeley, W., Netherton ... 230 0 0
Golding, H., Netherton (accepted) ... 220 0 0

DUDLEY.—For the erection of a cottage, Peel-street, Eve Hill, Dudley, for Mr. Frederick Fleming. Mr. A. Ramsell, Dudley, architect:—
Golding, H., Netherton ... £255 0 0
Slater, W., Sedgley ... 252 0 0
Pittaway, H., Dudley (accepted) ... 237 10 0

DUDLEY.—For the erection of a villa, Holly Hall, near Dudley, for Mr. T. Priest. Mr. A. Ramsell, Dudley, architect:—
Preston, J., Brierley Hill ... £580 0 0
Golding, H., Netherton ... 537 0 0
Deeley, W., Netherton (accepted) ... 530 0 0
Seckerson, E. and J. W., Holly Hall ... 495 0 0
Hancox, G., Holly Hall ... 490 0 0

EBBW VALE, MON.—For the erection of a vicarage, for the vicar of Ebbw Vale. Mr. Chas. J. Fox, Newport, Mon., architect:—

Morgan, W. T., Crumlin	£1,635	0	0
Jones, W. T., Monmouth	1,677	0	0
Williams, J. D., Knighton	1,460	0	0
Evans, T., Cardiff	1,432	0	0
Reed, C. H., Newport	1,400	0	0
Monks, J., and Co., Crumlin	1,390	10	0
Davies, D. J., Newport	1,365	0	0
Parfitt, A. E., Newport	1,365	0	0
Davies, S., Ebbw Vale*	1,323	0	0
Pugh, D. W., Newport	1,260	0	0

* Recommended for acceptance.

EXETER.—For the erection of a Wesleyan Sunday-school, chapel, glass-rooms, &c., at St. Sidwells, for the Trustees. Mr. Frederick J. Commis, F.S.I., Exeter, architect, in conjunction with Mr. Walter B. Coles, Exeter, architect. Quantities by Mr. Vincent Cattermole Brown, of Paignton:—

Mingo and Boon	£1,957	0	0
Stephens and Son	1,935	0	0
Diggins, G.	1,930	0	0
Brealey, W.	1,922	0	0
Tree and Bolley	1,900	0	0
Herbert, G.	1,883	0	0
Setter Bros.	1,863	0	0
Ham and Passmore	1,814	0	0
Wadman, W.	1,743	0	0
Gibson, W.	1,700	0	0
Blatchford, J.	1,675	0	0
Westcott and Austin (accepted)	1,600	0	0

EXETER.—For repairing the glass in the Higher and Lower Markets, for the city council:—
Miller, F. J., Milk-street, Exeter (accepted).
[Lowest of five tenders received.]

FINEDON.—For works of sewerage, for the Finedon Urban District Council. Messrs. Mosley and Anderson, Northampton, architects:—

Weldon, H., Birmingham	£10,284	9	3
Brown and Son, Wellingborough	7,999	10	0
Marriott, R., jun., Rushden	7,700	0	0
Hipwell, S., Wisbech	6,500	0	0
Chapman, T., Finedon	6,500	0	0
Henson, G., Wellingborough	6,213	0	0
Cosford, R., Northampton	5,810	0	0
Martin, H., Northampton (accepted)	5,750	0	0

GLOUCESTER.—For the removal of 7,000c.yds. (or more, as required) of mud from the reservoir at Witcomb, now emptied, for the city corporation:—
Cruwys and Holbrough, Birmingham and Gloucester (accepted) ... 2s. 6d. per yard.

GRANTHAM.—For alterations to the Grantham old workhouse to fit it as a temporary lunatic asylum, for the Kesteven and Grantham District Asylum Committee. Mr. Herbert Kirk, Sleaford, County and Diocesan Surveyor, architect:—

Hodson and Sons, Nottingham	£1,640	0	0
Wartaby and Son	1,569	0	0
Hockley and Son (late)	1,515	0	0
Rudd and Son (accepted)	1,500	0	0

(Rest of Grantham.)

KENT.—For outside painting and other minor work at the police-station of the home division, for the Kent County Council. Mr. F. W. Ruck, county surveyor:—
Pryer and Co., Maidstone ... £108 17 11
Gentry, F. T., Canterbury ... 108 0 0
Bateman, H. W., Canterbury* ... 80 0 0

* Accepted.

KINOSTOWN, CO. DUBLIN.—For the erection of a brick chimney, 110ft. in height, at the electric lighting works. Mr. Geo. M. Harris, engineer:—
Beckett, W., Dublin (accepted) ... £546 0 0

LEVER, LANCs.—For (A) laying a drain and (B) rebuilding a retaining wall, near Farnworth Bridge, for the district council of Little Lever:—

A.	B.
Crowther, T. (accepted) £63 10 0	£35 0 10

THE BUILDING NEWS

AND ENGINEERING JOURNAL.

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FRIDAY, AUGUST 14, 1896.

MODERN PROBLEMS.

WITH the increasing complexity of civilisation and the social wants and tastes of the age, the architect and the builder have to keep pace. To-day, life in our great cities becomes the all-absorbing question. Sanitarians and hygienists have barely cleared the ground by removing what is obnoxious and hurtful from the soil and the atmosphere before questions of another sort, relating to accommodation, come up for solution. Increased space for recreation and facilities of communication have called for concentration of dwelling in those parts that are left. Every open space secured for the public recreation, every new street, and every enlargement of a railway station or siding means a denser packing of dwellings, to provide for the classes which cannot migrate. Thus, we have two conflicting forces at work in our midst—one clearing and demolishing, another concentrating and rebuilding on smaller areas, so that what we do with one hand we are apt to render nugatory by the other.

The puzzling question of making the most of our dwellings in crowded cities still confronts the architect. How many people can be accommodated on a plot of ground with safety against fire, and at the same time healthily, is a problem that perplexes many; it has been mainly solved by a building of several stories, and, in America, by what is known as the "sky-scraper," or "tall building." We doubt very much if this solution will ever be seriously entertained in London or our large cities without a protest on the ground that it is an encroachment of the property-owner on the rights of citizens. Imagine what would be the result if owners were permitted in our City thoroughfares to erect buildings of double, or even half again, their usual height! How overshadowed the street would become, how much light and air would be shut out, and what a depressing effect our streets would suffer from. The limit of height which the new London Building Act imposes—namely, 80ft., "exclusive of two stories on the roof," and other features—appears to be an exceptional height in many of the City streets, as it would practically mean, with the roof stories, 90ft. to 100ft. The question of height, as to what is permissible, depends, of course, on the width of the street, or the angle subtended by the building on the opposite side, and this appears to be the only rational rule. Indeed, the Act adheres to this principle in dealing with the raising of old or the erection of new buildings in certain modern streets of less width than 50ft.; and it gives adjoining owners power of appeal when consent is given to buildings of greater height than that prescribed.

But the tendency of a growth of population will be to augment height at the expense of other considerations—let us hope not in our day, as this increase of one dimension will lead to other questions, such as that of new structural methods, thinner walls, means of lighting, &c. Those who have had to design and construct any lofty building on a small plot of ground must have realised the encroachment on the space involved by the necessity of thick walls and foundations. Any increase of height entails a considerable extra thickness of base for masonry walls. The difficulty lies at this point. A considerable addition to the height of our buildings in cities would compel us to adopt a system of construction, like that which has become prevalent in New York, Chicago, and other Western cities, which allows a relatively thin

wall. There is no alternative. The steel-skeleton buildings of those cities may be said indeed to have had their origin in this necessity; they have been the natural result of erecting lofty structures on small areas. At first cast-iron columns with wrought iron beams were used as a framework for thin brick or stone walling; but the irregularities in the manufacture of cast iron, and the unreliable nature of the material, which led to many serious failures, have gradually led the architects and engineers of the States to discard cast iron and to employ steel. We may cite such buildings as the Home Insurance, the Reliance, the Rookery, and the Tacoma Buildings, and other Chicago structures. Are English architects prepared and willing to adopt the steel frame or skeleton system as exemplified in these erections—a thin shell or veneering of terracotta carried by the iron construction? This is the logical outcome of the problem of the accommodation in our large cities in the future, if we are to follow our American cousins. The old tradition of building is to build massively from a foundation upwards, the walls resting on the ground and carrying each story and floor load; but the newer idea of the "sky-scraper" is to alter all this, by supporting the walls as well as the floors on beams and columns. Instead of an evenly-distributed weight on the foundations, according to the old plan, the weight of the superstructure and its loads are concentrated on certain isolated points, each brought on by cylinder piers or iron columns from the hard rock. In short, we have a lofty steel-framed cage resting on legs or stilts, all else being a filling-in, or a system of curtain walls—the clothing of a skeleton. The very idea of architecture as the art of building stone by stone is done away. We have the erection of a steel structure instead, which is more properly the work of the engineer, the architect's function being confined to the elevations and the decorative treatment of the material, brick or terracotta.

The latter point is a problem also worthy of our very careful consideration in this connection. How is the high building, whether of steel or masonry, to be designed? The high office building as we see it in Chicago in the Reliance Building, the most notable example of a steel skeleton structure, in which the inclosing material is reduced to a minimum, presents nothing more than a huge cage of glass divided by horizontal and vertical lines of white enamelled brick. No architect will ever be satisfied with such a result. An unveiled or unclothed metal skeleton will never comply with our ideals of architecture, even in a crowded street; nor would a naked steel structure be without danger of rapid deterioration. Extreme tenuity of structure renders any architectural effect impossible; there must be solidity and stability, or an expression of those qualities. Height is a paramount element in new city buildings. The lofty building is too often a mere multiplication of stories instead of a well subdivided unit. The vertical element is the chief factor in the design. No Greek or Gothic precedent can help us; it is quite a new problem, and the sooner the architect of our great cities can grasp this fact the better. A writer on the subject has well pointed out that the high building naturally divides itself into a base, a superstructure, and a frieze. Such a division, in fact, corresponds with the threefold parts of a Greek temple or a Classic Order, and these three parts ought to be related and be treated as a unit, not as separated parts. A lofty building of 18 or 20 stories ought, we venture to say, be treated more as a tower than as a structure of ordinary proportions.

The problem of light, like that of height, seems to become more and more difficult. The court and the quadrangle become less possible every year in our crowded towns, as the limit of space becomes inevitably fixed or

diminished. The courts to our great office and residential blocks are assuming the proportions of shafts. We line their walls with white enamelled bricks, we devise reflectors; but they are still cold and draughty wells, down which the sun rarely or never shines. To turn them into tolerable light-admitters and transferers, admitting the light to the rooms which open on them, the only possible way is to make them funnel-shaped, wider at the upper end; and this can only be obtained by sloping the buildings back in step-like manner, so that the rays of the sun should enter at a lower angle—a plan which has the disadvantage, in the eyes of the owner, of curtailing the accommodation of the upper floors. The shape and construction of the windows have been regulated more by style than the dictates of common sense. Many of our City buildings have windows more suited to a Tropical palace than to a murky warehouse; even their proportions are often not those which favour the admission of light from the zenith—the principal point to bear in mind—while their details and furnishings are unadapted.

Our roofs and roofing materials have also suffered from the conventionalities of fashion. Flat, low, and high-pitched roofs have been used, with very little consideration for the climate or the position. The new London Building Act, by permitting two stories in the roof, will be an incentive to the construction of "curb" or Mansard roofs. The problem before the architect is how to make this feature agreeable. Ugly roofs are becoming more common every day. They are made for accommodation, and are shaped to avoid the obstruction of light, or are kept flat without any regard to the buildings they crown, or to those in their immediate vicinity. The roofs of the great hotels facing the Victoria Embankment, Piccadilly-circus, the Knightsbridge-road furnish instances of roofs to be avoided in their abruptness, lack of agreeable skyline, and proportion.

Why have not more suitable materials been employed? Tile is certainly an improvement on slate; but we should like to see copper more largely used as a covering to important buildings, and this topic leads us to speak of the future employment of metals in our buildings decoratively. As we have lately said, copper, brass, bronze, and other metals are being used in the modern American bank buildings, in fittings as well as ornamentally. But this is a large question which would really occupy pages. When shall we see metal used more artistically in our houses and public buildings? Is it not possible that in the near future metalwork will again become a much larger element in our architecture than it has yet attained; that we shall see the capitals of our columns externally and internally cast or forged in bronze or copper, the friezes of our large club-rooms and halls enriched with ornamental work of *repoussé* character? And may not our walls, so long under the supremacy of the modeller, the plasterer, the painter and decorator, have imparted to them the charm of colour and the lustre of metallic surfaces by the employment of sheet-brass and copper in panels and tablets beaten up by the hammer, and so carry through our apartments the metalwork of our electroliers, our stoves, hinges, and door furniture? By the aid of reflecting surfaces of metallic decorative panels, strings and friezes relieved by *repoussé*, we may once more retrieve our interiors from barrenness, and encourage an industry which has fallen somewhat into disrepute. There are some advantages in metal as a decorative material which do not belong to wood, stone, or plaster: it can be easily cleaned, does not decay or wear. On the contrary, there are objections to the use of metal to any large extent: it is conductive of heat and cold, promotes condensation of moisture; but these drawbacks would not be serious if

metal were employed in the decoration of the smaller parts and details of design. We have tried plaster, wood, carved stone and marble, ceramic tiles, and other patented products for our decoration, and there seems to be no reason why metal—cast, forged, or beaten in the sheet—may not in turn be brought into requisition.

TABLES AND TEXTBOOKS.

IT would be interesting to find out how many in the profession take the trouble to consult tables of experimental results, or apply to their work the formulæ and graphic methods of the ordinary textbooks. The proportion who do so would be small. We are quite sure that men like the late Mr. Street or Sir Gilbert Scott never bothered themselves with anything of the sort. They designed and proportioned their buildings with that keen intuitive sense of the materials they worked in and of the forces they dealt with which cannot be superseded by any analysis, however refined or scientific it may be. If their mental guesses or judgments exceeded the results of the mathematician, they did so because they took into mental view the margin which common sense suggests should be the proper allowance to be made for defects of material, workmanship, or wear and tear. In short, the actual "scantling" or size that has been so shown and specified will often be found to be a far closer approximation to the real strength than the size given in the table or found out after laborious calculation. Many a plate girder calculated with extreme care from the usual formulæ has been found to be singularly close to the section sketched in, rather less than more, showing with what accuracy an experienced eye can judge of the requirements. We do not mean it to be inferred from this that it is always safe or reliable to depend on our judgment in such a case as this; but only to show with what nearness the experienced eye can apportion. It is always better, before specifying for a plate girder for a given span, to calculate the stresses in the flanges for the load, distributed or otherwise, the angle irons, stiffeners, the riveting, &c., assuming a certain depth of girder, as it would not do to trust to the eye in matters of this kind. In the case of rolled girders published tables by reputable manufacturers may be depended on in ordinary cases; but it is safer to consult the formula used, and the tensile resistance of the metal taken. The latter is an important item to find, for the tables often give a lower strength than that required, and it is generally desirable to specify the strength, and see that the samples tested come up to the requirements. In these and similar matters affecting iron construction the architect ought to know the principles of the subject, though his experience may sometimes lead him to draw his own conclusions, and to allow a larger margin of strength than the theory requires.

To refer to the subject of materials. A great many published tables of tests are before the profession, many of them fairly reliable; but there is a natural reserve of late in accepting them as fully trustworthy. Numerous books giving the results of experiments are before the profession, and the French Government lately appointed a commission charged with supervising the laboratories and their investigations on the subject. This commission has published a volume containing a bibliography of all the recent results on the strength of materials. On the Continent and in America laboratories fitted with scientific apparatus are being established for the investigation on scientific principles of materials used in construction; but the ordinary architect knows very little of the results, except those which appear in common textbooks—and these are by no means very

reliable. Of the most ordinary building materials it may be said their constant properties have scarcely been determined with exactness. Thus, the crushing resistance of bricks and stones of many kinds is very variously estimated; and we have such varied and contradictory statements, that the practical builder turns away in disgust from these printed data.

Many of the tables published suffer from inaccuracy of translation, or from a want of reduction to our English units. In this connection the remarks of a writer in an American work on physical tests are to the point. He observes that no one is competent to devise or carry out experiments of any value who is not thoroughly trained in mathematics and mechanical science; hence it is the technical schools of Berlin, Munich, Zurich have stood so high in researches of this kind. We have all kinds of testing machines in our technical schools; but they are almost useless unless they are in the hands of scientific men who can combine theory with facts. When all the formulæ used in designing represent actual facts, we may expect progress—not before. By determining the facts experimentally, and afterwards devising theories and formulæ to account for and express them, we at once obtain an accurate method in our textbooks; instead of which, the usual proceeding has been to invent a theory, and then to try to make the facts agree with it. The latter has been the method pursued by theorists and mathematicians in their treatment of structural problems, hence the contradictory results arrived at by formula-makers and experimentalists.

The introduction of graphic methods to determine stresses in structures is another subject suggested by these remarks. We are afraid there are very few in the profession who avail themselves of the beautiful and unique method known as "graphic statics." The average architectural pupil very seldom sees the application of this method, though it is one which every master should explain to his pupils. It is certainly one which comes within the scope of office instruction, and can, in fact, be learned better in the actual drawing-office than in the architectural or technical school. In making, for example, the detail drawing of a counterfort or buttress supporting a vault or arch, the principle can be easily explained by a few lines on the drawing. But all such methods are left to the pupil to pick up for himself, if he has the inclination, or to the school or classes he attends. They are considered "extra subjects," outside the routine of the architect's office, and the same import is attached to them as to mathematical or scientific studies. But this is a mistake. Graphic statics ought to hold the same place as "squaring" or "cubing" dimensions, "taking off" quantities and abstracting. It is an applied science which the pupil ought to be able to bring into requisition; the same may be said of practical geometry, solids, the development of surfaces in masonry, vault construction, joinery, and other practical problems. How much can be learned by the student of the strength of materials by instruction in the graphical method of showing the "bending moment" of a beam, or its "shearing" stress! When, for instance, he has learned that the shearing force at any section of a beam can be represented graphically by plotting ordinates at different points of the beam, the length of these lines being proportional to the shearing stress, he has grasped in a more practical way what this force really is and how it acts than he could by the usual definition in mathematical treatises. So, too, the "bending moment" can be represented graphically by a diagram of easy construction, and the bending moment of the beam under any load can be found graphically by the length of a vertical line at that point. The funicular or link polygon, which

represents the loads at the various points, affords a very clear and ocular representation of the action on the beam, and imparts interest to the study. The same method applied to roof trusses by means of the "stress diagram," and to other structures, is certainly less liable to error or to be misunderstood than the ordinary method of calculation; the stress on each member is diagrammatically represented, so that the section of it can be at once determined—advantages which appeal forcibly to the mind of the architect and draughtsman. Whether this method is so largely adopted as it might and ought to be by the profession remains a doubtful question, and we are afraid, owing to a common apathy among designers for all investigations of this sort, the too easy reference to manufacturers' published tables is the more general custom.

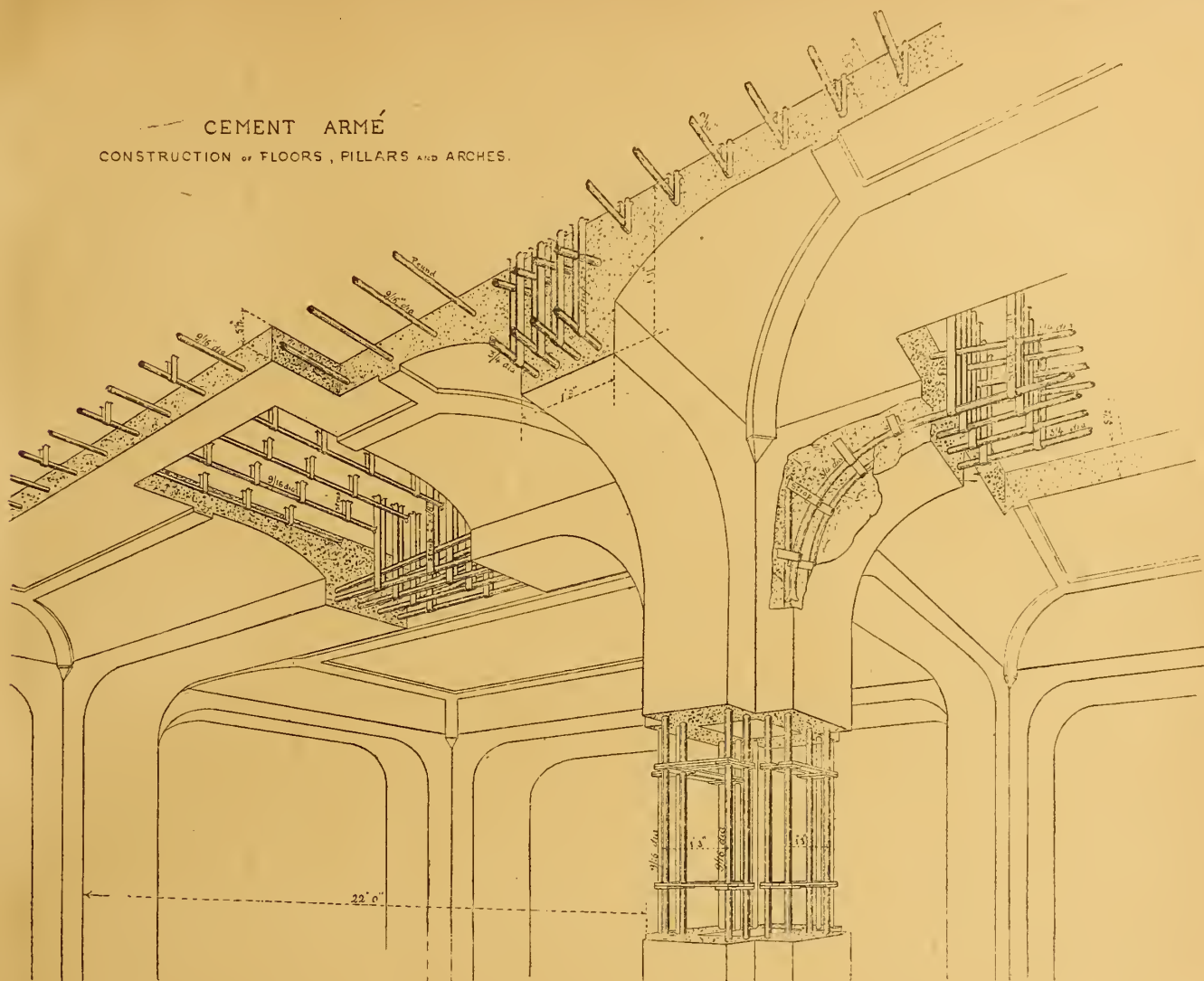
NEW METHODS OF BUILDING CONSTRUCTION AT PARIS.

DURING recent years an interesting change has been gradually brought about in the various methods of building construction employed in France, and more especially at Paris, where the size and importance of public buildings and the many-storied houses divided up into flats necessitate special systems of construction, which possess the advantages of combining economy in cost with strength and durability. Parisian architects and builders, although far from approving the extremes to which their American *confrères* go in the employment of iron for the construction of their somewhat exaggerated skyscraping buildings, in which the style of architecture employed is often scarcely logical or consistent with the modern methods of construction, are nevertheless obliged to own to the necessity and the utility of employing iron in moderation for the framework of their buildings. Up to the present the use of iron in its ordinary form has chiefly been confined to floors, partitions, and roofs, where, as a rule, its presence is masked by coverings of cement, wood, or stone, except in recent examples of the new style of buildings destined for brasseries or drinking halls, where the iron construction is left visible, and emphasised by means of bronze or colour painting and mosaic work, or, again, in the few examples of well-known work where the architect has endeavoured to obtain a decorative effect by means of iron lintels and columns. But where the use of iron is fast finding favour at Paris is in its employment in combination with other materials such as cement or concrete, and in a special form known as the cement armé systems, in which iron and steel is employed in the form of thick wire, trellis, or light bars, imbedded in cement or concrete. This method of construction, of which there are three different systems, has for some time been employed in the construction of various buildings of more or less importance, and has given proof of its strength and practical use as well as its advantages when employed for floors, partitions, walls and roof, both as regards its conveniences for internal arrangements, its economy, and as regards the manner in which it lends itself to modern schemes of polychrome decoration.

Two of these systems have been employed by the architect of the new building now being constructed in the Rue Blanche for the Society of Civil Engineers of France. The third system is much employed by M. de Baudot in various buildings designed by this architect, an advocate of rational construction and design and the logical employment of modern building materials. It will be interesting to examine the merits of each system as employed in these buildings, together with any other points of construction worthy of remark.

The building for the Society of Civil Engineers is remarkable from several points of view as regards construction and the arrangement of plan. The façade and plans will appear in the *Building News* as soon as the work is completed, and will form an interesting subject for comparison with the building recently completed for the English Society of Engineers, and with that about to be commenced at New York for the American Society.

Before entering into a detailed description of the systems employed, a summary idea of the plan



and general scheme of construction will not be uninteresting. The architect, M. Fernand Delmas, has endeavoured to construct the building on economical lines, employing to a large extent iron and those modern materials which have been tried and found fitting as regards suitability and economy; the building will cost £22,000, and it has been made a *sine qua non* that all the contractors shall be members of the Society of Engineers.

The length of the façade is 100ft.; the total depth of the building is nearly equal to the frontage; the height from pavement to cornice is 60ft. The façade is built of solid stonework throughout its length and height. The thickness of the masonry is 24in. at the lower stories, and 18in. at the upper portion. The façade work is really the only portion of solid masonry work in the whole building, and forms a decorative mask to the body of the building, which is constructed of a framework of iron. The chief supports of the building proper consist of four framed iron uprights, 16in. by 16in., rising from the basement to the roof. These uprights are solidly trussed and held together at the floor levels by strong iron girders supporting the iron joists of the upper floors and the light partitions which divide up each story. This system is at once economical and practical. The whole building is thus self-supporting, and the thick walls which would otherwise be necessary for carrying the upper floors are thus avoided.

The façade wall is built according to the system always employed at Paris, and is formed of blocks of stone roughly cut at the quarries to the outside dimensions of the proposed moulding and decorative work. As soon as the whole front is erected the work of cutting it into shape will commence, the mouldings, pilasters, and all carving work being done whilst the interior is being prepared. The buildings at Paris are by this means erected much more rapidly than when the stone is dressed or moulded before being put into place. Greater facilities are thus given for studying the general ensemble of the façade and the proper scale to be

given to the mouldings and decoration. The stone is as a rule soft when first from the quarries, but becomes hard and durable after dressing and exposure to the air. The courtyard wall of the building is formed of light brick or metallic fillings between the iron uprights and the party-walls.

The ground floor comprises a large entrance-hall or vestibule, 40ft. by 44ft., forming, with the cloak-room, the principal staircase, the rooms for the concierge, and the area, the whole front of the building. This large vestibule is vaulted over by means of one of the systems of cement armé, to be described. The floor is constructed on another similar system, and will be paved with mosaic work. The ground floor of the courtyard will be occupied by the conference hall, 50ft. by 50ft., to hold 300 seats. An annexe, 50ft. by 20ft., adjoining this hall, will open on the same by a large arched bay, and may be separated from the larger hall by means of a special system of wooden sound-proof roller shutters. The floor of the large hall will be a movable one, to be raised or lowered by an ingenious system of hydraulics, and capable of being placed in an inclined position for conference meetings, or raised to a horizontal position for ball-room purposes.

The entresol floor will comprise a large room for meeting, smoking and conversation-rooms, and a reading-room, to be used as a club for the members of the society. The first floor will contain the offices of the society, a large committee-room, and all conveniences. The second floor will be devoted entirely to the purposes of the important library, comprising the library proper, a room 45ft. by 25ft. by 17ft. high, rising to the ceiling of the low story above, and lighted by a large semicircular bay at either end; the surrounding rooms of the height of the second floor will be destined for the librarian, catalogues, drawing office, and library offices. The third floor will be devoted entirely to the purpose of storing the books of the library, in low rooms communicating by means of the gallery overlooking the library below, which

will be crossed by means of a light iron bridge. The bookcases will be suspended from the upper floor, and will be arranged in vertical tiers hung on rollers after the system employed at the British Museum. The roof story will be divided up into an apartment for the chief secretary, and reached by a private staircase from the ground floor. The large basement, occupying the whole of the ground surface of the building, will be used for storing the records of the Society, and will contain the heating apparatus, stores, &c. A hydraulic lift will afford access to the landings of each floor. The chief feature of the façade, which is simple in style, is the wide arched bay, 24ft. across, rising from the pavement to above the cornice; this bay will be filled in with an open decorative framework of wrought and cast iron.

Some of the most interesting points of the construction, besides the large use of iron, are the systems employed in the construction of the floors. The ground floor is built after the Coignet system, composed of light iron bars and cement; the first floor and its supporting pillars and arches is constructed after the Hennebique system of cement armé; the upper floors are formed of iron joists, filled in either with the system of light supports and plaster, much employed at Paris, or with terracotta fillings between joists. The roof is lined internally with agglomerated cork bricks, affording protection from excessive heat or cold, and the walls of the area will be lined with opaline, a vitreous material of a bluish-white colour, which in this case will insure cleanliness, and afford additional light; the lavatories and w.c.'s will also be lined with the same material.

Speaking first of the Hennebique system of cement armé, employed for the arches and floor of the first story, it will be interesting to illustrate the method by a few sketches, explaining the theory of this system, which has been put to practical proofs in a large number of buildings, chiefly for industrial purposes, in the North of France. The perspective section will give an idea of the construction as employed in the

building for the civil engineers, a system which holds its ground well against its rivals of other methods of cement armée.

THE ARCHITECTURE OF BRIDGE BUILDING.

IN an exceedingly interesting article under the above heading in the *Engineering Magazine*, by Mr. E. C. Gardner,* a number of illustrations of the most famous bridges in the world are grouped together, and some suggestions are offered which are worth consideration.

There is, says the author, no artificial structure that more readily admits of a satisfactory combination of the practical with the sentimental, using the latter word in its legitimate sense—that is, as the visible expression of a worthy sentiment. We have memorial churches, halls, towers, and fountains, but from the permanence and constancy of their service, from the instinctive and traditional gratitude that leads us to “speak well of the bridge that carries us safely across,” from the sense of triumph over a stubborn obstacle, and from the religious sentiment that is associated with the grandest achievements of this kind both in ancient times and in the middle ages, there is a peculiar appropriateness in giving a memorial or monumental character to these structures, whether they carry railway trains or bicycles, and whether they cross rivers, streets, or rocky ravines. It is easily possible here to maintain the visible distinction between the utilitarian and the monumental—the lack of which distinction is so often fatal in the attempts to combine the two in one structure. Towers for military defence of the approach to a city or province, which gave such beauty and dignity to many of the bridges of the middle ages, are obviously useless at the present time, when an electric torpedo would hurl the most massive arches into piles of worthless rubble, when long-range cannons laugh at any river, however wide and deep, and when balloons laden with dynamite ride with fearful menace along the viewless highways of the air; but, if we cannot adorn our bridges with crenellated watch-towers to repel invading foes, we can attach to them facilities for rest and recreation, and perhaps in some degree hasten the time when there will be no fear of hostile invasion.

In our abundance of land, few American cities would care to convert even the most central bridges that cross the river, providentially passing beside or through great cities, into mere extensions of the ordinary street, as was often done in the compact, walled cities of Medieval Europe. For more than three centuries the Ponte Vecchio in Florence has been bordered with jewellers' shops; Old London Bridge, if the pictures tell the truth, might have been a double row of tenement houses; and the description of the wooden bridge of Notre Dame, built in 1433, assures us that, while crossing it, one could not see the river, and, from the number and variety of the goods displayed in the shops, one would never doubt that he was on dry land. There is, in fact, ample precedent for any conceivable use for a bridge in addition to its one essential function. Chapels were among the most common accessories, and the statues of saints and heroes along the parapets are quite in order. Shops for all kinds of merchandise—from fancy dry goods to live stock—mills, factories, banks, schools, and prisons have rested upon the same piers that carried the bridges.

What would be far more suitable for our time and taste would be to make these urban bridges take the place of the public squares with which most of our cities are so scantily supplied. If our river-banks were always treated like the banks of the Arno and portions of the Seine and the Thames, there would be less need of using bridges for anything but travel. Unfortunately our river-banks are usually given over to commerce; or, worse, they are adorned with sewer outlets and factory tenements, and make a dumping-ground for garbage. But, by building the bridges that carry the streets across the river wider than

the mere passing of travel requires, we have at once the most attractive public park and promenade possible. It is strange that the universal instinct to loiter on the bridge and watch the water beneath, with its celestial reflection from above and the landscape up and down the river, beautiful in its perspective, however crude it may be in its near detail, has not led to a more frequent and comprehensive utilisation of its possibilities for what may be called public-square purposes. Even where parks and squares are abundant, the open river is sure to be a favourite rival to green trees and verdant turf. But there is no reason why bridges of masonry, or even of steel, should not also have green turf, and flowers, and fountains at each side of the roadway; more than that, pleasant resting-places and booths for refreshments. Why not, as well as in the parks and along the streets? And why not even more than that? With floor and walls already provided, it only needs a permanent roof to convert a wide steel bridge into an inclosed gallery, like an arcaded street, in which the rents from the stalls along the sides would make the building of the entire structure a profitable financial investment. What virtually increases the practical economy of such additions to the superstructure is the fact that the main strength of the piers and abutments for a steel bridge is required to resist the force of the water, and the load imposed upon them is a matter of comparative indifference. Often, indeed, the heavier the load, the more secure is the bridge.

Concerning the masonry of bridges, it is hardly necessary to suggest that heavy blocks of stone may be expected to resist the force of floating ice, logs, and other drift material that may be sent against them by the current better than anything smaller; but above this danger there is nothing more suitable for the structure than bricks. When it is remembered that, next to glass, burned clay is the most enduring of all mineral building materials, it is a singular conservatism that confines the use of bricks mainly to culverts, drains, and other underground construction. With the excellent building cements which are becoming more and more available—apparently destined to rival those of antiquity, which are the wonder and admiration of modern times—there is no limit to the availability of bricks in bridge-building, whether considered from the economical, the durable, or the æsthetic point of view.

Where the span is too great, or other conditions make an arch or a series of arches impracticable, the first impulse would be to say that wooden trusses are at best wasteful—a temporary economy resulting in ultimate loss. Still, we need not forget that from the time of Julius Caesar until a comparatively recent date the most famous and serviceable bridges in the world were of wood. There were none but wooden bridges in Paris until within two or three hundred years, and there is no apparent reason why a well-planned wooden bridge should not enjoy a useful life, as long as that traditionally allotted to the crow. This would call for the same protection from the action of the weather and the ground as would be given, as a matter of course, to any other wooden building resting on stone or brick foundations. Other things being equal, there is evidently more scope for architectural effect, both of composition and ornamentation, in a wooden structure than in one of iron. Here is another conspicuous inconsistency in the expenditure of public funds: it seems to be accepted as an axiom that, for the building of a bridge, nothing shall be allowed beyond actual necessities for the bare utilitarian needs; while a public building that may be seen less, used less, and be really of far less value to the community, is often given a large percentage of its cost for purely æsthetic ends.

The many beautiful bridges in our public parks, whether of wood, iron, or masonry, are admirable examples of what may be done by making these features of utility also objects of grace and beauty, whether they are intended primarily to carry us safely over a chasm, or to create a pleasing detail in the landscape.

It may seem unreasonable to ask for a high degree of artistic excellence in the design of a bridge over a millstream or a railway-track; but the simple truth is that there will be no social or industrial salvation for us until we have learned to apply the best scientific knowledge and artistic training to everything we build, from barndoops and brick culverts to “marble domes and gilded spires.” Our work must

not only serve our necessities, but minister to our enjoyment; it must add something more than mere convenience to the value of life. And the more extensive it is, the more commonly used, and the more permanent its character, the more imperative is the obligation to give it the highest possible artistic quality.

ADAPTABLE SPECIFICATIONS.—IV.*

DRAINAGE: FACTS AND MEMORANDA.

SIZE AND FALL OF DRAINS.—The daily consumption of water in houses is found to average about 30 gallons for each person. The whole of this should ultimately find its way into the foul-water or sewage drains. To carry off efficiently the contents of a sewage drain, the water should have a velocity of at least 180 ft. per minute. If the depth of the water in a circular pipe is equal to a quarter of the internal diameter of the pipe (or if, in other words, a 4 in. pipe has the water an inch deep in the middle of it, and a 6 in. pipe has the water 1½ in. deep), then, to gain this velocity, the following falls are required—

For a 4 in. drainpipe, a fall of 3 in. in 10 ft.
For a 6 in. " " 1½ in. in 10 ft.
For a 9 in. " " 1½ in. in 10 ft.

Where a drain changes its direction—as a branch drain does where it enters a larger drain, the water in it receives a check in its velocity, and should have an additional fall of 1½ in. allowed it at every bend or junction through which it passes. At a manhole an extra fall, equal to half the diameter of the principal drain, should be provided.

Rainwater drains need not fall so rapidly, provided they are large enough to carry off the utmost amount of water that is liable to enter them. This may be calculated for roofs and flats at about three-fourths of a cube foot per hour for every square yard in the area of the roof or flat. Rainwater falling on paths, courts, and the like should be kept separate from the clean roof-water; and, if the local regulations permit, should be discharged into the sewage drains. In calculating the size necessary for rainwater drains, it should be remembered that a round pipe carries off most water, not when it is absolutely full, but when only about eleven-twelfths of its area are filled.

A 2 ft. length of 4 in. stoneware pipe should weigh about 18 lb. The same length of 6 in. and 9 in. pipe should weigh 34 lb. and 60 lb. respectively.

Ordinary stoneware pipes, properly jointed, should be able to stand a pressure of 8 ft. or 10 ft. in vertical height of water without leakage.

Drains carried under a roadway should be at least 2 ft. below the surface. Sewage drains, where possible, should not be carried along within 6 ft. of a building, and if nearer should be entirely inclosed in concrete.

PART IV.: DRAINAGE.

IV. 1. PLANS AND DRAWINGS OF DRAINAGE.—All the work is to be done in conformity to the plans and drawings of drainage supplied by the architect.

IV. 2. MATERIALS GENERALLY.—The Portland cement to be of the same quality as that specified for bricklayers' work. The bricks for manholes and other purposes are to be thoroughly sound, well burnt, and sound. [Gault bricks, like those supplied by the Burham Brick Co.] The bricks, except where otherwise specified, are to be set in cement mortar composed of one part of Portland cement to three parts of clean sharp sand. The concrete is to be of one part of Portland cement, well and evenly mixed with five parts of clean ballast and a sufficient quantity of water. [Hard bricks broken up so as to pass through a 1½ in. ring, or thoroughly well-burnt clay of the same size; but without in either case more than one-fifth of powder or small stuff, may be substituted for half the ballast, if it is uniformly mixed with the remaining ballast and the cement.] The stoneware pipe joints are to be formed with neat cement.

IV. 3. STONEWARE PIPES.—The drains, except where otherwise stated, are to be formed of the best glazed stoneware; socketed drain-pipes laid to regular and even falls, as indicated on the drawings. [They are to be in 3 ft. lengths.]

IV. 4. LAYING DRAINS TO GRADIENTS.—The drains are to be laid quite straight between the

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* E. C. Gardner.—Born in Ashfield, Mass., in 1836; 1856 to 1862 engaged in teaching; studied architecture in Springfield, Mass., in 1862; soon after went into business alone; first book on Domestic architecture was published in 1872, followed by two other similar volumes; author of “Common-Sense in Church Building,” “The House that Jill Built,” and “Village and Suburban School Houses”; member of the Boston Society of Architects; 1855-1888, editor of the *Builder*; at present senior member of the architectural firm of Gardner, Lyne, and Gardner, Springfield, Mass.

points shown on the plates, and perfectly true and regular as to gradients. For this purpose, sight-rails are to be accurately put up, and maintained until the architect sanctions their removal, and a "boning staff" is to be provided and every part of the drain tested with it. The drain-trenches are to be finished to the proper gradient before the drains are laid. The bottoms of them are to be well rammed, and any soft places made good with concrete.

IV. 5. JOINTING DRAIN-PIPES.—The sockets are first to be stopped with gaskets of yarn, to prevent the cement from projecting inside the pipe. They are then to be very carefully and perfectly jointed with neat Portland cement, and as soon as each joint is cemented, the interior of the pipe against it is to be carefully wiped out with a tightly-fitting plug of hay.

IV. 6. DOUBLE-SEAL JOINTS TO DRAIN-PIPES.—Cast accurately on each spigot and socket a ring of bituminous composition in such a way that, when the pipes are united, the joint is entirely tight and waterproof. This must be done so as to leave a space 1in. in depth for cement, this space being then carefully jointed and made airtight in neat Portland cement.

IV. 7. ALL SEWAGE DRAINS TO BE BEDDED IN CONCRETE.—This is to be cement concrete, as above described. It is to be 4in. thick below the bottom of the pipe, and is to be 6in. wider on each side than the outside diameter of the pipe. It is to be sloped up on each side from its outer edge, level with the base of the pipe, to a line half-way up the depth of the pipe, so as to inclose and support the lower half of it.

III. 8. IRON PIPES.—Where a sewage drain passes below any part of the building, and elsewhere where shown on plans, it is to be formed of strong cast-iron pipes weighing, if 4in. in internal diameter, 1½cwt. to the 9ft. length; if 4in., 2½cwt.; and if 9in., 4cwt. The joints are to be formed with melted lead, and properly caulked so as to be perfectly airtight. [These pipes are to be inclosed all round with cement concrete 6in. thick.] [These pipes are to be covered from end to end with a brick culvert, semicircular in section, one brick thick and built in cement, on a foundation of cement concrete 9in. thick, projecting 9in. on each side beyond the base of the culvert.] [This culvert is to remain open to the external air at each end.]

III. 9. STONEWARE PIPES UNDER BUILDINGS.—Where a drain passes under any part of the building, it is not only to be bedded in concrete, but to be entirely inclosed by, and covered over with, concrete 6in. thick, and each end of this portion of the drain is to communicate directly with the open air [as shown on the drawings].

III. 10. PROTECTING IRON PIPES.—All iron drain-pipes are to be treated inside and out [with Angus Smith's preparation] [by the Barff process, so that the surface is converted into magnetic oxide of iron].

III. 11. RELIEVING ARCHES.—Turn relieving arches one brick deep and the whole thickness of the wall wherever a drain passes through any wall of the building.

III. 12. VENTILATION OF DRAINS.—Connect with the drain, by a joint of neat Portland cement, the soil-pipe furthest from the main sewer. This soil-pipe will be carried up against the building to a height of [25] feet. [At a point near the end of the drain furthest from the main sewer, to be selected by the architect, connect the house-drain, by an airtight joint to a 6in. ventilating pipe hereafter to be described.] At the other end of the drain, immediately before it enters the sewer, form a brick manhole [to drawing] [as will be directed, value £7] with a . . . intercepting trap of the same size as the house-drain at this point. This intercepting trap must be bedded on concrete 9in. deep and 12in. wider each way than the extreme size of the trap. The trap must be bedded perfectly level, and so set as to cut off all access of air from the main sewer to the manhole, but to leave the house-drain quite free and open to the manhole. Carry up from this manhole a [6in.] cast-iron ventilating shaft to a height of 10ft. below the top of the soil-pipe or ventilating pipe which is at the other end of the drain, and cover it with a conical top, allowing the air to pass out, but keeping out snow and birds. The inside and outside of these iron pipes to be painted 4 oils.

III. 13. NO TRAPS IN DRAIN BETWEEN THE ABOVE VENTILATORS.—The drain between the inlet and outlet ventilators just described must be left untrapped in every part of the course, so that a current of air may at all times pass through it.

III. 14. CONNECTING DRAINS TO SEWER.—Connect, or pay the necessary fees for connecting, the drains to the sewer, wherever such connections are shown or described. Make good the roads and pavements and arrange and pay for all necessary watching and lighting.

III. 15. INSPECTION SHAFTS.—Form each inspection shaft shown on plans, or described, in conformity with the detail drawings provided.

III. 16.—INSPECTION SHAFTS.—At each point shown on plan or described, form an inspection shaft 3ft. by 3ft. inside with walls [1 brick] thick, built and pointed in cement mortar. The walls are to have footings as described in the Bricklaying section, and are to rest on a bed of cement concrete 12in. thick, and projecting 6in. all round beyond the lowest course of footings. The principal drain which runs across this shaft, and the branch drains which join it there, are to rest on or to be made up from this concrete as the case may be. Where they run through the shaft, they are in all cases to be [half-round] [half egg-shaped] open stoneware drains. The branch drains are to be so laid that they discharge over the edge of the principal drain, and not on a level with it. They are to join it by proper curved junctions with as wide a sweep as possible, so that the water from them will enter the principal drain as nearly as may be in the same direction as the water already flowing down that drain. Finish the concrete with a trowelled cement surface, sloping downwards everywhere to the drains. Build into the brickwork strong wrought climbing irons, 1ft. apart. Provide and fix at top of the shaft a airtight iron cover and frame, value p.c., and form a neat concrete curb all round it. Properly connect all the drains which run into this chamber with their open channels and junctions.

III. 17. DISCHARGE FROM SINKS AND LAVATORIES.—These are in all cases to discharge on to a half-round glazed stoneware channel, 6in. in diameter and not less than 18in. long, connected at the lower end with [a trapped stoneware gulley] [a grease-trap] value p.c., which again is to be connected with the sewage drain.

III. 18. BEDDING GULLIES AND TRAPS.—All gullies and traps are to be bedded on concrete 6in. thick and 6in. wider on each side than the extreme size of the gully or trap.

III. 19. PIPES WHERE NOT LAID ON CONCRETE are in all cases to rest their whole lengths on the ground, a proper furrow being made in the soil at the end of each length to receive the projecting part of the joint.

III. 20. TESTING DRAINS.—The whole of the drains are to be tested in the presence of the architect, or of someone appointed by him, before being covered in, and the contractor is to find all labour, fittings, and materials of every kind necessary for such testing, and for subsequent re-testing, as many times as may be necessary until all defects have been made good to the architect's satisfaction. If required, the contractor will have to fix temporarily on the upper end of the drain one, two, or more lengths of drain-pipe so as to get a head of 8ft. of water, and the drains, six days after being laid, must be able to carry this amount without leakage.

III. 21. PERIODS AT WHICH DRAIN SHOULD BE LAID.—Wherever it is practicable to leave them, the drains are not to be begun till the outside scaffolding is taken down and the scaffold poles removed.

III. 22. FILLING-IN DRAINS.—No drain is to be filled in till the architect has seen the whole of it, and has given permission for the filling-in to be done. No filling-in is, on any account, to be done to stoneware drains until the newest of the joints in them have been completed at least 48 hours. No ramming is to be done to the earth over any drain until this earth has been made 2ft. thick above it.

III. 23.—DRAINS TO BE LAID FROM ONE END.—Each drain, however long, is to be entirely laid from the end it is begun at, and not started, as is sometimes done, from each end to meet in the middle.

III. 24. LEAVE ALL SOUND AND PERFECT.—All drains must be left sound, perfect, and in good working order at the time of the final payment to the contractor under this contract; and the filling-in must be thoroughly solid throughout. The contractor will have to make good, or compensate the owner and all adjoining owners, for all settlements and other injuries arising out of the formation of the drainage system, or out of

any defects in that system or in the filling-in of the drain-trenches.

NOTES.

In firm gravel and similar soils, much of the concrete specified in Part IV. might be dispensed with.

III. 5 and III. 6 are alternative modes of jointing, of which the second is the more costly. There are also various patented joints which present advantages of their own.

III. 15 will be sufficient, if a careful detail of an inspection shaft is supplied. III. 16 is a description of one, in the absence of a detail.

THE SANITARY INSTITUTE.

THE preliminary programme of the fifteenth Congress, to be held in Newcastle-upon-Tyne from September 2nd to 9th, has now been issued. The president of the Congress is the Right Hon. the Earl Percy, P.C., D.L., J.P. The meetings of the Congress will consist of three general addresses and lectures. Three sectional meetings, dealing with (1) "Sanitary Science and Preventive Medicine," presided over by Prof. W. H. Corfield, M.A., M.D. (Oxon), F.R.C.P.; (2) "Engineering and Architecture," presided over by Sir Andrew Noble, K.C.B., F.R.S., M.Inst.C.E.; (3) "Chemistry, Meteorology, and Geology," presided over by W. H. Dines, B.A., F.R.Met.Soc. Five special conferences:—"Port Sanitary Authorities," presided over by Arthur Holt-Barber, Chairman Port of London Sanitary Authority; "Medical Officers of Health," presided over by Alfred Hill, M.D., F.R.S.E., F.I.C., F.C.S.; "Municipal and County Engineers," presided over by Francis J. C. May, M.Inst.C.E.; "Sanitary Inspectors," presided over by George Reid, M.D., D.P.H.; "Domestic Hygiene," presided over by the Mayoress of Newcastle-upon-Tyne.

In connection with the Congress, a Health Exhibition will be held, and the Duke of Cambridge, who is president of the Institute, has consented to perform the opening ceremony on September 2nd. Excursions to places of interest in connection with sanitation will be arranged for those attending the Congress. The local arrangements are in the hands of a local committee, presided over by the Mayor of Newcastle, with Dr. H. E. Armstrong (Medical Officer of Health for the City), and Dr. J. W. Hembrough (Medical Officer of Health for Northumberland) as honorary secretaries. Over 160 authorities, including several county councils, have already appointed delegates to the Congress, and, as there are also over 1,800 members and associates in the Institute, there will probably be a large attendance in addition to the local members of the Congress.

CONCERT-HALLS AND ASSEMBLY-ROOMS.—XXV.

By ERNEST A. E. WOODROW, A.R.I.B.A.

I HAVE frequently had to refer in these papers to the excellence of the work of Messrs. Fellner and Helmer as specialists in theatrical architecture. The subject of the present chapter is one of their buildings erected in Buda-Pesth, which is used as an assembly hall of the music-hall type, and is known as the Somossy Orpheum. As is shown by the ground-plan, Fig. 1, this building is erected in such a way that it does not come under the regulations of a theatre, but merely as a place of public assembly, to be used as a music-hall. This is drawing a fine line of difference between the theatre and the music-hall, which would not be permitted in this metropolis, as the regulations for the one are, to all intents and purposes, the same as for the other. Upon looking at the interior view (Fig. 3), it is perfectly clear that this building follows the lines of a theatre in form, as it consists of stage and auditorium with galleries.

It is true the music-hall has a different object to fulfil from that of a theatre, and that the architects had in this case to overcome the task set before them of providing spaces for eating and drinking, as well as for promenading and smoking lounges in addition to the seated auditory and stage. It is because of these features having to be added in close proximity to the auditorium that music-hall planning may be considered more complicated than theatre planning; for, in addition to seating the audience

comfortably, the promenades must be so placed that those walking about will not disturb those seated, and yet the promenaders must have a view of the stage, and be able to see the performance over the heads of those seated.

Such we know were the problems placed before Messrs. Fellner and Helmer when they undertook the design of the Somossy Orpheum. The site is a most difficult one, there being only two small frontages to the streets, the rest of the site being long and narrow, and one would consider, from the outline, that it is most inappropriate for such a building. The auditorium and stage are very cleverly treated. The stage is placed at the angle formed by the two sections of the site, and the auditorium is placed with a centre line about 45° on either side of the street entrances. This was a most clever way of obtaining the greatest width and depth in the site for the auditorium, as in no other part of the land could such dimensions be procured.

11 The character of the entertainment does not, of

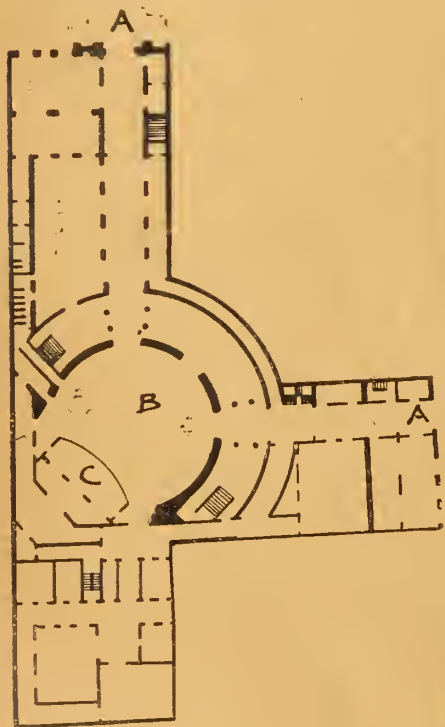


FIG. 1.—A A, entrances; B, auditorium; C, stage.

course, necessitate a deep stage, so that the narrow portion at the angle was quite sufficient for the purpose required.

A symmetrical and regular approach, 19ft. 6in. wide, forms the chief entrance from the Fell-gasse. On either side of this approach are show-cases, as seen in Fig. 4. By this means every available inch of space is made use of to bring in a revenue. The staircase leading from the vestibule, as is shown in the view given in Fig. 2, consists of two flights of stairs to the first landing, which then merge into one, leading to the first tier. The staircase continues upwards to the second tier, or gallery, and winter garden.

On the ground floor there is also a winter garden and a large café. These are thrown open after the performance every evening. The parterre or area level is arranged with tables and chairs after the manner of the old-fashioned London music-halls. The first tier consists entirely of private boxes, which are, however, open at the back, and have no doors to inclose them, a rope merely being placed across the entrance. These are somewhat similar in arrangement to what used to be called the omnibus boxes in the London theatres frequented by our forefathers, the last survival of which was destroyed when the Pavilion Theatre, Whitechapel, was rebuilt last year. On the second tier are four rows of seats, with promenade and saloon in rear.

The interior perspective given in Fig. 3 fully shows these arrangements, and more fully explains the character of the building than any other method. The decoration of this building is very elaborate: the figure painting is by the artists Gastgeb, Gartner, and Peifuss; the sculpture work is by Vogel, who was assisted by Dumbauer;

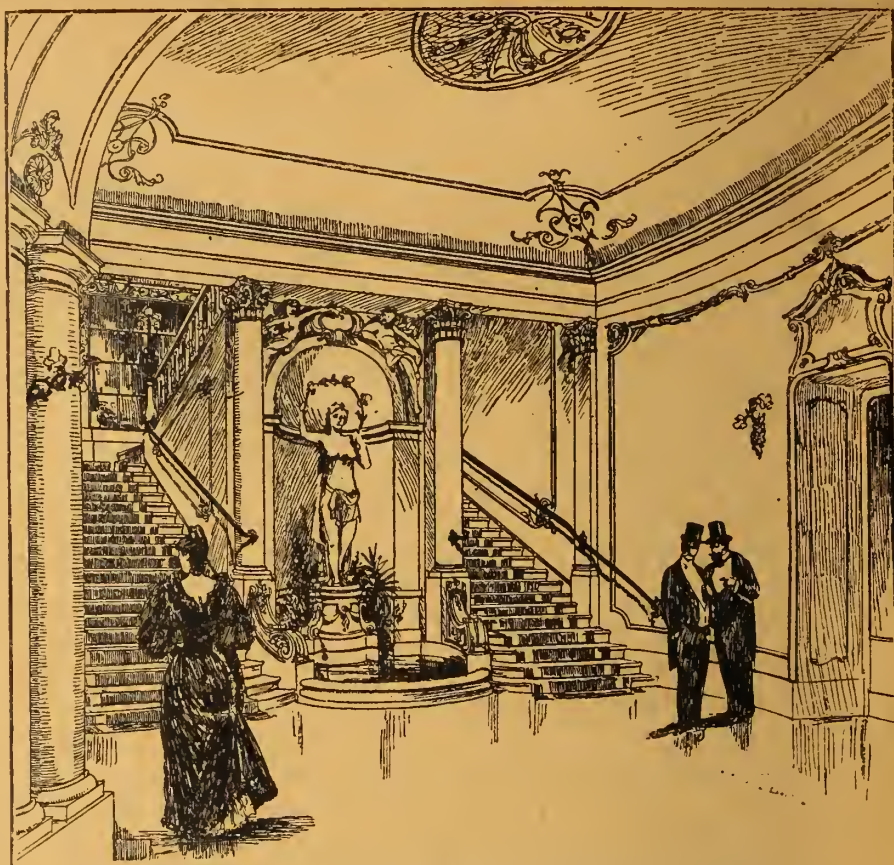


FIG. 2.—STAIRCASE AT THE SOMOSSY ORPHEUM, BUDA-PESTH.



FIG. 4.—SHOW-CASES IN THE APPROACH TO THE SOMOSSY ORPHEUM, BUDA-PESTH.

the rest of the statuary and furniture is by Kott and Bros. Thouet respectively. There are private rooms leading from the balcony used as supper-rooms (as shown in Fig. 3). Of these, three are decorated in Moorish style, two in Rococo, two in Japanese, and one is Hungarian in treatment.

In the corridor behind the parterre is a very

ample provision for hats and cloaks—a thing almost unknown in a London music-hall. Usually a few pegs on the walls of a narrow passage have to do duty for a cloak-room, with the result that there is always confusion when the audience is leaving the theatre, arising from those who have left their coats and are desirous of recovering them. Messrs. Fellner and Helmer never forget

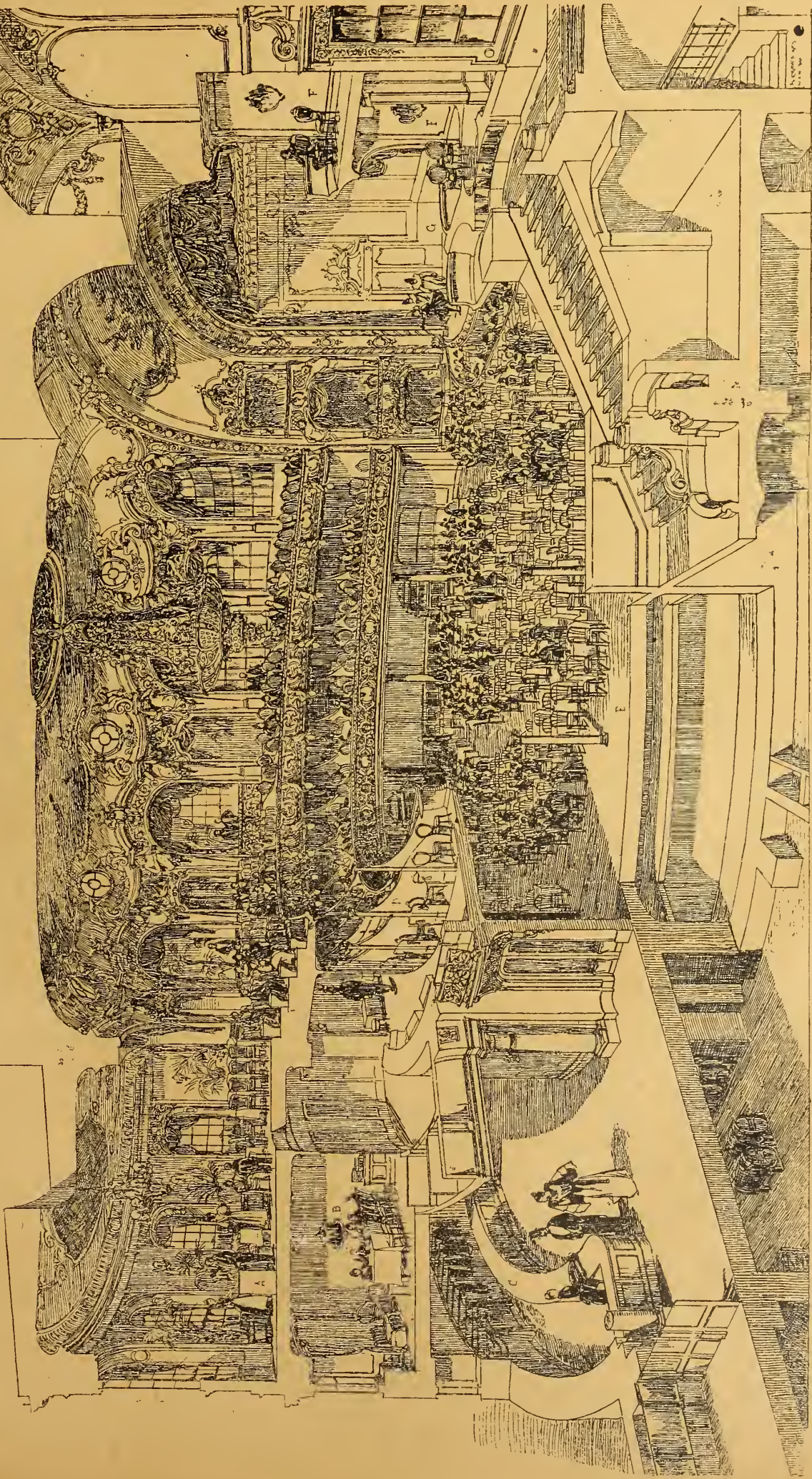


FIG. 3.—INTERIOR OF THE SOMOSSY ORPHEUM, BUDA-PESTH.

this provision, for in all their work long counters are provided for receiving hats and coats, and they are never placed in such a position as to be an obstruction to the easy exit of the audience.

Although there is much to learn and much to admire in the manner in which the architects carried out the difficult task set before them, in this case one cannot help dwelling on the unsuitable site and the inadequacy of the exits, which are only at the two points marked A A in the plan. Such a large building as is shown in Fig. 3 should certainly be provided with more ample means of exit. It is much to be regretted that the authorities of Buda-Pesth draw such a fine distinction between a theatre and music-hall, and allow the latter to be placed outside the stringent regulations which rule the former. Granting the site to be unsuitable, we must admit that the architects have worked out an extremely clever plan.

THE USE AND MISUSE OF WATER.*

By R. E. W. BERRINGTON, C.E., F.G.S.,
Wolverhampton.

EVERY member of the British Association of Waterworks Engineers is concerned with the use and misuse of water, and while every member desires to promote the public health by encouraging the use of water for every legitimate healthy and sanitary purpose, I take it that he is very anxious to prevent as far as possible the waste of water. *False Ideas with regard to Waste.*—People frequently leave their taps open under the impression that it is good for the drains. The idea is quite a wrong one. Small dribbles of water can have no cleansing effect upon drains, but a thousand taps left open for this purpose would have a material effect upon the water supply of a town, and enhance the difficulty of the local authority in dealing with it at the out-fall works. *Quantity of Water required.*—It is difficult to fix a quantity of water per head which shall satisfy the requirements in the several towns because so many factors enter into the consideration of such a question. For instance, w.c.'s and baths are becoming general in some towns, and in the future there is every probability that the artisan will want his bath—and why should he not have it? The author has measured the consumption of water at different-sized houses, and whilst admitting that no two towns are alike, nor any two houses, for the matter of that, some idea of the quantities generally used may be gathered. Meter readings showed the consumption of water in cottages to vary from four to seven gallons per head; in larger houses seven, eight, ten, and sixteen gallons. In houses with two w.c.'s it often came under 20 gallons. The question arises: How much water per head for domestic use must be allowed for in the future? The demand for manufacturing purposes must, of course, depend upon local circumstances. During the last few years it has become apparent that a water-carriage system of drainage will be universally adopted in all populous towns, and this means that the waterworks engineer must allow for the general use of w.c.'s. With a view of minimising the consumption of water for sanitary purposes, the sink and other waste water is being effectively used in w.w. closets. In the opinion of some engineers, these appliances are not considered economical; but it is certain that the three-gallon flush direct from the tipper is most effectual in its work, and in most cases the waste water is quite sufficient, and, therefore, clean water is unnecessary. A modern w.c. is cleaner than a w.w.c., and is the only appliance applicable to indoor use. Another increase in the future consumption of water must be looked for in the fixing of automatic flushing tanks, both in connection with main sewers and private drains of public institutions. Public baths are also increasing, and there is much more street-watering than formerly. There is little doubt that, under strict supervision, an efficient supply for domestic purposes may be given with 10 to 15 gallons per head. The amount of water going to waste in the course of a year in this country must be enormous, and if a monetary value were placed upon it, we should view such waste as a "national calamity." *How and Where Waste Occurs.*—A good percentage of the waste occurs underground, and therefore its tendency is to produce damp subsoils, wet basements, and ill-health. In

colliery districts mains are subject to sudden subsidences, and although a special form of joint has been adopted, it is not always successful. Service-pipes should be laid sufficiently deep to protect them from frost, and in doubtful ground should be surrounded with a soil known to be harmless to such pipes. A frequent source of waste arises from defective ball-taps, and as there are hundreds of overflows which still communicate with the drainage system by unscen channels, it is only by careful inspection that these leakages are discovered. Much waste often results from the ball-tap being insufficiently fastened down, and as the water in the cistern rises it lifts the ball-tap, and the water passes down the overflow for hours together. Of course, this could not happen in a properly-fitted modern cistern. *Siphon Cisterns.*—There are still some bad types of siphon cisterns in the market, and careful selection of the best is necessary to prevent waste of water. *Two or Three Gallon?*—What is to be the future discharging capacity of w.c. cisterns? Given a well-laid drain, a properly-made closet basin, a cistern not less than 5ft. or 6ft. above the basin, a down pipe of not less than 1½ in. diameter, and then a two-gallon flush will effectually do the work, but the work will be much better with some basins than with others. I do not include the wash-out basin, so much in use a year or two ago, amongst good basins. I do not believe that anything less than a three-gallon discharge will flush a wash-out with any degree of certainty. The siphon cistern is a most unsatisfactory appliance for a hotel, a lodging-house, offices, or indeed for any position where the basin is much used. Although a two-gallon flush is sufficient, I believe that a three-gallon flush will ultimately become general, because in sanitary matters nothing short of absolute certainty and entire reliability is acceptable. Everybody would feel confidence in the efficiency of a three-gallon flush, but there are many cases where a two-gallon would not inspire such confidence.* *Severe Frosts.*—Perhaps one of the greatest enemies to the waterworks engineer is a severe frost, and the winter of 1894 must have cost the country thousands of pounds in damage to mains, services, meters, &c. In the author's opinion, the practice of shutting off the water or reducing the pressure considerably at nights is the cause of much injury to the local authority or company as well as to the consumers, and is a retrograde step in the matter of public health. There can be no doubt that taps in open courts or other exposed positions cause endless worry; but the tendency now is to provide a tap for each house, and if care be exercised in laying the service, and if the consumer be taught to see that—at all events where the works are the property of the local authority—he is an interested party, we may expect good results. Even in a severe winter, with a judicious use of stop-taps and gas-jets, one can nearly, if not quite, get through without a burst pipe, and, of course, I mean without wasting water. *Waste-Water Meters.*—The value of waste-water meters in detecting waste is beyond question. Other methods for detecting waste, however, must not be ignored nor overlooked. Systematic house-to-house inspection, followed up by the plumbers, is very effective. The author, some years ago, undertook an inspection of this kind in a large town, and the consumption was reduced by three gallons per head as a consequence, from one inspection. What might it have been if regular and continuous inspection had followed? The introduction of the "Deacon" meter has in several instances reduced the consumption 50 per cent.; but it would more than justify its use if it reduced the consumption by 20 per cent. in any ordinary-sized town. It will be said that some towns have done much better than this with the meter; but in these the consumption was abnormally high to begin with. In new works it is easy to arrange for the waste-meter system, and it is desirable to make such provision. *Stop-Taps.*—The insertion of a stop-tap on each service should be looked upon as a *sine qua non*. It will facilitate the detection of waste or leaky fittings, and prevent the emptying of mains, so common in some towns, to enable repairs to be effected. The general use of stop-taps presupposes that an effective system of inspection is in operation, so as to prevent light lead pipe and indifferent fittings being used. If there is no such

control, it would be better for the corporation or company to do the repairs themselves. The waterworks engineer manages his works as well for a company as for a corporation, but I suppose there will be a consensus of opinion that the supply of such an essential as pure water should be in the hands of the local authority. It is a question as to whether the water and sanitary arrangements of the household should be under the immediate control and actually maintained by the local authority, first on the score of public health, and next in order to secure efficiency and economy in those works in which the general community has a direct interest. The competition amongst plumbers, and the desire of householders to get the work done cheaply, leads to the use of much inferior material and bad workmanship, and this often means disease and deteriorated health, if not death. Under the Public Health Acts the local authority exercises certain powers with regard to house drainage, and there is a limited control over the strengths of lead pipe, taps, &c.; but from an engineering or a sanitarian point of view the control does not go far enough, and as a matter of fact a house may be built in any large town in this country and the sanitary arrangements pass the usual inspection, yet upon examination a terrible state of things might exist. The author does not wish to undervalue the great progress being made, but he speaks from an intimate acquaintance with this particular branch of work, and from dozens of cases which have come to his knowledge during the last ten years or so. Is it desirable to repair waterworks fittings at actual cost price? Many authorities supply washer taps free, and no doubt it pays to do so. Should winter bursts be repaired at cost price? *Universal Use of Meters.*—It has been suggested that every house should be supplied by meter, but this would involve a capital outlay of several millions sterling, besides a good round sum yearly for maintenance. The author does not believe in a metered system. The very poor require to be taught to use, not stint, the water. If we are to secure a healthy community, its individuals must be kept healthy, and to be healthy one must be clean. There are disease centres in every town, and we need to cleanse them. A man may live in a mansion fitted up to sanitary perfection, but unless his neighbour in the slums is helped to a clean, healthy home, and taught the common laws of health, the mansion and its inmates will sooner or later suffer. Isolation is a splendid thing to stop the spread of disease; but we want, if possible, to prevent the very origination or the development of the germ of disease itself. The waterworks engineer can do much in this way, and is doing much now. If water had to be paid for by meter instead of by a rate, we should get people going without their bath to save the money. Money-making is a disease with certain individuals, and there are hundreds of people who put up with a most insanitary appliance rather than pay the water-rate for a proper w.c. The public health is a matter left in the hands of the local authorities, and, in populated centres at least, the immediate removal of decomposing matters is a necessity, and can only be accomplished by an efficient water-carriage system. The water-rate, therefore, should be such as will include the water for a w.c. or two, according to rental. In many towns a charge of 10s. per year for every w.c. is made. There is no blame to the water companies; but the local authorities of such towns are to blame if they do not arrange with the company for the supply, and if necessary, pay for the water to the w.c.'s. Where the pail or pan system is in operation, the local authority has to remove the contents, and therefore, it is a reasonable request on the part of a ratepayer to be supplied with water for sanitary purposes at the lowest possible figure. Although one is not in favour of meters, it is to be regretted that some people are able to deliberately waste water without being made to pay for it. Paying seems to be the only object-lesson in economy with certain individuals. It is not proposed to discuss the merits of the several water meters, or the various fittings use in waterworks. The author would briefly summarise his remarks thus:—(1) That 15 gallons of water per head for domestic purposes is ample; that in many towns the quantity actually used is much under this; that most of the water above 15 gallons is so much waste, and can be saved. (2) That in all cases a regular and systematic inspection pays for itself; that the most efficient and complete system is that by waste-water

* A paper read before the British Association of Waterworks Engineers at Nottingham.

* The two-gallon flush is, in our opinion, absolutely insufficient. We have twice lately had to unstop drains where the trouble was evidently due to the insufficient flush, and where no stoppage had ever taken place before the adoption of a siphon cistern.—Ed. "B.N."

meters and stop-taps; that excellent results may be obtained by house-to-house inspection, or by the use of valves and the stethoscope at night. The author has known of eleven or twelve burst services underground being discovered in one night by the simple use of valves and the stethoscope. No day inspection can in itself alone be considered effectual for arresting waste. (3) That where strict supervision of the house services and fittings exist stop-taps are a *sine quâ non*. (4) That in every waterworks a system of stamping fittings should be in operation; and samples of approved fittings should be exhibited. (5) That it is not desirable that the supply of water—a necessary of life—should be controlled by meter, but that people should be taught the proper use of it, and that all reasonable encouragement should be given to its use for sanitary purposes. (6) That mains should be laid with not less than 2ft. 6in. or 3ft. cover, and that they should be tested before being covered up. Service pipes ought also to be under the supervision of the engineer. In many existing cases mains and services are so shallow as to allow the water to be directly affected by the summer temperature, not to mention the dangers from frost. (7) That the water going to waste is not only so much loss—especially under a pumping scheme—but that much of it being underground tends to produce damp foundations, and ultimately a large portion of the waste finds its way into the sewerage system, causing the local authority considerable expense. The author has found many broken mains communicating direct with sewers. (8) That the siphon cisterns so much used are an immense improvement on the old-fashioned arrangements, but that they are unsuitable for many positions, and that an ordinarily careful consumer would use much less water with a first-class valve w.c. (9) That reliable self-closing taps may be introduced with advantage in many cases, and without the concussion that used to be experienced with the old type of tap. (10) That with the rapid increase of population without an accompanying increase of water, and with the necessary appropriation of the large watersheds by the large municipalities of the country, the question of economy in water becomes more and more important. (11) Economy in water will often effect a saving in capital expenditure, annual working expenses, and wear and tear of machinery. The quantity of water which escapes through small apertures is enormous. The following table shows the result of some experiments made by the author:—

Description of Fitting Under Test.	Gallons wasted in 24 Hours.
3in. bib-tap, washer bad.....	700
3in. tap.....	920
3in. tap, screw stripped.....	12,720
3in. ball-tap, washer bad.....	900
3in. " lever strained.....	200
Pipes burst by frost, 3in.	11,280
3in.	17,280
Taps left open, 3in.	23,520
3in.	12,000
3in.	9,600

These were not specially selected. The waste would be more under pressures higher than 50lb.

CAST IRON IN BUILDER'S AND CONTRACTOR'S WORK.—XXXII.

By JOSEPH HORNER.

I PROMISED in conclusion to give some account of the chemistry of cast iron. It is a curious metal: strictly speaking, it is an alloy of iron with carbon and other elements. With a pure iron little or nothing of practical value could be done. It is the wide range of physical characteristics obtainable in the various grades of cast iron which render it so valuable for all classes of castings. These grades are intimately related to the variations in chemical composition. The following table exhibits these relations:—

Physical Characteristics.	Combined Carbon.	Graphitic Carbon.	Silicon.
Greatest softness.....	0.15	3.1	2.5
" hardness.....	—	—	Under 0.8
" general strength.....	0.50	2.8	1.42
" stiffness.....	—	—	1.0
" tensile strength.....	—	—	1.8
" crushing strength.....	Over 1.0	Under 2.6	About 0.8

Though chemical differences in irons vitally influence physical characteristics, chemistry alone will not account for the whole of the differences in those characteristics. I think this will be obvious after a perusal of the statements already made in reference to the effects of design and of workmanship on the reliability of castings, and it

is a fact also that the chemist, though always essential to the conduct of the blast furnace, has not yet proved himself, I will not say so much as indispensable, but even desirable in the iron foundry. To-day, as half a century ago, the founder judges of the quality of an iron by the manner of its fracture and the appearance of its fractured surface. In the highest class shops, as in the jobbing shops in England, this practice is almost universally followed. It is not a rule-of-thumb practice, but is simply a matter of experience and ripe judgment. The student who should analyse a sample of iron and give its percentage composition would, as a rule, not be so good a judge of the suitability of a given sample for certain castings as the practical foundryman would be; albeit the latter should be quite unable to follow the student in his analytical determination of the elements present in it.

Since the personal equation is the chief factor in the estimation of the quality of an iron, it not infrequently happens that errors are made in judgment by foundrymen whose capacity for observation is not of the keenest. Therefore it seems desirable that some more scientific method should be sought by which the quality of an iron should be determinable, and by which any desired product should be obtainable from the varied qualities of pig and scrap which come into the foundry. The uncertainty incidental to the methods of working, and to dimensions of castings, should also be eliminated—such matters as the effect of the section of casting, as mass, methods of melting, of pouring hot or cold, of cooling, whether quickly or slowly. The quality of iron of a given chemical composition would be affected by these matters in so vital a manner, that its physical characteristics would be profoundly changed, while its percentage composition would still be unaltered. Such being the case, it appears as though the chemistry of cast iron is inseparable from its particular applications, and from the practical details of manipulation. I suppose this is almost the only material concerning which such incongruity still exists, and the reason, doubtless, lies in its heterogeneous composition. About 5 or 6 per cent. of cast iron consists of foreign elements, of which carbon and silicon are the principal, both in quantity and influence.

But although our methods to-day differ in no wise from those of our grandfathers, there are indications that a change is impending. A few years since, M. Gautier, of Paris, made a discovery which gave rise to considerable discussion at the time, and which has been pursued with advantage to the present day. It had reference to the improvement effected in white iron by the addition of certain percentages of silicon thereto. A mixture of silicon with iron was prepared and offered for sale to enable foundries to improve the quality of inferior irons. But the most lasting results of the discovery have been due to an American, Mr. Reep, of Detroit. In America, more than with us, the art of mixing cast iron by chemical analysis and synthesis is in a fair way of becoming an applied science. Mr. Reep's name is mainly associated with this branch of metallurgy. He has made, and is still making, a most minute study of the influence of silicon in cast iron, and has devised a neat system of delicate practical tests of the resulting qualities produced. His work will probably have a wide and permanent influence on American foundry practice. This gentleman is at the head of one of the large stove manufactories of the United States—a manufacture which is carried on very extensively there, and one in which competition is keen both in respect of quality and of price. Mr. Reep has worked during many years, endeavouring to eliminate all elements of uncertainty in reference to the qualities of metal required for given classes of stove work. The problem he has set himself to solve is: Given any qualities of pig and scrap which may be purchased at different times, how is a uniform product to be obtained therefrom—one, namely, which shall have uniform shrinkage, strength, and toughness? This problem has been solved to a considerable degree, and Mr. Reep's methods are now in use in many American foundries. But the noteworthy point is this: that he makes the physical characteristics of shrinkage and strength the basis for regulating the chemical composition of an iron. And, further, regarding sulphur, manganese, and some other elements as mere bugbears of the foundryman, he effects the desired changes wholly by means of silicon and of carbon, the silicon being mainly valuable by

reason of its influence in effecting a conversion of the carbon from the combined to the uncombined state. I will return to this again; but before the student can comprehend the full meaning of what is involved in the above, it will be necessary to state succinctly the leading facts in the chemistry of cast iron, and their bearing on the qualities of castings.

An analysis of a Cleveland No. 2 foundry pig gives:—

Graphitic carbon.....	3.44
Combined carbon.....	3.44
Silicon.....	1.13
Sulphur.....	0.08
Phosphorus.....	1.24
Manganese.....	0.43
Metallic iron.....	93.73

100.00

Carbon is the foreign element which more than any other affects the production of the blast furnace, and governs the subsequent operations of the iron manufacturer. Iron is classified mainly according to its percentage of carbon; and steels and wrought irons owe their properties—the one to the exact proportions of that element present, and the other to its elimination. Iron, on being tapped out from the smelting furnace is run into pigs, being bars D-shaped in section, weighing about a hundredweight each, and these pigs yielded from different furnaces and ores, or from different conditions of working in the same furnace, are classed according to the appearance which they present when fractured, such fractures indicating to the experienced eye of the smelter the various proportions of carbon present, and also the manner of its combination, and the excess or otherwise of other elements. The most highly carbonised pig—the softest, the most fluid—is that called No. 1, and it often contains as much as 4 to 5 per cent. of carbon. At the other end of the scale of the products of the smelting furnace we have "white iron," the various classes between these passing through various shades of "grey" and "mottled," containing carbon in various properties and modes of combination, and each class possessing distinctive qualifications which render it suitable for special kinds of work. The white iron approximates to steel in some respects, being extremely hard, though very brittle, and containing practically all its carbon in chemical combination instead of as graphite. It is, moreover, less fusible, less readily acted on by acids, and less susceptible to atmospheric influences than the grey varieties. Neither is it so fluid when melted, but passes into a pasty condition which, leaving its brittleness out of the question, renders it unsuitable for foundry purposes. It is, therefore, used for conversion into wrought iron, and is called "forge pig" to distinguish it from the foundry pig. Only in very exceptional cases is it used for castings at all, and then only for those requiring some special quality of hardness, or for mixing with other brands for the production of a serviceable iron. In the foundry it is seldom that one brand of iron is used alone, since greater toughness and strength can be obtained by a judicious mixture of various pigs than by the employment of one only. In these matters the experience of the ironfounder alone is usually the sufficient and only guide. The art of the furnaceman and ironfounder largely consists in the blending of irons, both pig and scrap, to obtain qualities ranging anywhere between these two extremes, to suit the many and varied classes of foundry work.

Until recently carbon was considered as the element which more than any other determined the character of an iron. Probably that view is correct. But it is now certain that the element silicon runs carbon very closely in the race. That, however, affects the iron through the carbon, that is by checking the tendency of the latter to leave the graphitic and enter into the combined state. The main difference between the grey and the white iron is that the carbon is usually graphitic in the first, and combined in the second. Silicon, by checking the tendency of the carbon to combine, favours the production of grey iron. Hence an alloy of ferro-silicon containing 10 per cent. of silicon has been used to render hard white iron grey and soft.

It is often stipulated that iron shall be remelted once before being poured into castings. The effect of remelting is increased strength and hardness. This is the result of a change of graphitic carbon into combined, which accompanies a diminution of the silicon. Hence repeated remeltings will produce an entirely white, hard,

and brittle iron. The following table shows these effects. The addition of more silicon would bring back white to grey.

Carbon and Silicon.	Original Pig.	Fourth Melting.	Sixth Melting.
Graphite	2.73	2.54	2.08
Combined carbon	0.66	0.80	1.28
Silicon	2.42	1.88	1.16

Silicon regarded alone, that is, without carbon to work upon, and in large quantity in iron, is an element which produces whiteness, hardness, and brittleness. Hot-blast iron is more silicious than cold blast. The product known as glazed, or blazed pig, is so highly silicious as to be discarded for all except the very poorest and roughest classes of work. But if the silicon be introduced in definite quantities relatively to the amount and condition of the carbon present, then it becomes a valuable agent in the founder's hands. An addition of silicon to white pig precipitates the combined carbon in the form of graphite, producing grey pig. In grey pig the expulsion of silicon converts the graphite into combined carbon, and produces white pig.

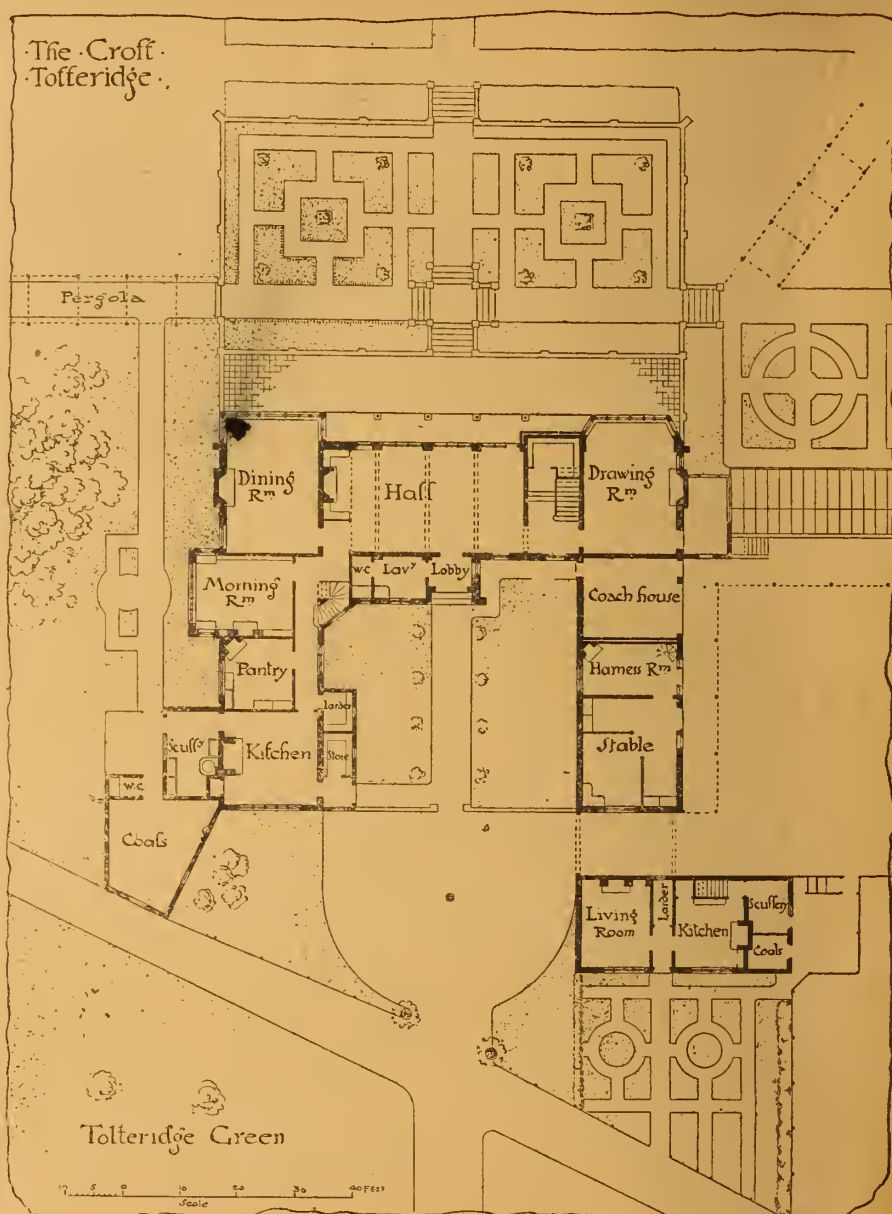
THE "PRIX DE ROME" AT THE ECOLE DES BEAUX-ARTS, PARIS.

THE art jury has awarded the Grand Prix in each section of art as follows:—Painting to M. Moulin pupil of M. Gerome; sculpture to M. Champeil, pupil of MM. Thomas and Gauthier; and architecture to M. Pille, pupil of M. Pascal.

This competition for the much-valued Prix de Rome is for five years' travelling scholarship in Italy. The subject given to the competitors in the section of Painting was, as usual, drawn from classic sources. "Marsyas, proud of his talent on the flute, dared to challenge Apollo. It was agreed that the vanquished would be at the mercy of the conqueror. The vanquished Marsyas was attached to a tree and mercilessly flayed by a slave in the presence of the victorious Apollo." The subject appears to have afforded sufficient inspiration to the ten competitors, for the work of each one is well above the average. The best paintings after that of M. Moulin, the prize winner, are by MM. Laurens and Galaud. The other artists have dwelt more especially on the punishment of the conquered rival; fortunately few have gone so far as to illustrate a scene of realistic butchery. One, however, M. Felix, has carried out the programme to the letter. One of the competitors shows the victim engaged in a desperate struggle with his two executioners.

In the section of Sculpture the programme proposed a classical subject not unworthy of the best artists. "Porsenna, King of Etruria, besieged Rome. Mucius Scaevola, a Roman of tried valour, having formed the intention of killing Porsenna, enters the enemy's camp; but not knowing the king personally, strikes one of the recorders whom he supposed to be Porsenna himself. Mucius, perceiving his error, defies the king with unflinching eyes full of menace, and, thrusting his right hand into a burning brazier, cries: 'Three hundred Romans have conceived the same purpose as myself, and wander in your camp, waiting the favourable moment to kill you.'" Amongst the ten works of sculpture sent in, three or four are worthy of special attention. The Mucius of M. Champeil proudly hides all evidence of the suffering he is undergoing; the expression of the face is calm and noble, and the lines of the figure very harmonious. The young sculptor has evidently intended to give to his work the style and appearance of a Roman statue, and has well succeeded in his idea. The Mucius of M. Vermare is a clever piece of work, and gives evidence of careful study and considerable skill in modelling. The works of two other competitors—M. Laurent and M. Rispal—are also full of excellent qualities. The others have somewhat unsuccessfully struggled with the difficult task of giving to the face and figure of the Roman the proper expression and attitude of a hero enduring self-inflicted torture. Some have entirely failed in this respect, and their works show faces depicting a keen suffering unworthy of the Roman.

The subject given to the competitors for the Prix of Architecture was a Naval School. This school, to be built in the close neighbourhood of an important seaport and naval station, should be placed in such a position overlooking the harbour that one of the principal entrances facing the sea could be strictly reserved for the naval service; the other, on the land side, would be used for the ordinary school purposes. The building should comprise the offices and administrative



buildings; the dwellings for officers and pupils; the school buildings proper, and all dependencies. The whole should be suitably planned with regard to the position of the buildings in respect to the port. For this "Prix" M. Pille was successful in obtaining the coveted award of the jury. Some of the competitors amongst the ten who sent in designs appear to have lost sight of the purpose for which the building was intended, and sent in designs more suitable, as regards their façades, for a museum or a town-hall. Others, however, have kept to the spirit of the programme, and exhibit plans and designs well worthy of remark, both as regards their careful planning and interesting style of architecture, and also the clever and effective colouring of the drawings. Good designs were also sent in by MM. Garnier, Umdenstock, Tronchet, and Bigot.

"THE CROFT," TOTTERIDGE, HERTS.

[WITH PHOTO-LITHOGRAPHIC ILLUSTRATIONS.]

THIS house, of which we give two views and a plan to-day, is built of red brick, with Ancaster stone mullions and jambs to the ground floor, and oak windows to the first floor, the upper portion of the walls being finished in rough-cast. The roofs are covered with old plain tiles. The house is placed in a belt of oak-trees facing Totteridge Green. The client began laying out his garden before the footings of the house were commenced, so that he has the advantage of nine months' growth of trees and flowers previous to occupying the house. The work has been carried out by Mr. F. Tribe, clerk of works, the owner buying material and employing labour. Mr. T. E. Colcutt, F.R.I.B.A., is the architect.

CHIPS.

Sir William Hart Dyke, M.P., opened a new Conservative Club at Plumstead on Saturday afternoon. The new clubhouse has been erected at a cost of £3,500.

The extensions to the municipal offices, Warrington, are being warmed and ventilated by means of Shorland's patent Manchester grates, the same being supplied by Messrs. E. H. Shorland and Brother, of Manchester.

At Colne, Lancs., Mr. R. Walton, a Local Government Board inspector, has held an inquiry into an application made by the town council for sanction to borrow £12,000 for the purpose of extending the gasworks.

Mr. R. Deane Sweeting, M.D., Local Government Board inspector, held an inquiry at Coventry on Wednesday with respect to the application of the corporation to borrow £6,700 for alterations and additions to the existing isolation hospital, and £3,100 for the erection of a small-pox hospital at Pinley.

A new parish hall and Sunday schools at Walker-on-Tyne were opened on Wednesday by Mr. Riley Lord, J.P., Mayor of Newcastle. The new structure is in close proximity to the east wall of the present parish church. The interior of the hall measures 70ft. in length, with a width of 33ft.

At Monday's meeting of the Morecambe District Council, it was resolved that tenders be invited for making the Bare sea-wall and promenade, including and excluding the laying of the tram-lines, subject to the requisite departmental consent being obtained. The district council approved of plans submitted by Mr. F. Edwin Breare, of London, for the erection of a new hotel on the Carlton Gardens Estate (now used as pleasure-gardens), at the east end of Morecambe, to be designated the "Grand Hotel." The building is to contain 100 bedrooms, and the estimated cost is stated to be about £30,000.

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THE HALL OF THE MERCERS' COMPANY.—"THE CROFT," TOTTERIDGE.—NEW SCHOOL FOR GIRLS, PAIGNTON.—MUSEUM BUILDINGS AND TECHNICAL SCHOOLS, LIVERPOOL.—HALIFAX NEW INFIRMARY.—DECORATIVE FURNITURE FROM PRIVATE COLLECTIONS.

Our Illustrations.

CITY GUILDS: NO. XXV.—THE STAIRCASE OF THE MERCERS' COMPANY.

THE previous illustrations which we have given from the Hall of the Mercers' Company, first on Nov. 8th last year, and again on May 29th this spring, were accompanied by notes and letter-press references to the incidents and historical records of this great City Guild. There is, therefore, little to add while now illustrating the Grand Staircase next the principal entrance in Cheap-side, and leading to the drawing-rooms on the first floor. The view was specially taken for our pages by Mr. J. T. Sandell.

"THE CROFT," TOTTERIDGE, HERTS.

(See description and block-plan on p. 222.)

NEW GIRLS' SCHOOLS, PAIGNTON, DEVON.

THESE premises were commenced in October last for the Paignton School Board, and adjoin the existing infants' and boys' schools in Curledge-street. The fall of the site necessitated much excavation in order to form a level playground at the rear. Around a spacious central hall are ranged six classrooms to accommodate 384 scholars, a cookery classroom, with scullery, mistresses' cloakroom and lavatories, &c. Children's dinner-room, stationery store, head mistress's private-room, and the scholars' cloakrooms are on either side of the main entrance, under which are arranged the heating-chamber, coke store, &c. A covered playshed will be formed in yard, and a group of nine water-closets, lavatory, &c., also in playground. Special entrances are formed for mistresses, night school, and for large hall when used for special purposes. The buildings are faced with local limestone and Monk's Park stone dressings, and white brick at rear. Some portions of the floors will be laid by the Wood Block Flooring Co., and the heating by De Ridder's small-pipe system. The work is being executed by Mr. H. P. Rabbich, of Paignton. Mr. J. Davey is clerk of the works. Messrs. Norman G. Bridgman, A.R.I.B.A., and Walter H. Bridgman, M.S.A., Torquay and Paignton, are the architects.

EXTENSION OF MUSEUM BUILDINGS, AND NEW SCHOOL OF SCIENCE, TECHNOLOGY, AND ART, LIVERPOOL.

WE illustrate to-day the selected design by Mr. E. W. Mountford, F.R.I.B.A. The Council of the City of Liverpool invited competitive designs for the extension of the existing Museum buildings, and for the erection of new buildings for a school of science, technology, and art, together with a students' lecture-hall, on land containing 2,900 square yards or thereabouts, situate on the west side of the museum, and having frontages to William Brown-street, Byrom-street, and Clayton-street. The Council offered premiums

of £150 and £50 respectively, for the two designs which might be adjudged first and second in order of merit, and when the buildings are proceeded with, the author of the first premiated design is to be the architect for the carrying out of the work at the usual commission of 5 per cent. on the actual cost. The Council, in the selection of the designs, were advised by Mr. Aston Webb as assessor. The accommodation required was as follows:—The museum extension is provided by means of continuous galleries running through and on a level with the ground and first floors of the present museum buildings. The upper floor of the museum is top-lighted. Communication between the floors of the extended museum buildings is arranged, but no other public entrance than that already provided in the present buildings is required. The existing lighting of the present museum buildings is interfered with as little as possible. This portion of the scheme is entirely separate and distinct from the School of Science and from the lecture-hall; but means are provided, in the extended portion of the Museum, for the escape of persons in case of fire. Provision is made for office accommodation, for the Museum staff, comprising one room 30ft. by 20ft., and two rooms each 20ft. by 20ft. The School of Science, Technology, and Art has its entrance from Byrom-street, and provides—(A) Rooms for practical work by the students: (1) plumbing and metal-plate work; (2) woodwork (carpentry, cabinet-making, pattern-making); (3) plasterers', masons', and bricklayers' work; (4) house painting and decoration; (5) photography; (6) electrical laboratory (with small room for gas-engine and dynamo); (7) practical physics and mechanics; (8) chemical laboratory (with small store-room and balance-room attached). Many of the class-rooms for theoretical instruction are necessarily appropriated to particular subjects, or small groups of allied subjects, so that the necessary apparatus and illustrations may be kept conveniently in the room, and any special fittings provided. The following rooms are provided:—(1) Chemical lecture-room (situated near laboratory, with good ventilation, water and gas supply, and accommodation for apparatus); (2) magnetism and electricity, and physics; (3) mechanical engineering (lectures on machine construction, applied mechanics and steam); (4) drawing-room for machine drawing, and practical plane and solid geometry; (5) plumber work, metal-plate work; (6) building construction, brickwork and masonry, plasterers' work; (7) carpentry and joinery, pattern making, cabinet making; (8) mathematics, theoretical mechanics, quantities, surveying; (9) printing trades—lithography, typography, and book-binding; (10) geology, mineralogy, physiography, agriculture; (11) physiology, biology, hygiene, botany; (12) flour-milling and bread-making; (13) tailoring, upholstery, and miscellaneous trades; (14 to 19) six spare classrooms; (20) special room for drawing and preparation of home work. The general arrangements include hall, with fireplace, where students may wait; lavatory, office, store-room, for general apparatus, &c.; teachers' room, board-room, reference library, stationery-room, heating-chamber, coal store, and scullery for charwomen. A students' lecture hall, accommodating from 400 to 500 students, is provided in connection with the School of Science, &c. The hall, which is to be used for lectures, meetings, &c., has ample exits, cloak-rooms, retiring rooms, &c., and the hall is so situated that no disturbance will be caused to students in the schools or those in the museum. The council, whilst not restricting the architect as to the style which he might adopt for the exterior treatment, were anxious that the new buildings should harmonise with the adjoining museum and other public buildings in the immediate neighbourhood, and the new buildings were not necessarily to form an integral part of the existing museum buildings; but if separated, the galleries were to be carried across. The frontage to Clayton-street is to be faced with brick and stone dressings, and the frontage to Byrom-street and William Brown-street with stone. The buildings are to be fireproof throughout. Great importance has been attached to the thorough lighting of the galleries, rooms, and corridors. The council's idea of the cost of the proposed buildings was about £80,000. The council expressed a desire to erect a building which will be an ornament to Liverpool, characterised by dignity of proportion and simplicity of design, combined at the same time with thorough efficiency and adaptability to its purpose.

HALIFAX NEW INFIRMARY.

WE herewith give a plan of the above infirmary buildings, of which Messrs. Worthington and Elgood, of Manchester, are the architects. In our issue of July 24th last we published a bird's-eye view, when we also gave full particulars.

DECORATIVE FURNITURE FROM PRIVATE COLLECTIONS.

AMONGST our sketches of old furniture this week, the Italian Chair of the 17th century presents several interesting features. Thus, the shaping of the seat, not only on the front and side edges, but also (which is far more uncommon) on the inner or rear edge. Then, again, the crocket-like termination of the uprights to back; and, further, the snaky twist of the arms, and slight outward turn of the legs (the front ones being tapered) are all points which give character and interest. The wood of which the chair is made is possibly pear, and it is ebonised throughout, with the exception of the decorated portions which are left the natural colour, inlaid with scrolls and flowers. It belonged to the late Lord Leighton, P.R.A., and was sold at Christie's, where our sketch was made. The China Cabinet, with cabriole legs and ball and claw feet, stands 5ft. high, and 1ft. 8in. wide by 9½in. deep from back to front, while the body is 1ft. 2½in. off the floor. It is made in walnut, and is now to be seen at the Exhibition at Bethnal Green. The Chair and Table, both from the same Exhibition, are interesting as early examples of furniture in which "bowed" legs are employed, which afterwards grew so much in favour, and received so many developments in the days of Queen Anne and onwards. They belong to that period of Dutch influence inaugurated by William of Orange, commonly known as the Anglo-Dutch. The Table-top is 2ft. 9in. long by 1ft. 6½in. wide, and stands 2ft. 4in. high. It is solidly veneered in figured walnut, and is slightly decorated with a little inlay in light wood.

CHIPS.

The town council of Aldeburgh, East Suffolk, have instructed Mr. James Mansergh, C.E., to prepare plans and report as to the best system of sewerage and sewage disposal for that small watering-place.

The claim to the public right of way over Kinder Scout, the finest hill-top walk within reach of Manchester men, and the most picturesque approach from the north-west to the Peak District, has at last been fully conceded by all the landowners concerned. The Northern Counties Footpaths Preservation Society propose to expend about £500 in improving the footpath, the course of which has been definitely determined.

The River Weaver trustees are negotiating for the borrowing of a large sum of money for carrying out the improvements to the waterway sanctioned by recent Act of Parliament. Something like £30,000 will be expended upon two swing bridges, which will probably be worked by electricity. One of these bridges is in substitution of the present fixed town bridge at Northwich, which has subsided so rapidly of late that the salt craft have to be overlaid to permit them to pass beneath. In addition to these improvements, a set of locks at Newbridge, near Wiusford, is to be removed, and at an early date the deepening of the river may be undertaken.

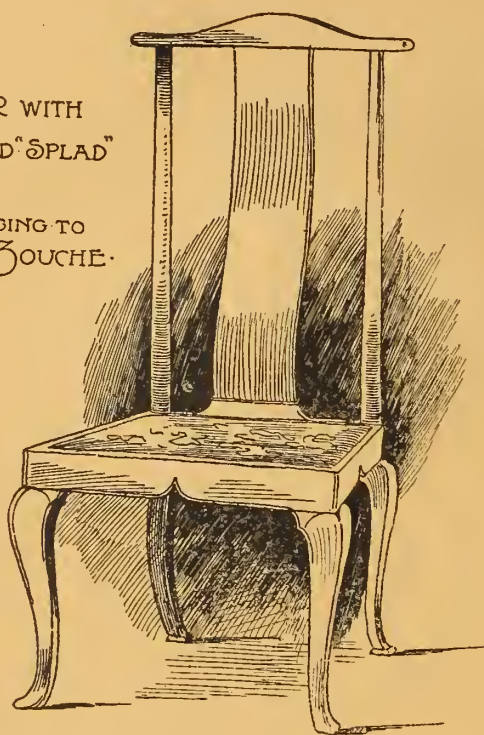
A fire broke out on the premises of Messrs. W. A. Rose and Co., Millwall, by which a building of six floors and about 60ft. square, used as an oil refinery, was completely destroyed, together with three barges loaded respectively with tar, oil, and coal.

Mr. Bicknell, an inspector from the Local Government Board, held an inquiry at Heaton Norris on Friday into the urban district council's application to borrow £2,447 for works of private street improvement, and £1,226 for the purchase of land for new offices. Evidence as to the proposals and requirements of the council was given by Messrs. Banks and Sheard, clerk and surveyor respectively.

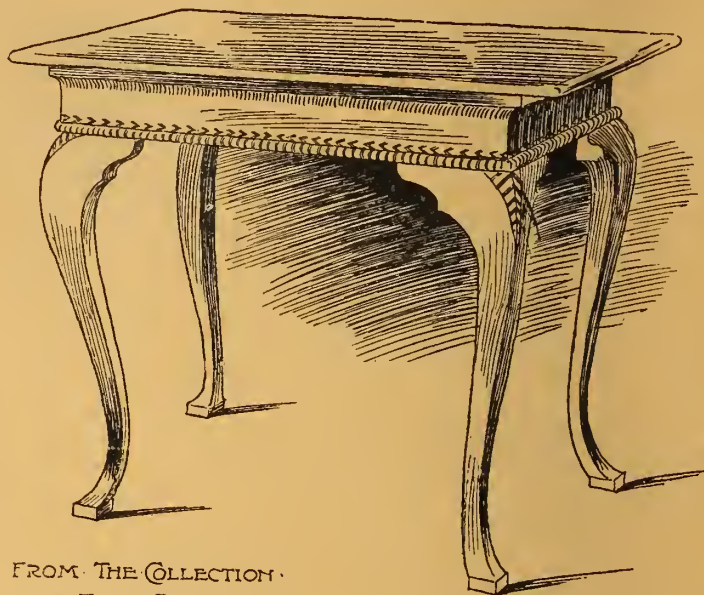
The Home Secretary, in settling the dispute between the Grantham and Kesteven authorities, has decided in favour of the Rauceby site for the new county asylum. The necessary land at Rauceby has been provisionally purchased.

A new eight-day turret-clock and bell has recently been erected at Lea Green by Messrs. W. Potts and Sons, clock manufacturers, of Leeds and Newcastle-on-Tyne. The clock shows the time upon two external dials and strikes the hours upon the bell; also compensation pendulum and all the latest improvements inserted.

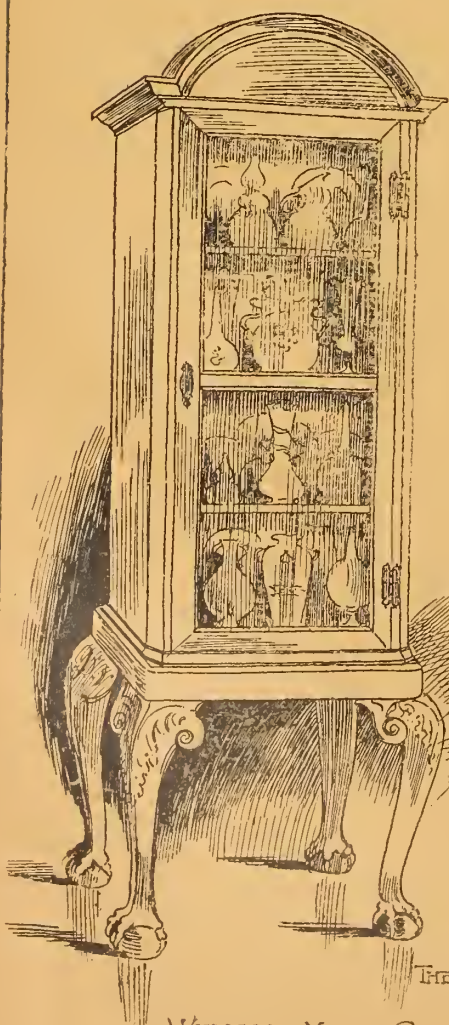
IN WALNUT.

CHAIR WITH
SHAPED "SPLAD"BELONGING TO
LORD ZOUHE.

DECORATIVE FURNITURE FROM PRIVATE COLLECTIONS

FROM THE COLLECTION
OF EARL BROWNLOW.

CHAIR & TABLE OF ANGLO-DUTCH PERIOD.



ITALIAN ARM-
CHAIR.
SEVENTEENTH CENTURY.
FROM THE COLLECTION OF THE LATE
LORD LEIGHTON PRA

THE PROPERTY OF
SIR W. WELBY-GREGORY BART

WILLIAM & MARY CHINA CABINET
WITH CABRIOLE LEGS

D. & G. S.

A: Ernest Chancellor S.W.

NEW SCHOOL FOR
GIRLS.
CURLIDGE ST.
PAIGNTON.

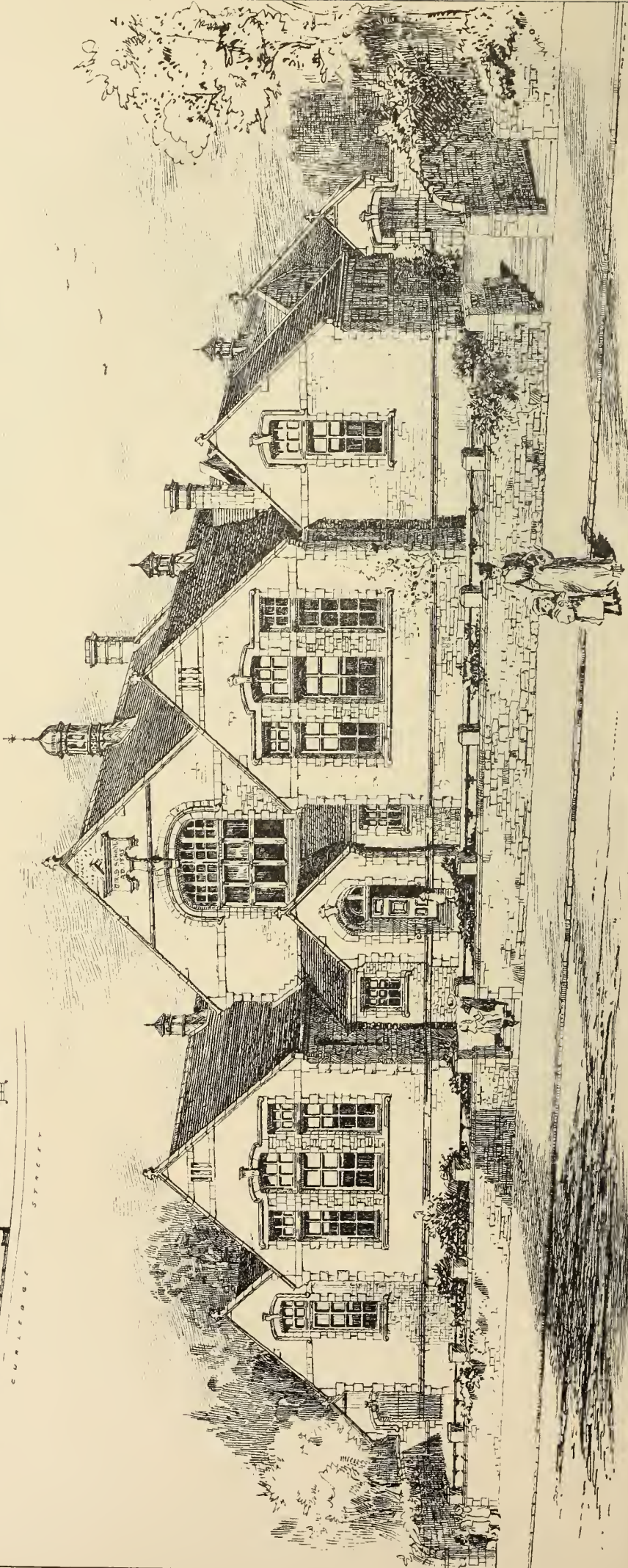
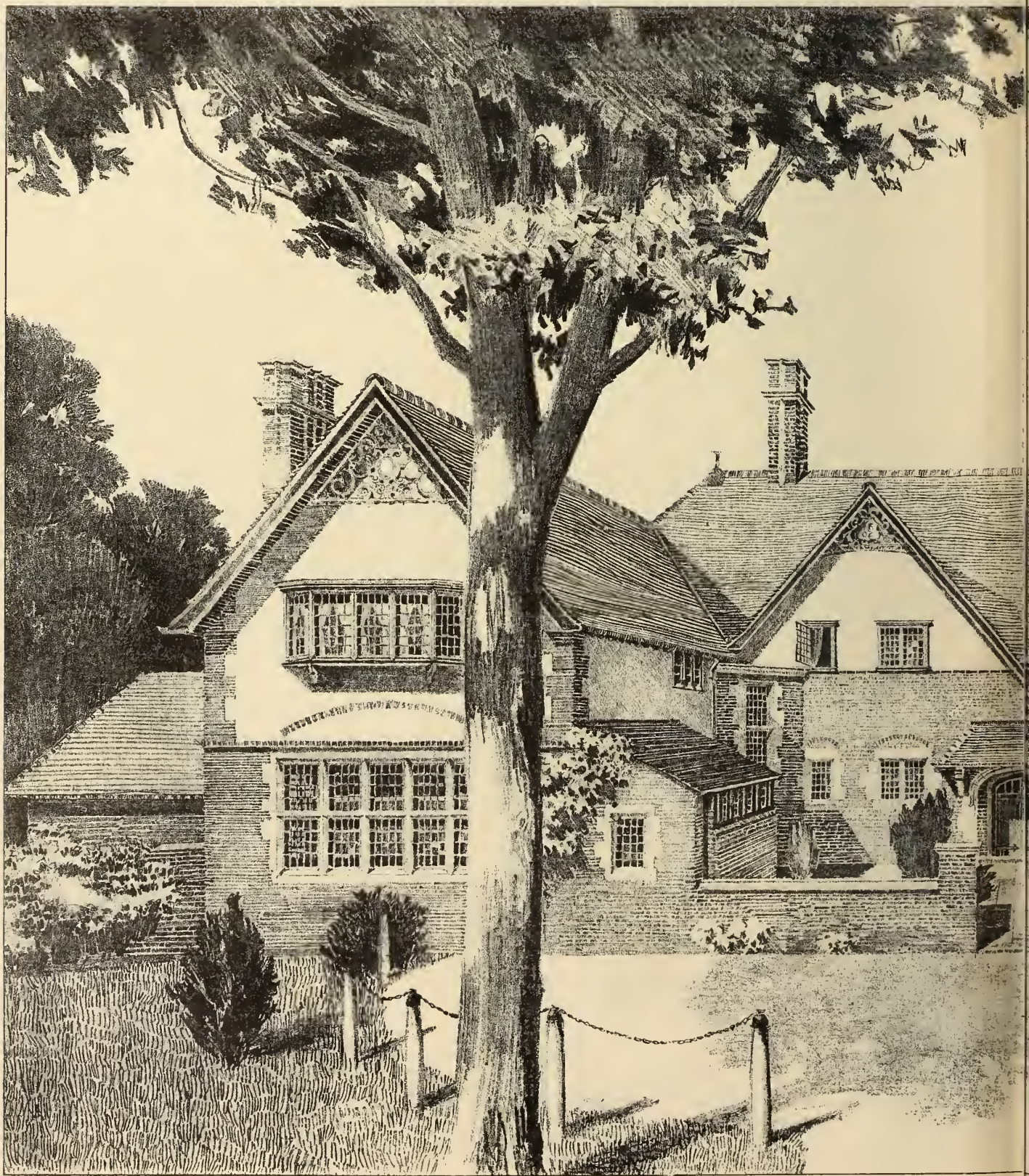


Photo Lithographed & Printed by James A. H. Newman, 6 Queen Square, W.C.

Bridgman & Bridgman, 1896



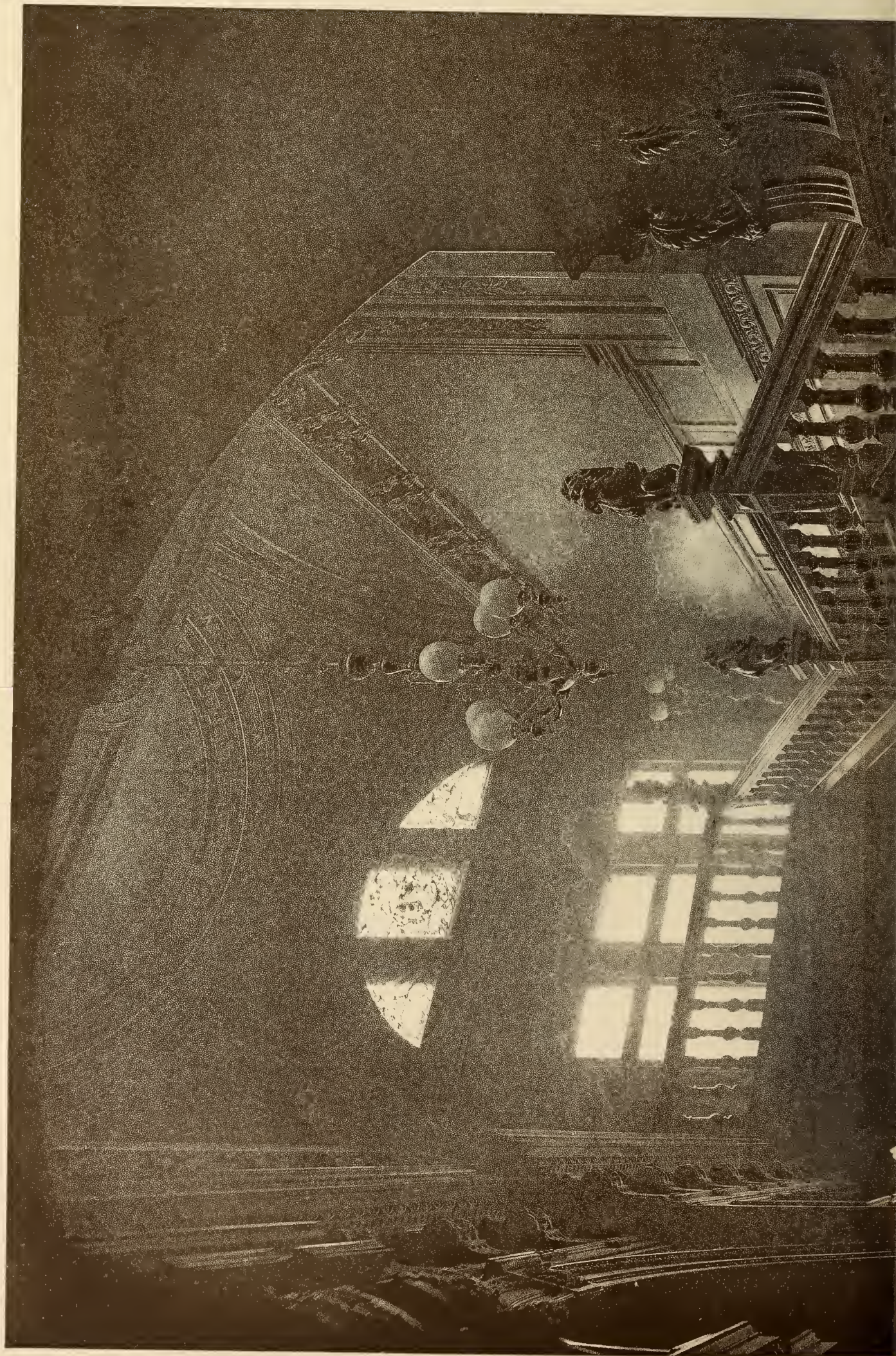
Aug. 14, 1896.

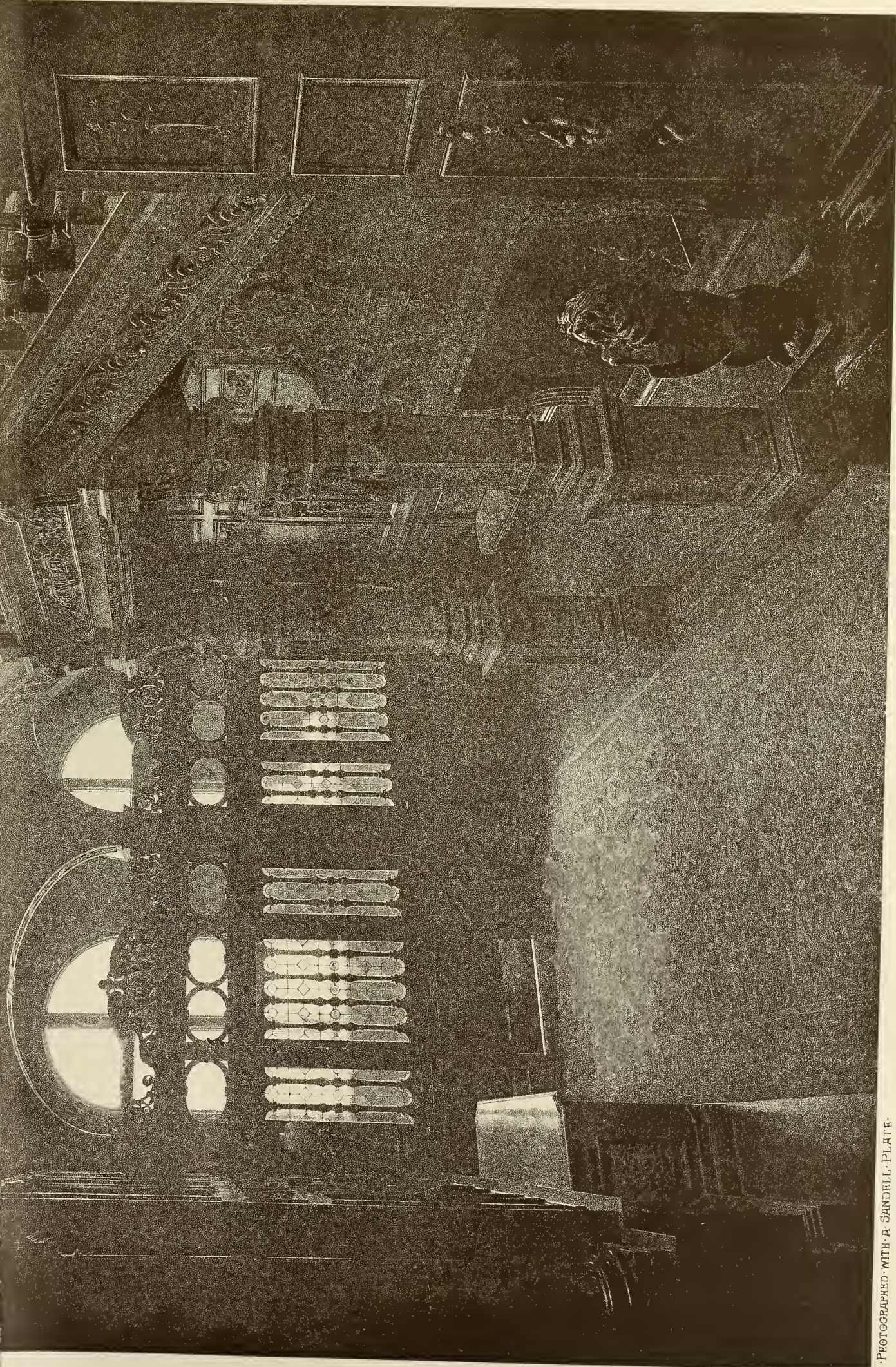


THE CROFT
TOTTERIDGE
HERT'S.
TECOLLUTT ARCHT

"PHOTO-TINT", by James Akerman, 6, Queen Square, London, W.C.

THE BUILDING DEWS, AUG 14, 1896

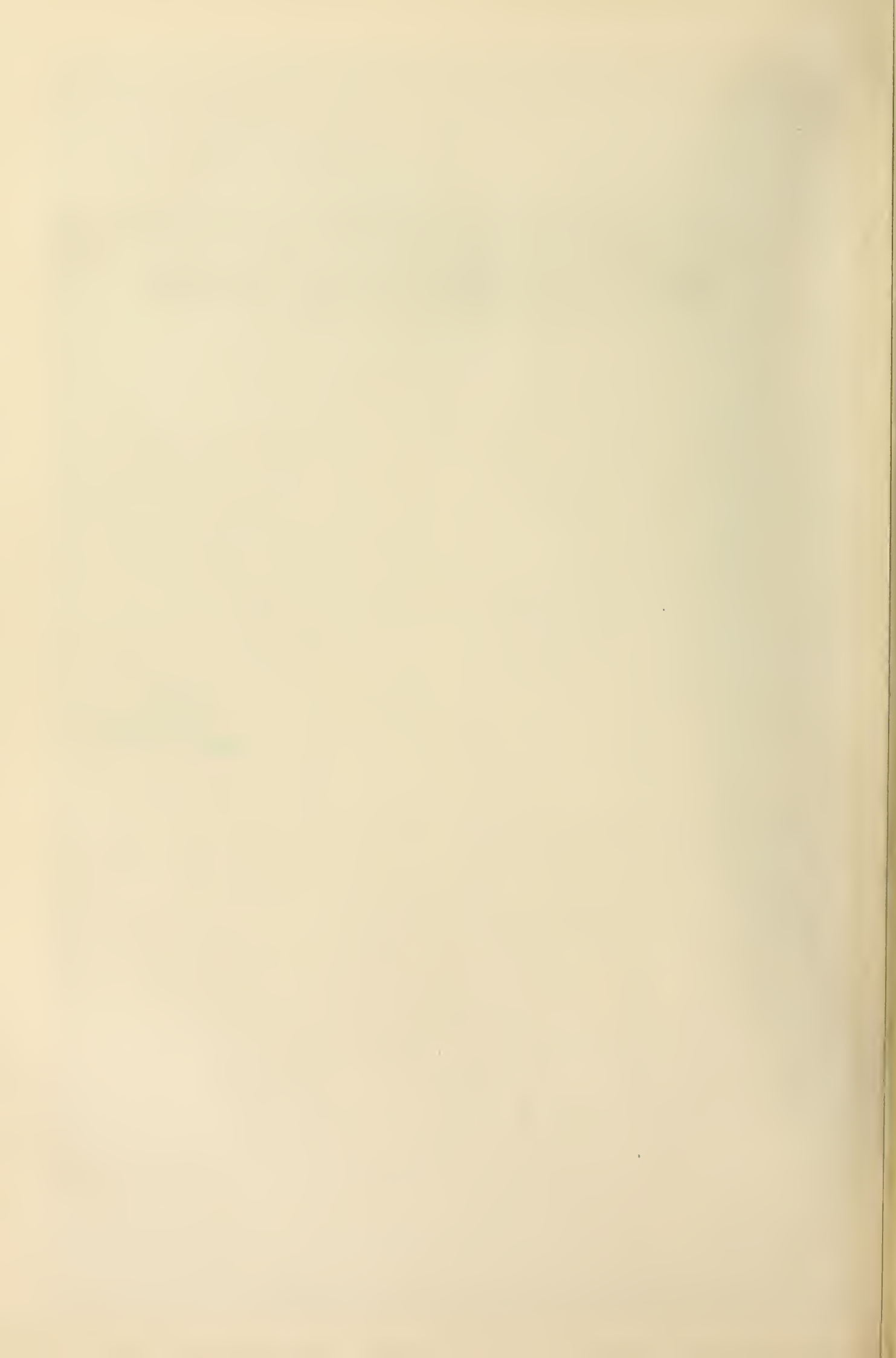


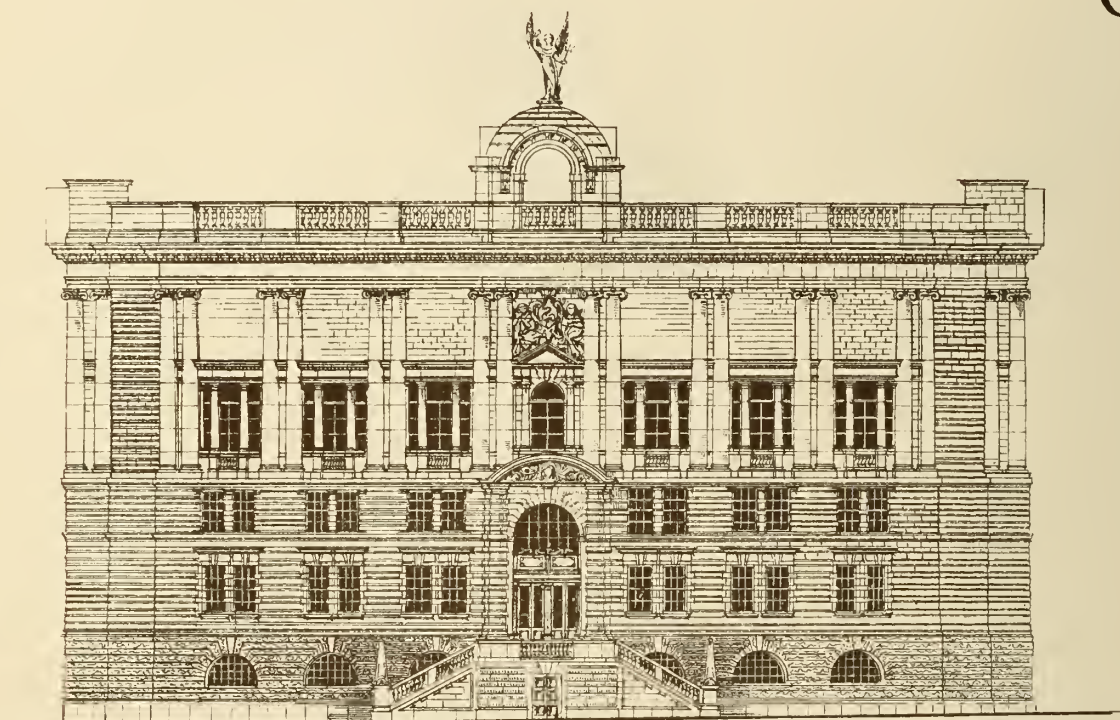


PHOTOGRAPHED WITH A SANDELL PLATE.

THE CITY GUILDS NO 25 THE HALL OF THE MERCERS' COMPANY
THE GRAND STAIRCASE.

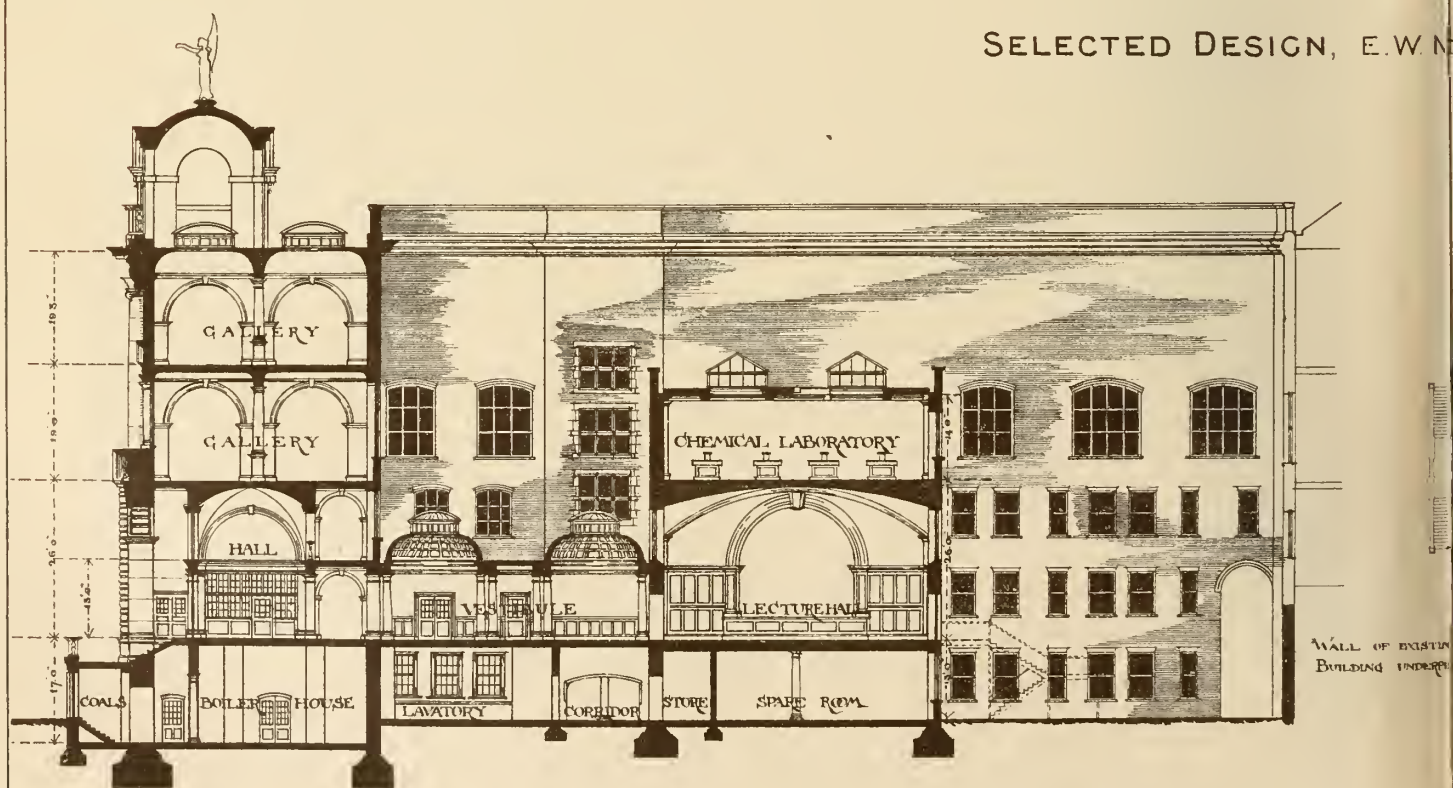
"PHOTO-FIN" by James Agerman Queen Square London W





ELEVATION: TO: BYROM: STREET:

SELECTED DESIGN, E.W.N.

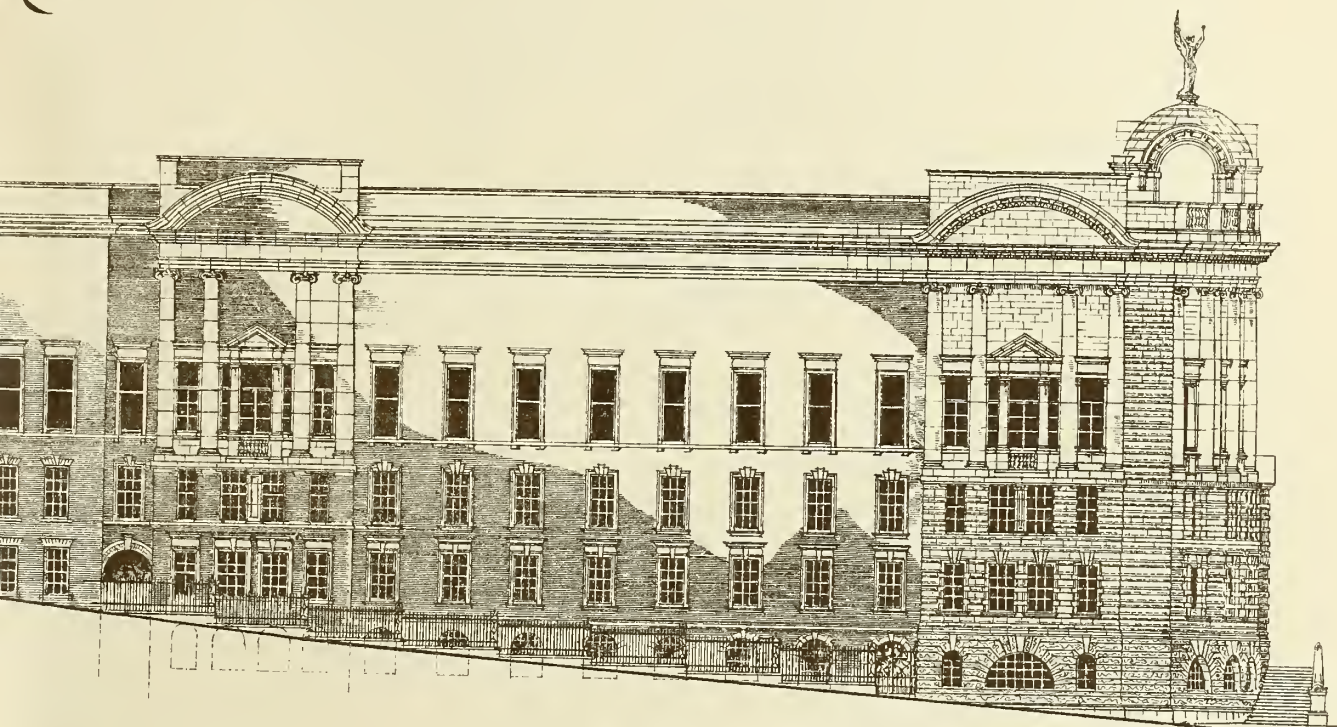


LONGITUDINAL: SECTION:

SCALE OF FEET

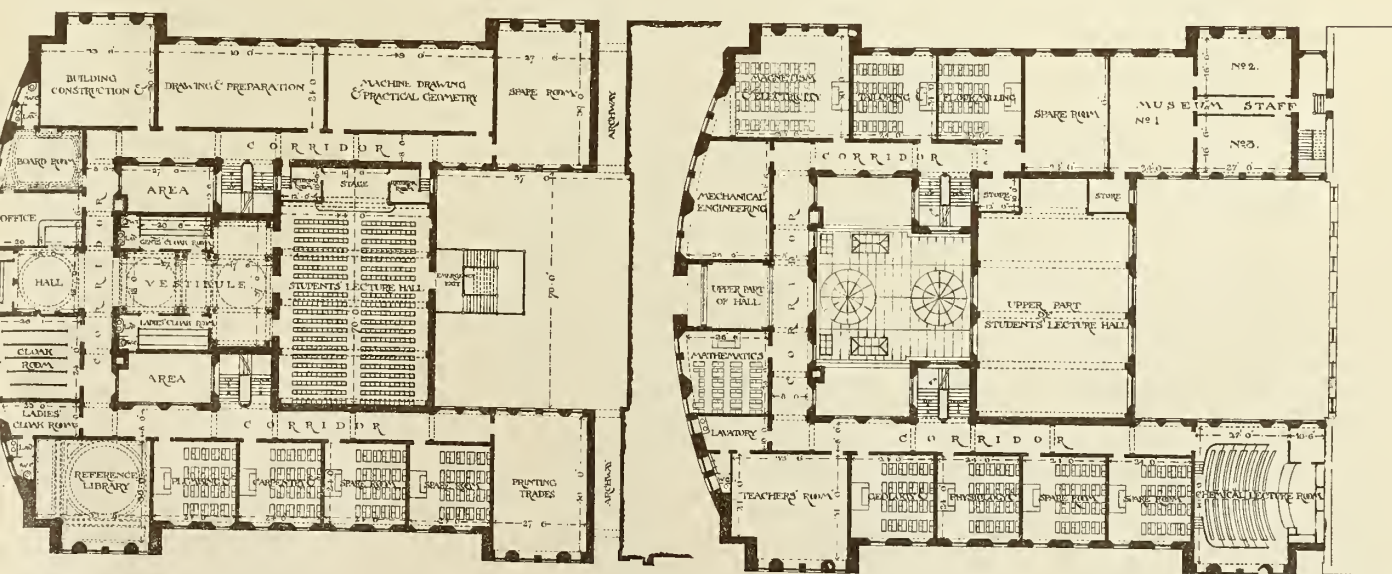
Aug. 14, 1896.

S: & NEW TECHNICAL SCHOOLS: POOL:



ELEVATION TO CLAYTON STREET:

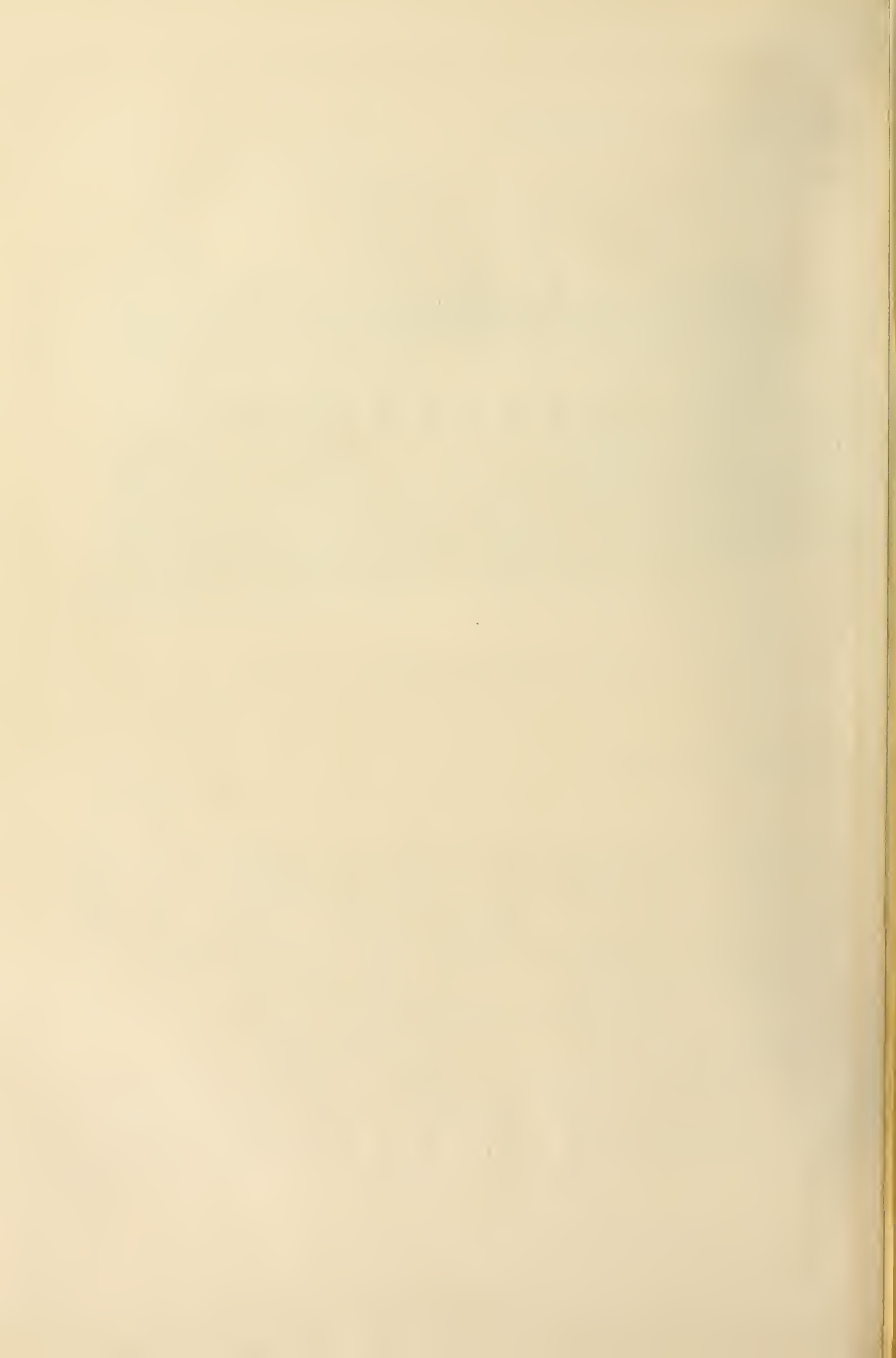
UNTFORD, F.R.I.B.A. ARCHITECT.



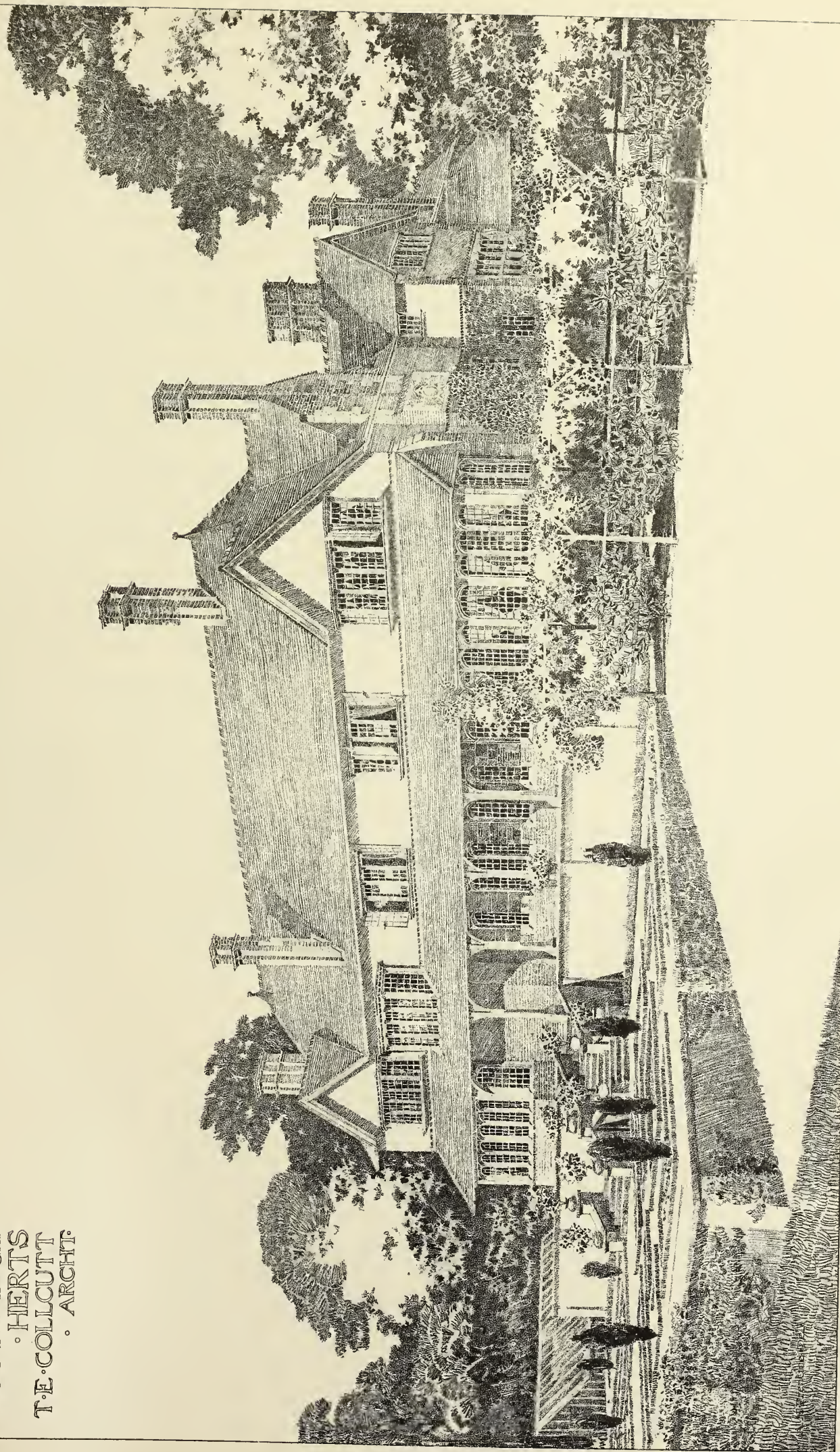
GROUND FLOOR PLAN:

1ST FLOOR PLAN:

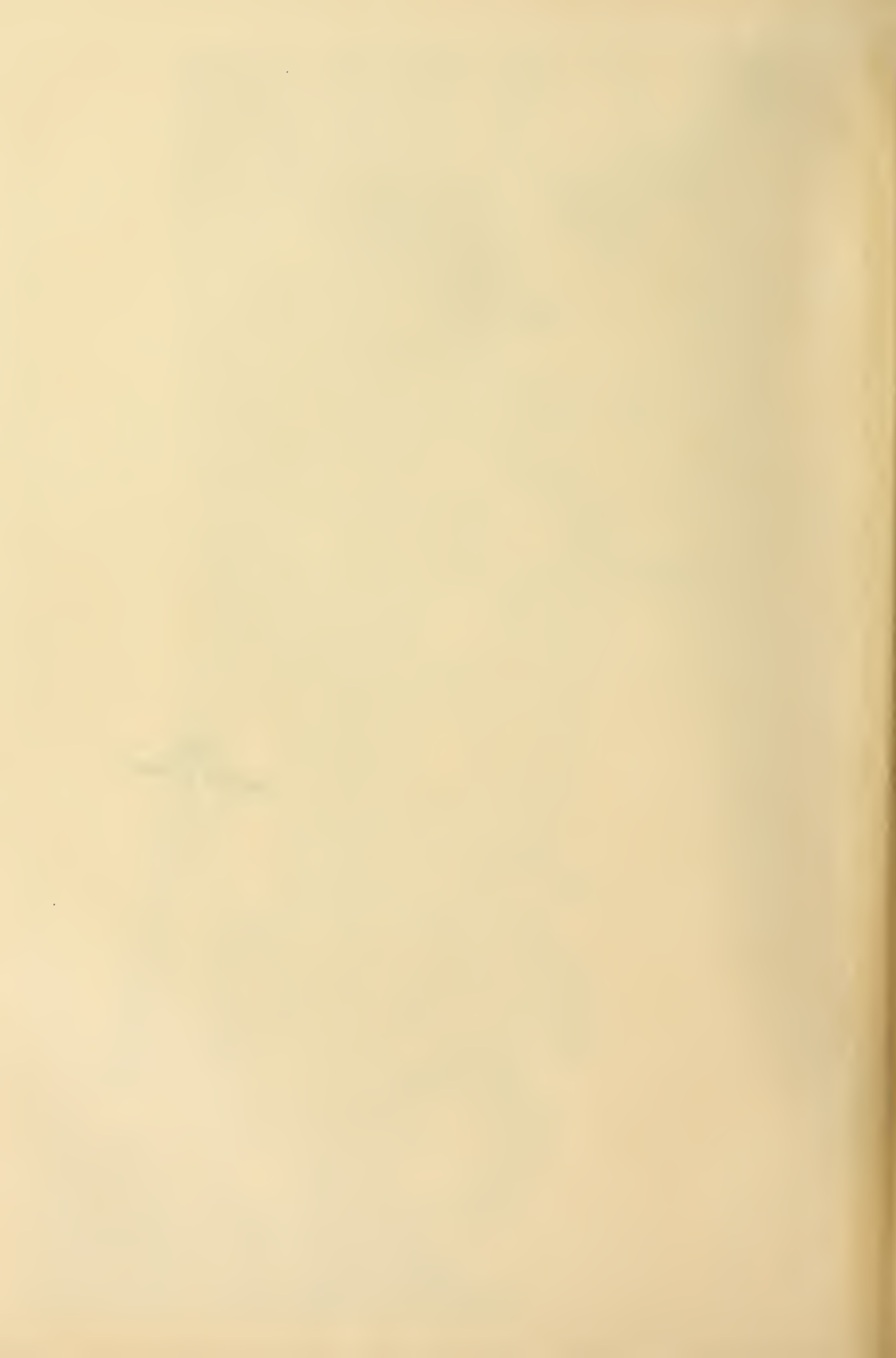
Scale of Feet 0 10 20 30 40 50 60 70 80 90 100



THE CROFT
TOTTERIDGE
HERTS.
T. E. COLCUTT
ARCHT.

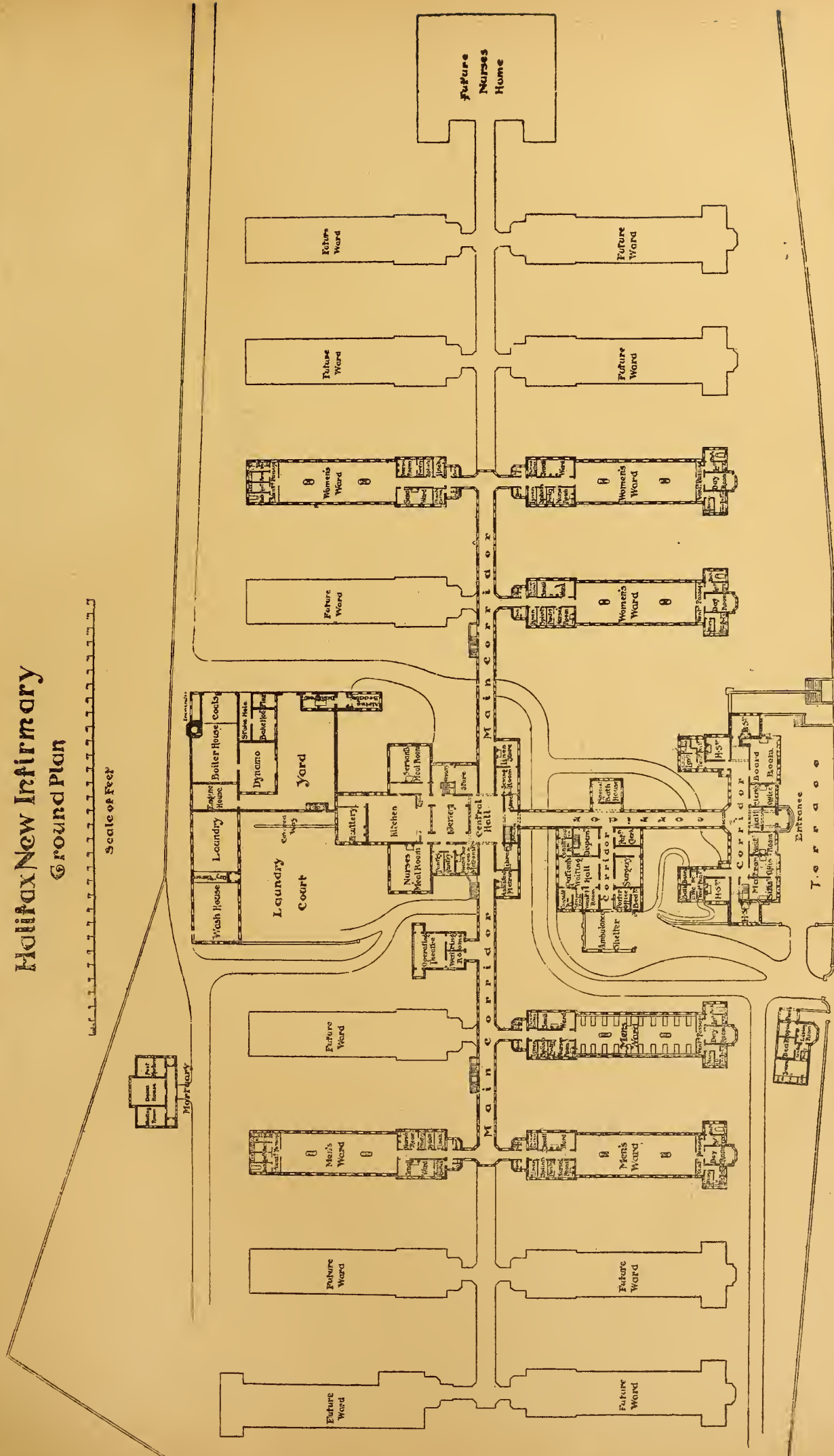


"Photo-Tint" by James Akerman & Co. Queen Square, London, W. C.



Mollifax New Infirmary

Ground Plan



Mrs Waddington

Building Intelligence.

CARLISLE.—A new girls' department, added to the board school in Brook-street, was formally opened on Tuesday in last week. In addition to the girls' department there has also been added to the existing block a cookery school with covered playground below, and the infants' department has been enlarged by the addition of a new classroom and cloak-room, affording accommodation for 78 more infants. The cost of these additions has been £5,217. The girls' department comprises a schoolroom divisible into three classrooms for 60 children each, flanked on the Edward-street side by two and on the Howe-street side by one classroom, each seated for sixty scholars, a cloakroom being provided contiguous to each entrance. A new arrangement of screens designed by the architect, and not hitherto adopted, will allow the main portion of the building to be converted in a few seconds into one large hall for special requirements, educational or otherwise. The school corresponds in appearance with the boys' and infants' schools erected some five years ago. The cloak-rooms, lavatories, teachers' room, &c., are disposed on the playground side. The floors throughout are laid with wood blocks, for silence, slightly raised galleries being formed for the desks. The cookery school is a separate block, with fireproof floor and staircase over the covered playground below it. Mr. T. Taylor Scott, F.R.I.B.A., of Carlisle, prepared the designs for the whole of the schools, and the work has been executed under his superintendence. The heating and ventilating appliances are by Messrs. E. H. Shorland and Brother, of Manchester.

HUNSTANTON.—The new town hall was opened on Thursday in last week. It has been erected from the designs of Messrs. G. J. and F. W. Skipper, F.R.I.B.A., architects, of Norwich, whose plans were chosen in a limited competition. The walls are constructed of brown Carr stone, relieved by window and door dressings of Monk's Park Bath stone. The roofs are covered with Broseley flat tiles. The main entrance is by a flight of stone steps, through an arched doorway into a vestibule, on either side of which are ladies' and gentlemen's cloak rooms and a ticket office. Thence are two entrances into the large hall, which is 77ft. long, and 37ft. 6in. wide with an open-timbered roof of massive principals. At one end is a gallery and at the other, a broad, deep platform or stage, provided with retiring-rooms. Beneath this is a store-room which can also be used as a retiring-room for choruses at concerts, when required. The windows are mullioned and transomed, and the walls, which are coloured green grey, have a dash of match-boarding to window height. Crush doors are provided, with a separate entrance for front seats. The council offices are approached by a side entrance in an octagonal annexe, and are also coloured green grey with Pompeian red dado. The council chamber is on the ground floor, and adjoining it is the clerk's office, and on the ground floor beneath the surveyor's office is situated. The heating is by hot-water pipes on the low pressure system. Mr. Selden Hipwell, of Wisbech, was the contractor, and Mr. Walker, the surveyor, has acted as clerk of works. A town clock is shortly to be placed over the west door. We illustrated the building in our issue of April 10, 1896.

ST. AUSTELL.—The new Public Buildings in Fore-street and Truro-road were formally opened by Sir C. Graves-Sawle, on Thursday in last week. They have been built for a company at a cost of £5,000, and are faced with light and dark granite, the windows being transomed and circular-headed. On the ground floor are offices for the urban district council, a fire-brigade station, and a volunteers' drill-hall. Over these is a public hall 80ft. by 40ft., and 33ft. in height. The roof is of open timbers carried on stone corbels, and a gallery is provided, accommodation being found for 1,000 persons. On the platform is an organ, built by Messrs. Head and Son, of Truro. The architect is Mr. Sylvanus Trevail, M.S.A., of Truro and London. Mr. Tom J. Smith was the contractor, and Mr. T. Parsons the clerk of works.

WOMBWELL.—The parish church of St. Mary, a building of no architectural pretensions, although occupying the site of a Norman edifice, is about to be pulled down and entirely rebuilt, from plans by Messrs. Hadfield, Son, and Garland, of Norfolk-street, Sheffield. The contract for

demolition has been let to Mr. W. Johnson, of Wombwell. The new church, which is designed in the Decorated style, will consist of a nave, aisles, chancel, and tower, the nave and aisles being 90ft. long and 56ft. wide. Under the chancel will be a parish room and choir vestry. In the nave will be six bays of Gothic arches, and the interior will be principally lighted by a clerestory. The church will be built of local greystone from Seal's Darfield Quarry, and the dressings will be of ashlar stone from Hollington, Staffordshire. The roof will be covered with Broseley tiles. The interior will have a panelled timbered roof, and will be lined with Bath stone. At present the funds available will permit of the building of the nave and aisles, and as supplies are subscribed the chancel and tower will be added, the tower being left until last. The choir stalls will be of oak, and the nave will be seated with chairs, sittings of pitchpine being added when funds are forthcoming. The new building, when complete, will accommodate 750 persons. It is estimated that the cost of the nave and aisles, which it is proposed to at once proceed with, will be £4,500, the cost of the completed church being £8,000.

COMPETITIONS.

HALIFAX.—The Halifax Town Council, at their last meeting, adopted the report of Mr. T. Roger Smith, F.R.I.B.A., London, upon the merits of the competitive plans for a new court-house, police-station, and public hall, the total cost being limited to £25,000. The awards made were as follows: First prize (£100), Messrs. Cheers and Smith, Blackburn and Twickenham ("Justice"); second (£60), Messrs. H. and D. Barclay, Glasgow ("Persimmon"); third (£40), Messrs. Farrow and Nisbett, London ("Hali-1662-fax").

NOTTINGHAM.—The competition has been settled for the Higher Grade School, Meadows, Nottingham. It was confined to local architects, and there were nine competitors. The assessor was Mr. E. R. Robson, F.S.A., who awarded the first place to Mr. Robert C. Clarke; second place, Messrs. Sutton and Son; third place, Messrs. Evans and Son. The buildings are to be carried out at once from Mr. Clarke's designs.

A new eight-day turret-clock has just been erected at Sittington Church, near Durham, the necessary work having been executed by Messrs. W. Potts and Sons, clock manufacturers, of Leeds and New-castle-on-Tyne. The above church is one of the oldest in the kingdom, visitors from all parts coming to see the beautiful stone tracery-work inside the church.

On Thursday in last week, at the council offices, Northwich, Mr. Meade-King, C.E., acting on behalf of the Local Government Board, held an inquiry into the application of the urban council for permission to borrow £1,750, to carry out improvement work under the Private Street Works Act in John-street, Tabley-street, Wellington-street, Whalley-road, and Yorkshire-place. The plans were explained by the surveyor to the urban authority, Mr. J. Brooke.

The new Roman Catholic Church of Our Lady of the Assumption and St. Edmund at Lyndhurst was recently consecrated by the Bishop of Portsmouth. It has been built from plans by Sir Arthur W. Blomfield, A.R.A., in Early English in style, and is built of stone both within and without, black marble being used for the columns, mosaic for the pavements, and oak for the panelled roofs. Accommodation is provided for 100 persons. A presbytery is connected by a cloister with the church, and a little cemetery has been laid out, in which, attached to the church, is a mortuary chapel containing the tomb of the founder's wife, Marie Louise de Souberbielle.

The workmen engaged upon the restoration of Peterborough Cathedral have made a curious discovery while underpinning part of the west front. They came upon some large pieces of carved Alwalton marble, which had evidently been used for the purpose of strengthening the foundations by the mediæval builders. On being pieced together they were found to make about half of an enormous marble basin, between 20ft. and 30ft. in circumference. The basin is not hollow in the centre, but has a series of carved hollows or basins, communicating with each other, running all round.

By the liberality of the Rev. G. Martin, rector of Caerhays, near St. Austell, a bold granite cross, about 30ft. high, is nearly completed on Dodman Headland, Gorrán. The promontory has an altitude of about 700ft., and faces the broad Atlantic, so that the cross will be a landmark to homeward-bound vessels.

ARCHITECTURAL & ARCHÆOLOGICAL SOCIETIES.

CAMBRIAN ARCHÆOLOGICAL ASSOCIATION.—This association will celebrate its jubilee this year at Aberystwith. The meeting will be held on Monday, September 7th and four following days. During the excursions the remains of the Cistercian Abbey at Strata Florida will be inspected, under the guidance of Mr. Stephen W. Williams, F.S.A., who explored the site under the auspices of the association a few years ago. An opportunity will be afforded on one of the other days of seeing the well-known collection of MSS. in the possession of Mr. Wynne, of Peniarth. Mr. J. W. Willis Bund, F.S.A., will read a paper on Llanbadarn Fawr, and Mr. Edward Laws, F.S.A., and Mr. Henry Owen, F.S.A., will lay before the association their report on the archaeological survey of Pembrokeshire.

CHIPS.

The Bible Christian Chapel at Wadebridge is being enlarged; a schoolroom is formed beneath the chapel, and the whole block of buildings receive a fresh frontage. On Wednesday last week the ceremony of laying memorial stones was performed. Mr. Harry Symons is the contractor, and Mr. Stephens the architect.

The town council of Richmond, North Riding, have purchased for £500 the Castle and Church Mill property.

At Monday's meeting of the Cardiff town council it was resolved that an expert valuer should be engaged to value the interests to be acquired at Temperance Town for the site for the erection of a new town hall.

The county councils of Brecknockshire and Radnorshire have decided to purchase for £7,000 a farm-house, buildings, and 164 acres of land at Lower Porthamal, near Three Cocks Station, Brecon, as a site for the proposed joint counties asylum. Buildings will be erected for 350 lunatics.

For the new church of St. Matthew's, which has recently been opened at West Ham, Messrs. Jones and Willis, of London and Birmingham, have executed and fixed some very fine carved oak-work—viz., pulpit, choir-stalls, altar, and reredos. A Caen stone font, brass lectern, &c., have also been supplied by them. The above work has been carried out under the superintendence of the architect, Mr. Richardson, formerly assistant to the late Mr. E. P. Loftus Brock, F.S.A.

The statue group which adorns a niche in the eastern wall of the Scottish National Portrait Gallery at Edinburgh, has now been formally handed over to the Board of Manufactures. It has been executed at the cost of the women of Edinburgh, and consists of a group of Queen Mary, supported by her faithful friends, Bishop Leslie and Maitland of Lethington. Mr. Birnie Rhind, of Edinburgh, was the sculptor.

The new hospital and administrative offices at the Aberdeen Royal Lunatic Asylum, the contracts for the erection of which were entered into in August, 1893, have now been finished. The total cost has been upwards of £30,000. The hospital has accommodation for 150 patients, and is divided into administrative, observation, and sick blocks.

The South-West London Polytechnic at Chelsea has made arrangements for the establishment of day classes in engineering and other technical subjects on the same lines as the classes at the Finsbury Technical College of the City and Guilds of London Institute. The classes, like those of Finsbury College, will be preparatory to the course of study provided at the Central Technical College in Exhibition-road.

There has just been completed for the town of Stockport a sewer which intercepts the whole of the sewage of the town from entering the River Mersey, the total length of which is four and a half miles, and the cost of which has been nearly £100,000 (exclusive of the cost of land). This important work was intrusted to Mr. A. M. Fowler, M.I.C.E., late city surveyor of Newcastle-on-Tyne, and ex-President of the Association of Municipal and County Surveyors.

Alterations have been made at St. Mark's College, Chelsea, embracing the ventilation, the extraction of the vitiated air being effected by the latest improved form of Messrs. Robert Boyle and Sons' air-pump ventilators.

The new court-houses at Cork will be opened by Earl Cadogan on Tuesday, September 2nd. They have been erected from plans by Mr. W. H. Hill, F.R.I.B.A., of Cork, selected in competition, Mr. Thomas Drew, of Dublin, being the assessor, and were illustrated in our issue of Dec. 25, 1891, by plans, sections, and elevations. The style is Classic, and the cost has been about £25,000.

Engineering Notes.

CENTRAL LONDON RAILWAY.—From the statements made at the half-yearly meeting of this company, it appears that a good start has been made in constructing this important undertaking. Mr. Henry Tennant, who presided, announced that possession had been obtained of sites for stations at Shepherd's Bush, Holland Park, Notting Hill-gate, Westbourne, Marble Arch, Oxford Circus, Tottenham Court-road, British Museum, and Chancery-lane. At Shepherd's Bush, Westbourne, Marble Arch, and Chancery-lane the work of sinking shafts had been commenced. He thought he might say so of the Marble Arch, although the beginning might not have been made more than a few days ago. From several of these shafts the work of tunnelling had to be carried on. Close by the Bank, where the station in the centre of the City would be constructed, a commencement was being made with the subways which the company had undertaken to construct. As regarded the stations at Queen's-road and Newgate-street, the requisite property had not yet been acquired. At Newgate-street, near the General Post Office, a larger provision for station purposes would be made than was originally contemplated. The station site between the Marble Arch and Oxford Circus had not yet been arranged for. The engineers reported that satisfactory progress had been made with the preparation of their works for the tunnels throughout the whole length of the line, and also with the shields and other appliances needful for the execution of the work. The outlay during the half-year had amounted to £273,812, which, added to the amount previously expended, made the total outlay to June 30 of £442,098. The tunnel for six miles out of the total distance of six and a half miles had been let to the contractors, the Electric Traction Company, who had shown every disposition to press on with the work.

WATERLOO AND CITY RAILWAY.—In their report just presented to the directors of the Waterloo and City Railway, the engineers, Messrs. W. R. Galbraith and J. H. Greathead, state that during the past six months steady progress had been made with the works. Towards the City one tunnel has been driven to the western end of the terminal station, while the other is within 80 yards of the same point. The large shield for driving the station tunnels, each 23ft. diameter, is nearly finished, and will be delivered on the works at an early date, when operations will be commenced. At the Waterloo end of the railway, one of the tunnels, the northernmost or up, has been driven under compressed air up to within 25 yards of the South-Eastern Railway viaduct, which is now being underpinned and secured; the other, the down, tunnel has been completed to the western side of Cornwall-road, Stamford-street. The total length of tunnel driven during the past six months has been 1,100 yards. The total length of single tunnel completed is now 3,936 yards, leaving a total length of single tunnel to be constructed between the terminal stations at either end of the railway of 464 yards only. The contract for the terminal station at Waterloo was let to Messrs. Perry and Co. in January last, and notwithstanding that some delay has arisen in obtaining possession of the land and a temporary loss of labour owing to the recent building strike, good progress has been made by the contractors. The underpinning of the South-Western Company's general offices is well advanced, and the work underneath Waterloo Station is making rapid progress. The plans for the generating station are being prepared, and will soon be ready for letting the contract.

GLASGOW.—The opening of the Glasgow Central Underground Railway on Monday marked the completion of one of the most costly railway undertakings in Scotland. But seven miles in length, the line has taken almost as many years to construct. Originally estimated to cost under a million sterling, fully 1½ millions have been expended on its construction by the Caledonian Railway Company. The line is the longest underground one in Scotland. Starting from Dalnarnock-road—connected with which there is a branch to Rutherglen—the railway passes through the district of Bridgeton on to Glasgow Cross and the Central Station, from which point it proceeds due westward to Stobcross, and north-westward through the Kelvingrove Park to Hillhead, and on through the Botanic Gardens to

Maryhill. At Dalnarnock-road there is a terminal station with a platform 700ft. in length. From this point the line strikes at once under Dalnarnock-road, and runs on to Bridgeton, where a large working-class district is tapped. The tunnel then proceeds under Canning-street to Monteith-row, where it enters the Glasgow-green, and passes on by way of London-street to Glasgow Cross. At this point the Saltmarket, Tron-gate, and High-street converge, and the construction of the railway has been the means of effecting a very complete transformation of the district between the Tron and the Cross steeples. Both of these ancient landmarks have been retained, but the southern side of the Tron-gate has been thrown back in a diagonal direction, and instead of a narrow thoroughfare there is now a spacious triangular place with the station buildings in the centre, and substantial structures on the south side, where quaint tenements formerly stood. From the Cross the line runs due west under Argyle-street, and here the chief engineering difficulties were encountered. Before the company was allowed to construct the tunnel at the narrow depth from the surface which they proposed, they were obliged to rearrange the sewage, gas, water, and electric light mains, and this work alone cost £350,000. The foundations of the buildings on either side of Argyle-street had to be strengthened by the withdrawal of the earth and the insertion of underpinning piles with brick, cement, and iron wedging. The mode of work adopted in constructing the tunnel was to drive in the piles by day, remove the surface in short portions by night, fix the girder-roofing, and relay the street for traffic before the morning. Along Argyle-street the system of "jack-arching" thus took the place of the ordinary rounded brickwork covering. At the Central Station the entrance at present is from Argyle-street at Hope-street, but a domed station is in course of erection. This station, which will be the chief one on the underground system, is 750ft. long and 120ft. wide. It has two platforms, each 600ft. long and 30ft. broad. The walls and platform buildings have been white-tiled, and the pillars have been painted in bright colouring. The station is roofed with girders, and no fewer than 3,000 tons of steel were used in connection with it. Anderson Cross is the first station after leaving the Central, and passing on to Stobcross—where access is obtained to the Queen's Dock—there is not only a passenger but a large mineral depot. On emerging from this station a bell-mouth arch is seen, under which two tunnels converge—the Central and the Lanarkshire and Dumbartonshire Railway meeting and running on to the Central Station under one tunnel. The span of the arch is 55ft. wide, and was constructed in open cut, and without timber centring, the arch being turned on the earth core. Taking a north-westerly course, some difficult operations had to be carried out under Dumbarton-road and St. Vincent-crescent, owing to the nature of the soil and the buildings above-ground. Passing under the west end of Kelvingrove Park a soft seam of good coal was struck. The line emerges from the park at Gibson-street, where the Kelvin Bridge had to be reconstructed, and at the Great Western-road Bridge over the Kelvin, at Hillhead, there is an open station for passengers, with goods and mineral sidings. A short run westwards carries the line to the Botanic Gardens, where a station has been erected, and the railway emerges into the open at Kirklee-road Station. Beyond the Kelvin-side Academy the line divides, the main section crossing the Kelvin by means of a viaduct, and reaching the terminus at Gairbraid-street, Maryhill; while the other branch connects with the Lanarkshire and Dumbartonshire Railway. The engineer for the line was Mr. Charles Foreman, Glasgow, the engineer of the West Highland line, and associated with him in a consulting capacity was Mr. J. Wolfe Barry, C.E., of London. Three contractors have carried out the undertaking—namely, Messrs. Brand and Son, Mr. James Young, and Mr. A. H. Boyle, all of Glasgow.

The foundation-stone of the new halls, at present in course of construction in connection with St. Paul's parish church, Lorne-street, Leith, was laid on Saturday by the Right Rev. Dr. Scott, St. George's, Moderator of the General Assembly of the Church of Scotland. The halls are being built at the back of the church, and consist of one hall to accommodate 500 persons, another 120, and a third 50. The cost is estimated at £1,500.

TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. All communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondents.]

It is particularly requested that all drawings and all communications respecting illustrations or literary matter should be addressed to the EDITOR of the BUILDING NEWS, 332, Strand, W.C., and not to members of the staff by name. Delay is not unfrequently otherwise caused. All drawings and other communications are sent at contributors' risks, and the Editor will not undertake to pay for, or be liable for, unsought contributions.

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The charge for advertisements for "Situations Vacant" or "Situations Wanted" is ONE SHILLING for TWENTY-FOUR WORDS, and SIXPENCE for every eight words after. All Situation Advertisements must be prepaid.

NOTICE.

Bound copies of Vol. LXIX. are now ready, and should be ordered early (price Twelve Shillings each), as only a limited number are done up. A few bound volumes of Vols. XXXIX., XL., XLI., XLIV., XLV., XLVI., XLVII., XLVIII., XLIX., L., LI., LII., LIII., LIV., LV., LVI., LVII., LVIII., LIX., LX., LXI., LXII., LXIII., LXIV., LXV., LXVI., LXVII., LXVIII. may still be had, price Twelve Shillings; all the other bound volumes are out of print. Most of the back numbers of former volumes are, however, to be had singly. Subscribers requiring any back numbers to complete volume just ended should order at once, as many of them soon run out of print.

RECEIVED.—S. E. Barham.—L. R. and Co.—Gasfitter.—B. A. C.—Anxious One.—F. J. B. (Northwich).—E. W.

Correspondence.

THE R.I.B.A. FELLOWSHIP.

To the Editor of the BUILDING NEWS.

SIR,—If you can prove, by means of the reporter's notes at the Institute meeting on last Monday night, that I said "that certain holders of the Institute Fellowship were in the habit of accepting surreptitious commissions," then I am willing to resign my Fellowship. I made no such charge, and at the meeting I strongly repudiated the accusation.

Fortunately, I had headings and copious notes of my remarks, which were wholly directed (a) against touting for members, (b) against the admission into the Institute of the authors of the enormous mass of bad architecture (so called) which abounds in London as well as in the country, unless they pass an examination, which should prove, at least, that they are acquainted with the elements of architecture, and that in the future we may expect from them better work; and (c) an earnest appeal to make ourselves so worthy, that membership of the Institute should be a guarantee to our employers, not only of sound work, but of integrity above the shadow of a suspicion, so that, of necessity, architects would seek to become members.

As an instance that employers of architects had reason to believe that architects were in the habit of accepting discount from tradesmen whose goods they specified, I mentioned an advertisement which has lately appeared in a local paper circulating in a district where a good many architects practised.

A certain public body desired an architect to design a county school. They asked by advertisement that candidates should state their terms, cautioning them as follows: "The architect will

not be allowed any trade discounts upon any part of the work ordered."

This seemed to me to be so important, that I thought that the Institute would have been glad of a warning, to at least have a care lest any of the architects at whom the advertisement pointed were admitted as Fellows. An architect may be, as an architect, a man of good repute; but if he descend to a practice which a public body by a public advertisement deem it their duty to denounce, then surely such a man is not fit to become a member of the Institute.

Amidst the interruptions which followed these and my remarks generally, I mentioned the fact that I had applied for the post advertised myself at the usual terms; but at the same time I did a thing which insured my rejection, and that was to tell the advertisers that the warning was entirely unnecessary in the case of members of the R.I.B.A., giving them as proof extracts from the Charter and By-laws against illicit commissions and providing for expulsion. Surely no man can think more highly of the Institute than to be willing for the sake of its honour to sacrifice the possibility of a commission, and even the surety of a commission, for this I have been able to do, and will again do, should necessity arise.

By the interruption I was led to speak on the question of quantities. And here a charge can be levelled against the whole profession, and, as I said, the practice amounts, in my mind, very much to the acceptance of an illicit, or, if you like, an unaccounted-for, commission. Say a job amounts to £20,000. The quantities, at 2½ per cent., amount to £500 in addition to this sum, and £50, say, for lithography. At the end of the quantities we find this appears:—

Amount	£20,000
Add to above 2½ per cent. for quantities to be paid out of the first instalment	500
Add also for lithography ditto	50

Amount of tender.. £20,550

The work is carried out and the architect receives £1,027 10s., out of which £27 10s. is commission upon a commission: that is, a percentage upon the commission paid to a quantity surveyor, who as often as not is the architect himself. Now, unless the architect especially explains to his client that he so receives £27 10s., it seems to be an illicit commission. Even then it would be an extraordinary client who would be willing to pay such a sum for nothing.

In my own practice I have had business men in private and on public bodies declaring that they had never heard of paying fees to quantity surveyors—the builder, they thought, always paid; and when it was explained how the builder always added it (and legally did so) to his amount of tender, it came to them as a revelation.

On one occasion a Government auditor, auditing the accounts of a public body, actually objected to the paying to the architect of the commission for the quantities, in addition to the usual 5 per cent. He had "never heard of an architect receiving more than 5 per cent.," he said.

In the Institute scale of charges, it is there advised that quantities should be taken out with the concurrence of the employer.

I venture to say that we should go as far as some individual members go—and that is, on no account to allow payment for quantities to be made otherwise than through the employer. Members who observe this practice, after once explaining it, find no difficulty in carrying it out.—I am, &c.,

ROBERT WILLIAMS.

SIR,—I beg to inform the individual who signs himself "An Architect" in last week's issue of the BUILDING NEWS, that before any person can become a Fellow of the R.I.B.A., he is obliged to sign a declaration that—"he promises and agrees that he will not accept any trade or other discounts, or illicit, or surreptitious commissions or allowances in connection with any works the execution of which he may be engaged to superintend, or with any other professional business which may be intrusted to him." If it can be proved that there are members of the R.I.B.A. who break this, its fundamental law, they should, and would be expelled from its ranks. I was not at the Institute meeting held on the 27th ult.; but if the purport of the remarks made by any member on that occasion can be construed as set forth in the BUILDING NEWS of the 31st ult., he should be made to prove his insinuations, or to publicly apologise for them.—I am, &c.,

F.R.I.B.A.

ILLICIT COMMISSIONS.

SIR,—I am afraid that in the provinces, where the status of the architect is of a somewhat lower order than that of his professional *confrères* of the cities and large towns, illicit commissions are more the rule than the exception—at any rate, I know it is so in that part of England where I happen to practise, and members of the R.I.B.A. are not exempted from the category. There are architects in this neighbourhood who habitually take and expect "commission" from the contractor (in one case I actually know of in a most fraudulent manner), from the building merchants and tradesmen, and from the quantity surveyor. There is a quantity surveyor I wot of that, without any concealment or diffidence, waits on architects with a view to obtaining "jobs," and offers them (the architects) half his commission on the jobs, which is invariably accepted by R.I.B.A.'s, M.S.A.'s, and others alike.

There is also an architect (not R.I.B.A.) who employs a quantity surveyor of reputation to prepare bills of quantities, for which a charge is made (on the bill of quantities) of from 3 to 5 per cent.; but as this charge is added in the architect's handwriting, the deduction is obvious.

Is this black list sufficient, or shall I tell of how the professional pirate goes to work stealing commissions from his *confrères* by means of specious allurements to the credulous or foolishly-greedy client? Another time, perhaps.

The excuse given for accepting illicit commissions usually is, that "competition nowadays is so keen, and the public want us to work so cheaply, that if we did not make a bit that way we could not manage to live at all." Quite so; but, still, I know of well-to-do architects who do the same things.—I am, &c.,

PROVINCIAL.

LONDON BUILDING ACT, 1894: CAN THE COUNTY COUNCIL SUMMON?

SIR,—A client of mine was summoned last week by the L.C.C., under section 84 of the Building Act, for erecting a "wooden structure" without a license. For the defence, we contended, *inter alia*, that the Council had no power to summon save in the manner appointed by the Act—i.e., by their district surveyor.

It is the district surveyor who is expressly appointed "to enforce the execution of the Act" (section 146), by giving the builder a "notice of irregularity" requiring him "to do anything required by the Act which has been omitted to be done" (section 151); and it is only on non-compliance with such notice that, at the district surveyor's instance (section 153), the Petty Sessional Court may proceed. It is also only the district surveyor who has the "power of entry to inspect buildings" (section 148). Any other servant of the Council presuming to enter for that purpose would apparently be a trespasser.

The magistrate considered that the defence could not be conclusive unless and until the County Council's claim to summon had been successfully contested on appeal. As I can find no reported decisions bearing on this point, I should be glad to know whether any of your readers have ever raised it as a direct issue, and, if so, with what result?

I think the bulk of your readers will agree with me that the district surveyors, as a body, exercise the very extensive powers delegated to them under the Act with the maximum of common sense and the minimum of friction. The same can hardly be said of the Spring-gardens officials, who are now attempting to usurp the right of entry and the right to summon; and it seems to me high time that both these rights should be restricted on appeal to the district surveyors, who alone seem able to legally exercise them.—I am, &c.,

LEONARD P. HODGE, F.S.I., A.M.Inst.C.E.
6, South Side (the old London and South-Western Bank), Clapham Common, S.W.,
Aug. 11.

Among the eighty-nine Private Bills which have passed both Houses of Parliament, and to which the Royal Assent has just been given, are the Kensington (James-street Arca) Improvements Bill, the North Metropolitan Railway and Canal Bill, the London County Council (General Powers) Bill, the Brighton Marine Palace and Pier Bill, the Strand Improvement (Hotel Cecil frontage) Bill, the London County Council (Vauxhall Bridge Tramways) Bill, the Brighton Improvements Bill, the Metropolitan Railway Bill, and the Baker-street and Waterloo Railway Bill.

Intercommunication.

QUESTIONS.

[11538].—**Ice-Making Plant.**—Can any reader give or inform me where I can obtain specification of latest ice-making and cold-storage plant, and also building accommodation required?—W. SINDALL, Mill-lane, Cambridge.

[11539].—**Building Contracts.**—Are printed forms of building contracts to be obtained which shall be legally binding? Or will any reader quote in this column from which work a brief, legally-binding form of contract could be obtained, which would not fill more than two sides of a foolscap sheet?—H.

REPLIES.

[11530].—**Norwegian Houses.**—These are manufactured by Boulton and Paul, of Norwich. This firm will, I know from personal experience, be glad to send "Constant Reader" their catalogue, and give every information as to these buildings on application.—SAMUEL PILGRIM, The Welwyns, North Walsham.

[11534].—**Cleaning Old Stonework.**—Probably "F.R.I.B.A." refers to the senior partner in the firm of Messrs. J. Whitehead and Sons, 74, Rochester-row, Westminster, S.W.—G. A. T. MIDDLETON.

CHIPS.

Mr. S. J. Watson has been appointed electrical engineer to the town council of Bury, Lancs, at a salary of £200 a year.

The foundation-stone of new Masonic rooms, which are being erected in Cunliffe-road, Ilkley, was laid with much ceremony on Saturday. The architects are Brothers E. Critchley and A. Adkin.

A portrait of Mr. George L. Beeforth, an ex-Mayor of Scarborough, painted by Henrietta Rae (Mrs. Henry Norman), has this week been hung in the council-chamber at Scarborough.

Mr. William Young, railway contractor, has died at his residence, Wemyss Villa, Greenock, in his seventy-first year. Deceased was the last of three brothers, who for many years carried on the business of railway contractors, and among the works executed by them were the Gryfe Waterworks, Greenock, the Wemyss Bay Railway, and the Ayrshire Railway. Mr. Young retired from business about ten years ago.

Mr. A. Lyons, contractor, Norton, has been intrusted with the laying of a new sewer in St. Nicholas-street, St. Peter's-street, and Langton-road, for the urban district council, under the supervision of Mr. Moses Nelson, surveyor.

A contract for the restoration of the parish church of Stoke Gifford has been entered into between the Duke of Beaufort and Mr. C. A. Hayes, of Bristol, and will be completed by the end of November. The work will be superintended by the Duke's architect, Mr. E. H. Lingen Barker, of London and Hereford.

The restoration works which are being carried out in the Norman church, at Aldermaston, near Reading, at the cost of Mr. Charles E. Keyser, who purchased the Aldermaston Court estate two or three years since, are disclosing some features of interest. The old church was originally a chapel of Monk Sherborne Priory, which was situated between Aldermaston and Basingstoke. On the stonework of the Norman doorway have been found carved a number of votive crosses. In the south transept, known as the Congreve Chapel, some wall paintings have been brought to light, including the not unusual full-length figure of St. Christopher, who is depicted as crossing a stream bearing the Infant Christ. On the other side of the chantry window there are represented two figures, one being in kneeling posture, and the other an angel descending, with a mitre, while above is drawn some canopied work.

Memorial stones were laid last week of a Baptist Sunday-school at Golcar, near Huddersfield. The building is being erected at a cost of £3,000 from plans by Mr. Joseph Berry, of Huddersfield, and will consist of thirteen classrooms, infants' school-room, secretary's room and library, and an assembly hall, 76ft. by 36ft. 6in. A reading-room and a conversation-room will also be provided for the young men. The floors throughout will be laid with wooden blocks on concrete. The front elevation will be Renaissance in style, built of Elland Edge pitch-faced wallstones, and Crosland Hill ashlar dressings. The internal joiners' work will be of pitch-pine, varnished, and the roof will be covered with blue Westmoreland slates. Accommodation will be provided for 700 scholars. The contractors are:—Masons, Messrs. A. and T. Haigh; joiner, Mr. Wm. Lockwood; plumber, Mr. John Marsden, Huddersfield; slaters, Messrs. T. Longbottom and Sons, Huddersfield; ironwork, Messrs. G. W. Crosland and Co., Huddersfield; plastering and painting, Mr. Wilson Armitage; wood-block flooring and concreting, Mr. John Cooke, Huddersfield; heating apparatus, Mr. F. Milan, Lockwood.

Legal.

PAVING EXPENSES.

ALTHOUGH the owner of premises from whom paving expenses are claimed can dispute the apportionment, and so go to arbitration, yet it now seems certain that the local board cannot enforce the arbitrator's award by summons in the High Court, as provided by the Arbitration Act, 1889. This was the point raised and decided in a case by the "Willesden Local Board v. Wright" (*Times*, July 22), in which the Court of Appeal considered the whole question as to the remedies by which the payment of these paving expenses can be enforced. As the result of the arbitration required by the owner, the arbitrator had made an award against him for the £175. Upon a summons taken out in the High Court under the Arbitration Act to enforce that award in the ordinary way, the Master at chambers, and afterwards the judge, held that there was no jurisdiction to do this in the Queen's Bench Division, and ruled that the only remedy was that given by the Public Health Act, 1875, which is by means of summary proceedings before Justices.

Upon appeal, the Master of the Rolls gave judgment confirming this view of the matter. He held that no such order could be made enforcing this award, because it was not an award under the Arbitration Act at all. He again laid down the principle upon which the Court acted, that where an Act creates a new liability, and, at the same time, provides a remedy, such remedy is the only remedy. Of course, if the Act itself gave two or more alternative remedies, these would be applicable; but that did not affect the principle above stated. In this case, section 150 of the Public Health Act, 1875, which created the liability for paving expenses, also gave the remedy, which was by summary proceedings before justices. It is true that section 261 gave an alternative remedy by a summons in the County Court, where the amount did not exceed £50; but this did not confer any right of action in the High Court. Then there was the clause by which these expenses were made a charge upon the premises themselves; but that gave no new right as against the person liable. So the Court of Appeal held that the arbitration was merely to fix the amount payable, and not the liability, and left the local board with only one remedy—by proceedings before justices. As they had not used this within the six months allowed, the Court held that they had lost their remedy altogether. FRED. WETHERFIELD, Solicitor.

1, Gresham Buildings, Guildhall, E.C.

NOTE.—All questions for reply in this column must be headed "BUILDING NEWS," and must reach my offices, as above, by *Tuesday morning* to insure answer same week.

W. W.—CONTRACT.—ARCHITECT.—PENALTIES.—This depends upon the terms of the contract and the facts. It is impossible to quote any cases that would apply to your dispute, of which I know nothing. You had better consult a local solicitor.

S. W.—CARPENTER.—ESTIMATE.—WORK.—You can only summon him in the County Court for the balance you say is owing upon the contract, or for work and materials. He will then bring in his counterclaim, and the judge will decide upon the evidence.

The three-light window over the south porch of St. James's Church, West Teignmouth, has been filled with stained glass illustrating the Acts of the Apostles, as a memorial.

The subscribers to the blind school in Hardman-street, Liverpool, at a meeting held on Monday, adopted plans by Messrs. H. and A. P. Fry for the erection of a new school on a site of 3½ acres at Wavertree Hill. The estimated cost of the new building is £20,000.

Mr. Willcocks, an inspector of the Local Government Board, held an inquiry at Halesowen, on Friday, respecting the application of the rural district council for sanction to borrow sums of £5,713, £2,891, £2,329, and £935 for works of sewerage for the parishes of Cradley, Halesowen, Hasbury, and Hawn respectively. It was explained by Mr. E. Grove, the clerk, that under the Upper Stour Valley Main Sewerage Board a scheme had been prepared for providing sewage-disposal sites for the different localities. The sewage would be taken away by one main trunk outfall sewer. Dr. Young (medical officer) stated that the present drains were made very imperfectly, and a proper system of sewerage was absolutely necessary. Mr. Fiddian, the engineer, also gave evidence.

LEGAL INTELLIGENCE.

AN ARCHITECT AND HIS RATES.—As we reported last week, p. 210, at Marylebone Police-court, on the 1st inst., Mr. Plowden made, on the application of St. Pancras Vestry, an order of committal against Henry Hewett Bridgman, of Camden-square, St. Pancras, for the non-payment of rates, amounting to £44 11s. 11d., and costs. Mr. Bridgman was described as an architect and surveyor, a member of the Court of Common Council, and a member of the St. Pancras Vestry. The rates were said to be due in respect of Turkish baths belonging to Mr. Bridgman in Kentish Town-road, and other property. Mr. Castle, solicitor, now applied on behalf of Mr. Bridgman for the rescinding of the order made last week, on the ground that there had been an abundance of effects on the premises upon which a distress might have been levied without an order for committal being applied for. To say that there were not £5 worth of effects in a Turkish bath was an absurdity. There was an abundance to cover all the Vestry claimed for. Mr. Plowden asked if there was evidence to prove the assertion now made, and Mr. Castle replied that Mr. Bridgman had an inventory of the things, and he was prepared to go into the witness-box. Mr. Ricketts said the return made by the broker who levied for the rates was that there was not £5 worth of effects upon the premises, and he accordingly withdrew. This was the first time Mr. Bridgman had given the information about the effects. The vestry had been more lenient to him than to most people, as was shown by the fact that 20 calls and 100 applications had been made for the rates in question. Besides that, the Vestry had entirely lost £58 due from Mr. Bridgman for rates; there was the £44 now sued for, and some £42 had since accrued. The rates now being sued for were made in October of last year. On the 16th April last an order was made against Mr. Bridgman, and on the 29th of the same month a distress warrant was issued. Mr. Plowden inquired whether the condition of affairs had been brought to the knowledge of Mr. Bridgman, and Mr. Ricketts, in reply, read several letters which had passed between the vestry and Mr. Bridgman. They showed that on the 16th July Mr. Bridgman was informed that if he did not pay an order for his committal would be applied for, and he had better attend the Court. Mr. Bridgman replied the same day asking for delay, and promising to pay. Mr. Plowden said he made the order last week with great reluctance, bearing in mind the position of the defendant. Now he was asked to rescind or suspend that order; but before that could be done it would have to be shown that there were sufficient effects at the Turkish baths when the distress was levied, and no proof of that had been adduced. There was no desire to unduly press the matter, but the rates had to be paid. He could not help thinking that if this application was an honest and genuine endeavour to get the order rescinded on its merits, Mr. Bridgman would himself have realised the goods he said were on his premises, and have paid his rates like a gentleman. Every conceivable indulgence had been shown by the vestry, and he saw no reason to rescind the order of committal he had made against Mr. Bridgman. Mr. Castle asked for time in which to pay, but the magistrate refused the application. Mr. Bridgman was soon afterwards arrested, and left the Court in a cab, accompanied by Bowler, one of the Court warrant officers, for Holloway Gaol.

AN ENGINEER'S CLAIM.—BATEMAN v. LEVER BROS., LTD.—This case, tried on Tuesday at the Liverpool *Nisi Prius* Court before Mr. Commissioner Dugdale, Q.C., and a special jury, was a part-heard action, in which the plaintiff was James Thomas Bateman, an engineer, and the defendants were Messrs. Lever Bros., Ltd., soap manufacturers, Port Sunlight, near Liverpool. Plaintiff was represented by Mr. Bigham, Q.C., M.P., and Mr. Horridge; and Mr. Walton, Q.C., with whom was Mr. F. Mellor, appeared for the defendants. The action was brought to recover a sum of £500 for alleged wrongful dismissal, and a further amount of £1,200 as extra remuneration for work done that was not included in the plaintiff's terms of engagement with the defendants. The case, as put forward on behalf of the plaintiff, was that between 1893 and 1895 the works of Messrs. Lever Bros. were considerably extended in consequence of a large increase in the output, and the plaintiff, with great skill and care, supervised the erection of structural buildings, and did other works over and above that which was included in his contract. He was, comparatively speaking, receiving a very small salary, and, under those circumstances, claimed to be entitled to the extra remuneration that he now sought to recover, being 5 per cent. on the outlay on buildings. As to the alleged wrongful dismissal, it was stated that the defendants sent plaintiff a cheque for £25 in lieu of notice, whereas he was entitled to a notice of six, if not twelve, months. When the Court resumed on Wednesday, the plaintiff continued his evidence as to the description of work that he had carried out when in the service of the defendants. In answer to Mr. Horridge, he said that his work as a practical

engineer was never found fault with during the whole time he was there. On the 21st May the witness had an interview with Mr. W. H. Lever, who said that they were making alterations, and found that they would not require his services much longer. Mr. Lever said, "We have no fault to find with you, and we are going to put no one in your place. We think if we give you £100 and you leave about the end of June that would meet the case." On that occasion witness pointed out the extra work of a special kind that he had done, for which, otherwise, architects' commission would have had to be paid. On the 30th May witness wrote to Mr. W. H. Lever giving a statement of particulars regarding the extra work, and adding, "I think, had you been in possession of those details, you would have offered me a much larger percentage, and I trust you will see my way to arrive at this conclusion." Afterwards witness received a letter complaining of certain work having been carried on in a dilatory and negligent fashion, and stating that the directors would dispense with the services of witness. In regard to plaintiff's refusal to hand over plans to a Mr. Derryhouse, an employé who was succeeding him, witness declined to give him professional information, but said that he would hand the plans to the manager. Mr. Horridge: You would not teach him your profession? Witness, continuing, stated that Mr. Lever said: "If you do not give him information I will withdraw my offer of £100, and I do not know but I would be entitled to dismiss you at once." Ultimately Mr. Lever gave him a cheque for £25, which had not been cashed. In answer to Mr. Walton, witness denied that any complaint was ever made to him either about incompetence or want of despatch. The £100 was not offered to him in payment of the expenses that he had incurred in removing to Bebington. Witness did say: "I spent £150 to come here, and now you want to turn me away in this manner. I was told it was to be a permanent situation." Witness claimed for the work done at 5 per cent. on the value. He told Mr. Lever that he would give Mr. Derryhouse the necessary general information before he (witness) left the premises, but he declined to give him professional information. He told Mr. Lever that he would never be humbled in the same way as his coachman and his gardener. The defendants had no right to expect him to do constructional work.—Mr. Walton, addressing the jury for the defendants, said that the work in question was clearly within the scope of the plaintiff's employment, and was the kind of work that he was really engaged to do. Was there anything to show that Messrs. Lever Bros. were ever to suppose that they were to pay this sum of £1,200 odd for overwork? He submitted not. It would be a most dangerous precedent to say that employers should be called upon to pay these large claims, when an employé has been dismissed under such circumstances. As a matter of fact, Messrs. Lever Brothers increased their staff in order to provide Mr. Bateman with the assistance he required in the work. There was no indication that the plaintiff was in any way dissatisfied with his position until Mr. Derryhouse was promoted to be assistant manager, from which time there was friction that led to a condition of things which caused delay in the works. No fault was found with Mr. Bateman, who was a zealous and competent servant; but when these difficulties arose the new works did not progress so satisfactorily as the defendants desired.—Mr. W. H. Lever, examined by Mr. Mellor, referred to the terms under which the plaintiff was engaged, and said that he firmly believed, although he could not exactly remember, that he explained to the plaintiff that it was the rule of the firm to terminate such engagements by a month's notice. The work that he would have to do was also explained. The plaintiff had never mentioned any dissatisfaction with regard to his pay, nor had he complained of the work that he had to do. Mr. Bateman had never asked for extra remuneration. Witness told plaintiff that whilst they were satisfied with his work as work, they were not satisfied with the progress that had been made with regard to a certain department, and they had decided not to continue the arrangement. As plaintiff had been to some expense in coming to Port Sunlight, and as he might be a little while before he received another appointment, witness told him that they proposed to give him £100. In that interview no mention was made of commission or percentages. Plaintiff spoke of the great benefit that he had been to the firm, and witness reminded him of the delay that had taken place, which had neutralised the benefit. Mr. Bateman refused to give information, when desired, to Mr. Derryhouse, his successor, saying, "I will not sell my honour," and ultimately witness withdrew his offer of £100, and gave plaintiff a cheque for £25 in lieu of notice. Upon that, plaintiff said, "You will regret this day's work; others will leave as well as me."—By Mr. Bigham: Witness gave the plaintiff to understand when he engaged him that he would be expected to do the class of work in regard to which he now sought compensation. In making

the claim, plaintiff knew that he had been engaged to do the work regarding which he sought compensation. Corroborative evidence was given by Mr. Winsor, manager for Messrs. Lever Brothers.—Mr. Walton, addressing the jury for the defendant company, submitted that nothing like a real and *bona fide* claim had been made out.—His lordship said that the plaintiff did not seem to have made much objection to the engagement terminating at the end of June, and if he acquiesced in it there was an end to the claim for wrongful dismissal. The more serious part of the claim, however, was that referring to work done and services rendered. The question was whether the terms of the engagement were such that this extra work came within his salary, or whether it had been done under such circumstances that he, as a reasonable man, would suppose would entitle him to be paid for under an implied contract. The jury found for the plaintiff, awarding him £500 damages. His lordship gave judgment accordingly, and certified for a special jury.

THE RIGHT TO DESPOIL COMMONS OF GRAVEL.—The important case respecting the right of the Bromley Rural District Council to take gravel for road repairing from Hayes Common, was decided on Monday by the Bromley Justices. The rural council claim a right to take the gravel from this open space, and they recently applied for 250 yards for road repairs. The conservators, against whom an order was applied for, declined to allow the gravel to be taken, having regard to the continued increase of the use of the common by the public. They considered that the removal of the gravel would reduce the area available for recreation purposes, and destroy the natural aspect and beauty of the common. The Bench decided that the rural council have a right to take the gravel, and they made the order applied for, subject to the by-laws being observed as regards restitution, fencing, &c.

NOT ACCORDING TO CONTRACT.—*PIGOTT V. PEEL.*—In this case, heard by Mr. Justice Wills, at the Birmingham Assize, on Monday, the plaintiff, Arthur Pigott, horticultural builder, Erdington, sought to recover £635 from Sir Robert Peel, Drayton Manor, for work done. It was stated that during October, November, and December last plaintiff erected several hothouses for defendant, the bill amounting to £1,635. Defendant, however, only paid £1,000 on the account, and the present suit was instituted for the recovery of the balance. The defence was that the plaintiff engaged to do the work for £1,400, and, further, that he had not built the hothouses in accordance with the terms of the contract entered into, his failure to do so involving defendant in an expenditure of £261 13s. 4d. to rectify plaintiff's defaults. Since the issue of the writ in the present proceedings defendant had paid £535 to plaintiff's solicitors, leaving the sum of £100 in dispute. Defendant, however, counterclaimed for £161 13s. 4d., which he said was the balance of the amount paid by him in completing the work stipulated in the contract. The case having been opened, a consultation took place between both sides, and plaintiff's counsel subsequently intimated that an arrangement had been arrived at to accept judgment for plaintiff for £100, and for defendant on the counterclaim for £50, £50 of the sum paid into court to be handed over to plaintiff, and the remainder to be retained pending taxation. His Lordship assented, and judgment was entered accordingly.

ALLEGED FRAUDS BY A BUILDER.—At the Melksham Police-court, on the 6th inst., James Edward Wilshire, builder, and formerly rate collector of Semington, was charged on remand with obtaining various sums of money belonging to the trustees of the Trowbridge district of the Ancient Order of Foresters' Friendly Society. The prisoner was before the Bench on the 29th ult., when only one charge was preferred—viz., of obtaining from Edward Robert Cork, district secretary of the Foresters, two cheques for £46 12s. 8d. and £12 9s. 8d. respectively, the property of the Trowbridge District at Melksham on April 13, 1896. A remand was then granted. Five separate charges of similar character were now gone into. A large quantity of evidence was submitted, prisoner being eventually committed for trial at the Assize. Bail in substantial amounts was offered.

FENCES AND THE BUILDING ACT.—At Greenwich Police-court, on the 6th inst., Mr. James Webster, of 171, Lewisham High-road, architect, appeared to a summons at the instance of the London County Council for neglecting to comply with a notice requiring him to set back the external fence or boundary of the forecourt of certain new buildings in Pearson's-avenue, Deptford, to the prescribed distance from the centre of that roadway. Mr. Chilvers, from the solicitor's department, supported the summons, and Mr. R. Cunningham Glen Bannister defended. Mr. Chilvers, in opening the case, stated defendant was owner of a piece of land at corner of Wilson-street and Pearson's-avenue, Deptford, on which he had erected a building to be used as a stable and coachhouse; but he had failed to set back the boundary wall of the space between

the external wall of the building and the roadway of Pearson's-avenue, as required by section 13 of the London Building Act, 1894. Mr. Perkins, a surveyor in the office of the Council, was called and produced a plan of the building. In cross-examination by Mr. Glen the witness admitted that the boundary-wall was erected some time before the building, and was in place of an old wooden fence. Mr. Glen, for the defence, put in a plan certified by Mr. Lees, the district surveyor, as required by sub-section 5 of section 13, as to the position of the old fence and a shed which formerly stood on the ground, and he contended that the case came within the proviso contained in sub-section 5 of section 13, and he further contended that as the boundary-wall was erected before the building and in substitution of the old fence, section 13 did not apply. Mr. Marsham, in giving his decision, said he was of opinion that the case did not come within the proviso, as the old fence was not a structure within the meaning of that sub-section, and he was further of opinion that section 13 did apply to the new building, and that he must fine defendant 40s. for not complying with the notice, but at the request of Mr. Glen he consented to state a special case.

RE ALEXANDER BRAID.—In the London Court of Bankruptcy, on Wednesday, an application was made to Mr. Registrar Giffard for an order of discharge in the case of Alexander Braid. The bankrupt traded as a builder at Fore-street, City, and Camberwell-green, under the style of A. Braid and Company, and he failed in October, 1894. His accounts showed liabilities £6,859, and debts fully secured £71,736; assets £2,848. The Official Receiver reported as offences: The insufficiency of the assets to pay 10s. in the pound on the unsecured liabilities, imperfect book-keeping, trading after knowledge of insolvency, rash and hazardous speculations, and two previous failures. The Registrar, taking into consideration the time that had elapsed since the failure, said it would be sufficient to suspend the discharge for two years from this date.

SMITH V. KING'S NORTON RURAL DISTRICT COUNCIL.—The action against the King's Norton District Council, wherein at the Birmingham Assizes on Wednesday week a jury awarded £3,500 damages to the executors of the late Mr. Thomas Henry Smith on the ground that his death had been caused by exhalations from a ventilating shaft, was again mentioned to Mr. Justice Collins on Friday, when Mr. Jelf applied for a reduction of the damages. The Judge allowed a reduction in the damages of £625, and entered judgment for £2,875 against the district council, and stayed execution for 21 days. (In reference to this case, Mr. Oliver Essex, F.R.I.B.A., of 9, Newhall-street, Birmingham, writes explaining his professional connection with the property. In 1885, Mr. Essex says, "I was engaged by a builder, Mr. Thomas Gough, to prepare plans. I was not engaged to superintend or carry out the work, nor did I do so; nor had I any control over, or responsibility whatever in, the erection of the buildings, or the ventilating shaft, or in the sanitary or other arrangements. On visiting the site I pointed out to Mr. Gough that the ventilating shaft, then attached to a tree, and the manhole in the road would be sources of danger to the health of the occupants of the house, and suggested to him that he should arrange with the sanitary authority for the removal of the shaft and closing of the manhole. As a result of negotiations, he instructed me to alter the plans, by showing a separate shaft at the side of the chimney breast, to contain the proposed ventilating pipe, in order that he might obtain the consent of the freeholder and the sanitary authority, which consents were obtained in due course. This ended my connection with him. I subsequently heard that on Mr. Gough's failure other builders were employed to finish the work. Early in 1891 I heard incidentally that there had been illness at the house, and I called upon Mr. Godfrey and advised him to permanently disconnect the shaft, which he promised to do, and two days later he sent me word that he had done so. I heard nothing further of the matter until the present action.")

Mr. Rienzi Walton, Local Government Board inspector, held an inquiry at the Tyldesley District Council Chamber on Friday into an application of the council for sanction to a loan of £17,500 for the making of certain private streets.

The General Purposes Committee of the Darwen Town Council have further considered the applications for the borough surveyorship, which is worth £300 a year, and was rendered vacant on Mr. Stubbs's appointment to a similar position at Blackburn. Twelve names were before the committee, and the voting left the following five candidates in for the appointment:—Messrs. F. Thackeray, Darwen; W. H. Prescott, deputy engineer, Darwen; N. Greenshields, Leicester; A. W. Bradley, Bury; and R. W. S. Saville, Burton-on-Trent. The committee will meet again on the 27th inst., when the appointment will be made.

PARLIAMENTARY NOTES.

ST. MARY WOOLNETH CHURCH.—In the House of Commons on Wednesday, the Lords' amendments to the City and South London Railway Bill were considered. Sir J. Savory moved that the House should disagree with the amendment striking out the clause which the committee had inserted under instruction from the House of Commons, providing for the preservation of the church of St. Mary Woolneth, and substituting a clause providing that the money derived from the sale of the church should be handed over to the Ecclesiastical Commissioners. After considerable discussion the motion was agreed to.

CHIPS.

The estate market at Tokenhouse-yard was very slack last week, owing to the holiday season, the aggregate for the week being £31,475 only.

M. André Michel has been appointed Keeper of the Department of Mediæval and Renaissance Sculpture at the Louvre, in the place of M. Courajod, whose death was lately recorded.

An Omnibus Bill for Leicester is being promoted by the town council for consideration by Parliament next Session. The Bill includes clauses relating to a proposed public hall, gasworks, extensions, power to purchase tramways, &c.

Mr. R. H. Bicknell, one of the Local Government Board inspectors, held an inquiry at the Institute, Sparkhill, Birmingham, on Friday, into an application made by the rural district council of Yardley for sanction to borrow £4,000 for works of sewerage, £1,000 for covering a stagnant brook course in Stoney-lane, and the improvement of the roadway, and £600 for the erection of an ambulance station at Lyndon End. Mr. A. E. Currall, surveyor to the Yardley rural council, explained the plans.

The memorial stones of a new Sunday-school to be erected in connection with the Ebenezer Bible Christian Chapel at Taunton were laid on Friday. Four cottages adjoining the chapel have been taken down, and on the site is to be erected a schoolroom capable of seating 250 persons, with classrooms and preacher's vestry. The plans have been prepared by Mr. F. W. Roberts, architect, and Mr. T. Manning is the contractor.

Exmouth District Council, at their last meeting, adopted a report from the surveyor which stated that the approximate cost for carrying out the storm-water scheme would be £1,200.

The town council of Leicester has made application to the Local Government Board for a loan of £2,000 to lay out a recreation ground.

The School Board for Leeds, at their last meeting, accepted tenders for the erection of Kepler School, Roundhay, amounting in all to £9,125. The school will accommodate 1,240 children, and will cost £7 12s. 6d. per head.

At Brighton College chapel last week a memorial was unveiled to the Rev. Dr. Griffith, M.A., for 18 years the vicar of Sandridge, Herts, and previously from 1856 to 1871 the principal of Brighton College. The memorial consists of a tablet of alabaster and marble, upon which is a bronze medallion of Dr. Griffith, executed by Mr. Onslow Ford, R.A., and was designed by Mr. T. Graham Jackson, A.R.A., who, as one of the doctor's pupils, gave his services free of charge.

When the new clock at St. Paul's Cathedral was erected about three years ago the dials had their central parts filled with white glass for illumination at night. This white glass has been found to make the dials less distinct by day, and also not to be in architectural harmony with the cathedral. Instructions have therefore been given to the makers of the clock, Messrs. John Smith and Sons, of Derby, to fit in new dark central parts to the dials. It may be mentioned that the total diameter of the dials is about 17ft., and the central parts are 10ft. diameter. When this work is done the dials will have the same appearance they had before the new clock was fixed.

A monster blast at Messrs. Gardner's Bouave Quarry, near Oban, was fired on Saturday. It has taken twelve months to make the preparations for the blast. A shaft of 65ft. with cross-heading was driven into the granite, and a chamber formed at each end. In one of the chambers were placed six tons of gunpowder, and in the other two tons. The result was all that could be desired, upwards of 100,000 tons of rock being displaced.

An action was heard, before a special jury, at the Liverpool Assizes, on Tuesday, in which James Thomas Bateman, a mechanical engineer, sued Messrs. Lever Brothers (Limited), soap manufacturers, Sunlight Soap Works, Bebbington, for £500 damages for alleged wrongful dismissal, and £1,200 as remuneration for extra services rendered in connection with the erection of new buildings. For the defence it was alleged that plaintiff did no more work than he was engaged to do. The jury found for the plaintiff, and allowed £500 damages.

WATER SUPPLY AND SANITARY MATTERS.

WINDSOR CASTLE.—The Royal residence is to have an improved water supply. For a considerable period the water for the use of the residents was pumped from the wells, near Romney Lock, by an undershot wheel. This was afterwards supplemented by a 15H.P. steam-engine, and the combined force has, when necessary, been lifting 400,000 gallons of water a day from three wells sunk in the chalk-bed near the Thames, the water for drinking being sent through the trunk line up the Castle slopes and along the North Terrace to the Brunswick Tower and other places; while that required for the extinction of any fire that might occur at the Castle has been forced through the great park to Cranbourne reservoirs, over three miles distant, and on a level with the summit of the flagstaff turret on the Round Tower. The improvements are being carried out by Messrs. James Simpson and Co. (Limited), the engineers for the Office of Works. The engine-house at the river-side pumping station, near the South-Western Railway, is being considerably enlarged, and the existing steam machinery will be replaced by a 50 or 60H.P. engine, and a couple of large boilers working up to 120lb. pressure, which, with the assistance of the old wheel, will pump about 750,000 gallons of water daily. A new 50ft. well is also being sunk at the works.

CHIPS.

The movement for the purchase of the Llandaff Fields by the Corporation of Cardiff was advanced an important stage on Monday, when, after a long discussion, the Cardiff Town Council finally confirmed the recommendation of the parks committee that the fields be purchased for £69,000. There was no opposition to the recommendation of the committee.

The foundation-stone of a new Baptist chapel at Bexhill-on-Sea, to be erected in memory of the late Mr. Spurgeon, was laid on Tuesday by his twin sons the Revs. Charles and Thomas Spurgeon, acting on behalf of their mother. The building will seat about 250 persons, and cost about £1,000.

During the last few years Gainsborough has greatly increased in population, and the urban council surveyor, in his annual report, just published, states that during the year nineteen new streets have been declared public streets, and a large number of highways have been completed under the Private Streets Works Act. Two hundred and twenty-eight new houses were built during the year.

The council of the National Trust, of which Mr. Alfred Waterhouse, R.A., is a vice-president, have accepted the custody of the monument commemorating the deaths at the Battle of Newbury of the Earl of Carnarvon, Lord Falkland, and Lord Sunderland (the husband of "Sacharissa"), raised in 1878 at a cost of over £800, on a site given for the purpose by Mr. Walter Money, F.S.A.

The official opening of the Liverpool and Bootle Police Orphanage, at Woolton, by the Right Hon. the Lord Mayor of Liverpool (the Earl of Derby), will take place during the early part of October. The house stands in seven acres of ground, and has been altered to serve as an orphanage, under the direction of Mr. Dod, honorary architect.

A discovery of Roman pottery has been made at Bourn, Lincolnshire, at Eastgate, formerly known as the Potter's Gate. Five vases have been unearthed by men engaged in enlarging the gasworks. The vases are each 14in. in height, 7in. in diameter at the top and base, the widest circumference being 3ft. They are thin, but hard and smooth worked. They were found inverted, imbedded in clay about 6ft. 9in. below the surface. Four have a pair of ear-shaped handles.

It is stated that the town-hall committee of the Edinburgh Town Council and Mr. Usher, the donor of the sum of £100,000 for its erection, are in favour of utilising the Castle-terrace site. This is bounded by Castle-terrace, Princes Street-gardens, Castle Terrace-gardens, and Johnston-terrace. The area of the site is about 6,000 yards superficial, and would extend over part of King's Stables-road, the lower level at that point being 35ft. below the level of the road in Castle-terrace. Although it would require a considerable amount of expense to bring up the building to the higher level, the space between could be utilised for caretakers' houses, stores, artistes' dressing-rooms, lavatory accommodation, &c.; and below these a subway from Grassmarket to Lothian-road. The Cockburn Association have issued a report on the proposed sites for the Usher town hall, in which they specially recommend the canal basin, and, failing it, the south-west corner of Chambers-street. The other two sites to which strong support has been given by the association are on the north side of St. Andrew-square and the Music Hall, George-street. Along with the report is published a letter from Sir Noel Paton condemning the Castle-terrace site.

Our Office Table.

It is said that the Duke of Devonshire is about to make some alterations at Devonshire House, Piccadilly, that will include the removal of the long wall which has hitherto screened his Grace's town house. Times are altogether changed from 1735, when Devonshire House was built by Kent. This wall, with its two massive double gates, stretching from Berkeley to Stratton-street, has always been a feature of Piccadilly; and although by no means a thing of beauty, we agree with some of our daily contemporaries, it may be permissible to regret its removal and the consequent disappearance of the old-world air that it preserved to this very much modernised thoroughfare.

SOME time ago, when the foundations of the southern leg of the parvise (inserted in the centre arch of the Peterborough Cathedral to strengthen it) were laid bare for the inspection of the architect, Mr. J. L. Pearson, R.A., some very large pieces of moulded Alwalton marble were exposed. They have since been removed, and on being pieced together are found to complete a section of an enormous circle, about 9 feet 7 inches across, having a series of hollows or basins, apparently communicating with each other, running all round. It is hoped that as the work proceeds other pieces will be brought to light. Mr. J. T. Irvine, the clerk of the works, suggests that it is probably the bottom basin of a fountain that may have stood either in the centre of one of the cloisters or in front of the masonry, and having become broken, possibly by frost, the fractured materials were put into the foundations, where they were found. He believes, judging from the unpolished appearance of the centre of the section, that this is the lowest of a series of tiers from which the water, served from a central jet, plashed and was ultimately received and conducted away—each of the basins alluded to having a central hole like the piscine of an altar. The marble is from the old quarries of Alwalton, on the south bank of the River Nene near Peterborough; and from the same marble were made the ancient font of the cathedral (now remaining), some of the shafts of the inner arcading of the west front, and many of the recumbent effigy slabs of the abbots still existing in the choir of the cathedral.

THE premises in Great George-street in which the offices of the Tribunal of Appeal are situate, being about to be rebuilt by the Surveyors' Institution, the offices of the Tribunal will be temporarily removed to Savoy-hill, Victoria Embankment, and until further notice all communications should be addressed to the Clerk of the Tribunal of Appeal, London Building Act, 1894, Savoy-hill, Victoria Embankment, W.C. The Tribunal of Appeal will return to the new premises of the Surveyors' Institution in Great George-street, on their completion, in about eighteen months from the date hereof.

THE annual meeting of the Western branch of the Sanitary Inspectors' Association will be held in Bristol to-day (Friday), the civil court at the Guildhall having been placed at their disposal. Following on a general meeting of the members, at which the annual report will be presented and the executive elected, the members will assemble at half-past one at a public meeting, for the reading and discussion of papers. Mr. D. Cameron, of Exeter, will deal with "The Reconstruction of Sewers in Narrow Streets and their Cost;" Mr. T. J. Moss-Flower has promised a paper on "House Drainage;" and Mr. J. Siddols, Tiverton, will enumerate some rural difficulties in dealing with sanitary matters. In the afternoon there will be a visit to the Refuse Destructor Works, when a short paper will be contributed by Mr. Yabbicom, and after that Mr. Faraday Proctor, Electrical Engineer, will conduct the visitors over the Central Electric Lighting Works. The annual dinner will be held in the evening at the Grand Hotel. To-morrow, Saturday morning, members will visit the Electric Tramway Works at St. George's, and the Water Works Pumping Station at Clifton, and in the afternoon they will visit Portishead, and be entertained at luncheon at the Royal Hotel by Mr. George Corner, chairman of the Portishead District Council. A garden party at the residence of the High Sheriff of Bristol, at Stoke Bishop, will complete the programme.

THE Local Taxation Committee of the Central and Associated Chambers of Agriculture, having

found that considerable misconception exists among many rating authorities as to the principle involved in the valuation of agricultural land and buildings under the Agricultural Rates Act just passed into law, and the manner in which the required change is to be carried out, have collected some information from a number of counties, showing what has been the method adopted in those cases where a separate valuation of land and buildings has already been made. It is explained that the provisions for fixing the ratable value of agricultural land, apart from any houses or buildings erected upon it, will in the case of many local authorities involve a new method of procedure in preparing the valuation list, and that it is necessary to bear in mind that the present ratable value is not to be increased by reason of the separate assessment of buildings and land, but the total sum as now appearing in the valuation list is to be divided as in the above instances. The committee has obtained information from the clerks to 254 union assessment committees as to the practice hitherto adopted in preparing the valuation lists, and in the majority of cases it would appear that no separation of agricultural land from the houses and buildings upon it has been made, but in a considerable number of cases this has been done.

At the recent congress of the Royal Archaeological Institute at Canterbury, Professor Gregoire Tocilescu, of the University of Bukharest and chief director of the Roumanian National Museum, described his researches in the Dobrudsha and of the excavations which he has carried out during several years. His labours have resulted in the identification of the ancient topography of Lower Moesia; the discovery of three great lines of fortification running across the province; the collection of over 600 ancient inscriptions; and the excavation of a considerable part of a buried city, Tropaeum Trajani (now Adamklissi), which is situated about nine miles to the south of Rassoava. It was formerly one of the most important places in that region, and the chief garrison of the frontier. A few years ago all that was known of it was some nameless heaps of ruins, including a great tumulus of masonry. Professor Tocilescu's plan shows a city of 26 acres in area, surrounded by walls pierced with three gateways, and 36 towers, of which 12 have been already uncovered. The principal street is paved with slabs of stone and has central channels, one for the water supply, the other for drainage. Right and left of the main street were ranged great buildings—here a basilica (in the classical sense), there a Byzantine basilica with a crypt under the altar and containing a fine mosaic. There are proofs that the city had been reconstructed, as stones bearing inscriptions had been re-employed as building material. The city was founded by Trajan, received municipal rights towards the close of the 3rd century, and was probably destroyed by the Goths. Among the discoveries was a trophy of limestone designed by Apollodorus of Damascus, erected by the Emperor Trajan, after his victory over the Dacians in the year 108-9. During the present year Professor Tocilescu has discovered and excavated another monument which is unique in the ancient world. It is a mausoleum erected by Trajan to commemorate the soldiers who fell in a battle near the spot, in which the Emperor himself took part.

THE Local Government Board have intimated that they are prepared to accept the scheme of the Manchester Corporation for the provision in Miles Platting of accommodation for persons of the labouring class. In place of buildings similar to the Oldham-road and Pollard-street dwellings, built by the Manchester Corporation, it is intended to erect in sections sixty cottage houses on a site between Queen's-road and Monsall-road. On the ground floor of each house there will be a living-room, kitchen, and scullery, and on the first floor two bedrooms. At the inquiry into the application conducted by Colonel Halstead, R.E., on behalf of the Local Government Board, it was stated that the estimated cost was as follows:—Houses, £11,434 10s.; street paving, flagging, and sewerage, £1,293 10s.; contingencies, £272; total, £14,000.

IN the report of the progress of the Ordnance Survey up to the end of March last, just issued, it is stated that all cultivated districts in England and Wales, with the exception of Lancashire and Yorkshire, were surveyed and published before 1890. The plans of all cultivated districts of Lancashire and Yorkshire, 7,293 square miles, have since been published. The uncultivated dis-

tricts in Lancashire and Yorkshire, 861 square miles, have been revised on the ground, and the publication of the revised six-inch plans of the counties is in progress. The area published is 7,631 square miles, of which 2,740 square miles were published last year. Nearly all the photolithograph six-inch maps of the two counties have been published, but the progress of those now in course of publication by engraving is slow. They will however, it is stated, be completed during the current year.

YET another Yorkshire watering-place is being laid out, the site being at Ravenscar, a little to the south of Robin Hood's Bay, and midway between Scarborough and Whitby. The estate of 800 acres has been laid out into building plots by Mr. Frank Tugwell, architect, of Scarborough, and the residences will, from their elevated position, command picturesque moorland and sea views. About a month ago the first sale of building sites took place in connection with this new development, and a second one was held on Friday last. The old mansion, which is on one of the highest cliffs on the Yorkshire coast, is being converted into a first-class hotel. The Peak railway station, on the Scarborough and Whitby line, is close to the estate.

THE Cumberland County Council discussed on Friday the proposal to make a carriage-way from Seathwaite, in Borrowdale, to Wasdale Head Hotel, over the Sty Head Pass. The county surveyor submitted a report and map on the subject, describing and showing the proposed route. From Seathwaite the road follows the Derwent to the top of Grains Gill, sweeps round to the right, and turning under Airm Crag, proceeds to the top of Sty Head Pass, following to a great extent the existing footpath. The gradient for a portion of the ascent would be 1 in 8.5, for another portion 1 in 13.2, and the remainder 1 in 18. From Wasdale Head Hotel on the other side of the Pass the road goes up the Mosedale Valley, turns at the head, passes along the face of Kirkfell and Great Gable to the summit. The gradient of a portion of the ascent from the hotel is 1 in 12, and for the remainder 1 in 20. The horizontal distance between Seathwaite to Wasdale Head Hotel is three miles and 1,177 yards, and by the proposed new road seven miles and 1,540 yards. The distance between the two points by the nearest available carriage-way is about 55 miles. He estimated the cost of the new road at £10,000. A special committee of the Highways Committee, who had visited the *locus in quo*, submitted a report, in which they said that they had come to the conclusion that the scheme was quite feasible, the route being well and carefully laid out as regards easy gradients, with the exception of a short section at the Seathwaite end. A resolution was proposed, referring the question of constructing the road back to the Finance Committee, to obtain estimates, to ascertain what wayleaves may be required, and to consider the financial ways and means, and report. To this an amendment was proposed: "That this council, having ascertained by actual survey, made by the surveyor, that the proposed new road over Sty Head Pass is feasible, and being of opinion that it will be beneficial to the district through which it passes, now leaves the matter in the hands of the District Councils and the parties immediately interested, to complete their scheme for carrying out the project." A long discussion took place, and the amendment was carried.

ANOTHER stage in the superannuation of Mr. W. S. Till, C.E., of Birmingham, and the appointment of Mr. John Price as his successor in various offices, was reached on Friday last, when the Birmingham, Tame, and Rea District Drainage Board formally appointed Mr. Till as consulting engineer, at a salary of £100 a year, and passed a resolution acknowledging their appreciation of his long and valuable services, and regretting the necessity that had arisen for altering the term of his appointment. Mr. Price, the new borough surveyor of the city of Birmingham, was then elected as deputy engineer, at a salary of £300 per annum, the terms and conditions of the appointment being identical with those which had hitherto prevailed in the case of Mr. Till.

ARCHÆOLOGISTS will hear with regret that the French Woods and Forests Department are going to sell the ruins of the feudal stronghold of Monthéry. This was one of the most important keeps in the Middle Ages. It commanded the

road from Orleans to Paris, and was, and is still, majestic both in architectural character and situation. Monthéry stands on the edge of the sad-looking but rich tableland of the Beauce, and on one side rises from a steep declivity. Hugues Capet, the Black Prince, Salisbury, Bedford, and Louis XI. are associated in French history with this stronghold. Boileau devoted a descriptive verse to it. The State bought Monthéry in April, 1842, when Gothic architecture was the rage. It spent about £200 in urgent repairs, on condition that the town at the foot of the castle was to pay a caretaker. The townspeople have since laid out a good deal of money, and are ready to take over the ruin and the ground it stands in should the Woods and Forests wish to be done with them.

AN improved joist-hanger has been introduced by a firm in Cleveland, O. It forms an open pocket similar to other contrivances of this kind, forged from rolled steel, having a high tensile strength of 50,000 lb. per square inch. The hook fits over the top of the header on the wall. The hanger has a large bearing surface on the header, and allows the end of the joist to fit tightly to the hanger. A hole in the bottom of the hanger allows the joist to be spiked if desired. It is made in several sizes to fit joists or beams. Another form is made to build into a wall, a Z-shaped wall-plate being used. The advantage of a strong joist hanger is that the end of the joists are free of the wall, and does not impair its strength; decayed joists can be more speedily removed, the bearing is shortened. Rolled steel hangers appear to possess all the requisites of security.

AN enormous amount of spruce-wood is used in making paper for newspaper printing, and the English market for foreign paper is rapidly increasing, if we take the importations of the last six months into account. Even the paper-mills of this country are largely using wood pulp. But the question arises: To what extent is this wood-pulp paper likely to go? Is it to supersede the superior-made paper, and what about its durability and qualities for artistic impressions? But even wood pulp cannot always be cheap; the price of spruce-wood controls the market, and its present great consumption must soon cause a rise in the price. The present cheapness is a kind of recklessness, which must bring retribution. According to *The North-Eastern Lumberman*, the wood-pulp situation is at present in a very flourishing condition.

AT Fort-William, the new electric-lighting installation, carried out by a limited company with £7,000 capital, was formally inaugurated last week. The source of power is found in the River Kiachnish, which falls into Loch Linnhe, about three miles below Fort-William. The stream itself is small, but the construction of a lade of about 1,200 yards allows a fall of 120 ft. At this point a building has been erected in which are placed the turbines and dynamos required for producing the electricity, which is conveyed thence by cables on poles to the storage house at Fort-William, from which it is distributed by cables, partly overhead and partly underground, to where it is required. The poles for the overhead cables are placed at a distance of 60 yards from each other. The cables are of 19 strand 13 gauge copper wire. The total length of cable is about 14 miles. The power is applied by means of two 60 H.P. vortex turbines, which drive two dynamos, supplying a continuous current. The storage house at Fort-William contains 164 cells, E.P.S. Central Station type, with the requisite switchboard for distributing the current. The lamps used are 16c.p., voltage 150. The cost to the consumer is to be 9d. per Board of Trade unit from an hour before sunset till nine o'clock in the evening, and for the rest of the 24 hours 4½d. per unit. The town is, in the mean time, to have four arc lights of 1,000 c.p. each, and over 60 incandescent lights, each of 16c.p. The total cost for lighting the streets is for the present £180 per annum, but terms have been arranged on which the street lighting may be extended. Arrangements have already been made for the electric lighting of the principal shops and hotels, the churches and other public buildings, and a number of private houses. The chief engineer of the work was Mr. R. T. Yorke, with Mr. H. W. Bagot and Mr. A. Cottrill Dorman assistants. The lade was laid out by Mr. John Paterson, C.E., Fort-William, and the contractor for it and for the turbine-house was Mr. A. Bremner, Fortingall. The contractors

for the accumulator house at Fort-William were Messrs. J. and P. MacLachlan, Larbert.

CHIPS.

MR. G. S. T. Harris has been appointed consulting architect to the Government of Madras in succession to Mr. H. Irwin. Mr. Harris, who designed the combined Post and Telegraph Offices at Rangoon, went from Burma to Rewah and from thence to Gwalior.

The Scarborough Town Council received on Monday a report from a committee of the whole council recommending that £100 be granted the borough surveyor, Mr. Joseph Petch, for services rendered in connection with the proposed new marine drive, and that he be appointed consulting surveyor at a salary of £200; that a fully-qualified civil engineer be appointed borough surveyor at a salary of £300, increasing to a maximum of £400; and that the salary of the assistant borough surveyor, Mr. G. Ball, be increased to £170. The recommendations were adopted, with the exception that the retiring pension granted to Mr. Petch, under the guise of salary as consulting surveyor, was reduced from £200 to £150.

It is announced in Tuesday's *London Gazette* that a receiving order has been granted in the case of Henry Hewitt Bridgman, of Poultry, E.C.; and 1, Camden-square, Camden-town, N.W., architect and surveyor.

St. James Church, Burnley, has just been enriched by the addition of a two-light stained glass window, executed by Messrs. Jones and Willis, having Dorcas as the subject, represented in the act of clothing the poor.

The town council of Southampton decided on Wednesday to make application to the Local Government Board for sanction to borrow the sum of £24,900 for the purpose of carrying out a scheme of sewerage which provides for the treatment of the sewage of the borough at Chapel.

Mr. George Cartledge has been appointed head master of the school of art at Bolton, in succession to Mr. Dawson, resigned.

With the view of providing additional accommodation for the fishing industry, Aberdeen Harbour Board resolved, on Monday, to complete the quay on the south side of Albert Basin by the erection of a concrete cylinder wall, at an estimated cost of £11,880.

At the church of St. Thomas, Seaforth, Liverpool, a new east window, the work of Mr. C. E. Kempe, of London, was unveiled on Sunday.

Abbeyle House, Sheffield, which, with an acre of land adjoining, has just been purchased by the Brunswick (Sheffield) Wesleyan Methodist circuit for a church and schools, was built by the late Mr. John Rodgers at a cost, including seven acres of ground, of £39,000. From him the house was purchased for £10,000 by Mr. Mark Frith. The Wesleys have now secured it for £2,500.

The foundation-stone of the Belsize Branch Library at Antrim-street, Haverstock Hill, was laid on Monday by the chairman of the public libraries committee of the Hampstead vestry. It will be a single-story building, erected of red brick, with stone dressings, from the design of Mr. C. H. Lowe, the surveyor to the vestry. The lending department will contain accommodation for upwards of 10,000 volumes, whilst the reference and magazine room will accommodate 50 readers. The total cost of the building and site is estimated at £2,300.

A new United Free Methodist chapel was opened at Newquay last week. It has been built from plans by Mr. John Ennor, Jun., of Newquay, the contractor being Mr. John Collier, of Truro.

At Tuesday's meeting of the Taunton town council the Emergency Committee reported that for months past they had been in communication with Mr. H. W. Pollard and his solicitors on the subject of his claims under his contract for the erection of North Town Bridge. Mr. Pollard claimed that a balance of £1,255 2s. 1d. was due to him, but the borough surveyor refused to certify for more than £805 15s. 4d. After several meetings and a long correspondence, Mr. Pollard offered to take £1,000 in settlement of his claim, but the committee did not feel justified in offering him more than £900, which he had agreed to accept in discharge of all claims.

A memorial is proposed to three deceased Canons of Truro, who were conspicuous for their liberal gifts towards the building and decoration of Truro Cathedral. Canons Richard Martin, Phillpotts, and Wise gave between them a sum amounting to no less than £14,000, about one-ninth of the whole amount expended on the cathedral and its fittings. It is proposed to fill with stained glass the three vacant lancet windows (with double lights) in the north transept in memory of these three generous benefactors of the cathedral. About £400 is required.

Trade News.

WAGES MOVEMENTS.

NORTHWICH.—On Thursday afternoon a deputation from the Northwich branch of the Amalgamated Society of Carpenters and Joiners waited upon the employers in the district, with reference to a notice served upon them six months ago, as to an advance of wages and a reduction of hours. The employers agreed to concede to the joiners an increased wage from 7^d. to 8^d. per hour, and also to reduce the hours of labour during the winter months from 52 to 47 per week. This arrangement will affect 160 men.

CHIPS.

The name of W. H. Crossland, of Great George-street, Westminster, S.W., late of Upper Bedford-place, Russell-place, W.C., architect and surveyor, appears in Friday's list of receiving orders.

An action brought by Mrs. Jane Smith, tenant of Cold Bath Cottage, Billesley, and William Francis Taylor, against the King's Norton Rural District Council, for an injunction and to recover damages for an alleged pollution of Cold Bath pool, was heard at the Birmingham Assizes, on Monday and Tuesday, before Mr. Justice Wills, who gave a verdict of £300, and costs in favour of the plaintiffs.

The Ardrossan Sawmills, including plant and stock, were completely destroyed by fire on Tuesday, the damage being estimated at £4,000.

At a meeting of the Bristol Town Council held on Tuesday, a recommendation that the Ham Green Estate should be appropriated for the erection of a contagious diseases hospital was approved, and authority was given to borrow £27,592 for the purposes of building.

Mr. Edmund Sedding's report for the restoration and enlargement of St. Michael's Church, Princetown, has been approved by the Duchy authorities, and the Prince of Wales has given £100 towards the work.

A memorial is about to be built at Tunbridge Wells to the late Canon Hoare, from a design by Mr. John Oldrid Scott. It is in the Late Perpendicular style. The tower rises from a pedestal of three steps to a height of 20ft., flanked at angles by buttresses terminating in shafts or pillars, carrying figures representative of the Four Evangelists. The tower is surmounted by an octagonal gabled lantern, supported by eight flying buttresses, and terminating in a crocketed spire, rising to a total height of about 40ft. On the principal face of the tower is a quatrefoil panel, with canopy, for the reception of a marble *bas relief* portrait of the late Canon, with panel below for inscription. The memorial will be placed on the present site of the Grosvenor drinking fountain, the latter being shifted to the corner of Mount Ephraim and Calverley roads.

Owing to the late decease of George Henry Welchman, architect, all professional matters in which he was interested will now be carried out by Alfred Ernest Nightingale, architect and surveyor, 52, Queen Victoria-street, London, E.C.

The summer meeting of the Institution of Junior Engineers commences to-morrow (Saturday), when the corporation of Edinburgh will receive the members on their arrival there. The Forth Bridge will be visited on Monday. On Wednesday a reception is to be given by the Glasgow Corporation. Thursday will be devoted to an excursion on the Clyde, by invitation of the president, Mr. A. Denny, of Dumbarton. The Institution dinner will take place on the 21st inst., at Glasgow, Lord Kelvin being the guest of the evening.

On the close of a term of tenancy of the Manor House at Southwell, the owner allowed some tenant's fixtures to remain, in the expectation that the next tenant might take them. Subsequently the owner mortgaged the premises, and the mortgagees claimed to be entitled to the whole of the property thereon. The case came on Wednesday before Mr. Justice Hawkins, who decided that the mortgagees were not bound by the agreement between the owner and the previous tenant; and therefore gave judgment for them.

Professor Herkomer, R.A., presented to Hwfa Mou, the Arch-Druid of Wales, at his residence at Llangollen, on Wednesday, in fulfilment of the professor's promise made at the National Eisteddfod, a costume he has designed in accordance with the traditional dress of the Arch-Druid. The robe is a flowing one of pure white crepe, and covers the figure. The sandals are made of white kid of soft texture, and are much longer in the leg than the ordinary boot. The wreath of oak-leaves for the headpiece has been worked by Professor Herkomer in copper. The gold breastplate is of pure gold, shaped in a semicircle with two large studs at each end. Its weight is not much, but it is of solid metal, and cost about £70.

Mr. Howard John Kennard died at the Orleans Club at Brighton on Saturday last, in his 67th year. The deceased was the son of the late Mr. R. W. Kennard, M.P. for Newport, Isle of Wight. He was chairman of the Blaenavon Iron Company, partner in the Falkirk Iron Company, a Past Master of the Carpenters' Company, and president of the Royal Metal Trades Pension Society, of which his father was the founder. With Alderman Nottage, the late Lord Mayor of London, he established the London Stereoscopic Company.

Hanover Chapel, Regent-street, built 60 years ago from designs by Professor Charles Cockerell, R.A., is being demolished under a Private Act obtained two or three years ago.

At the quarterly meeting of the Belfast Municipal Council, held on Monday, Mr. Leahy moved, "That the members of this Corporation urgently request the contractors of the main drainage scheme to proceed with the work, so as to provide employment for the large body of workmen so long idle in our city." The contract was accepted, Mr. Leahy remarked, last March, and there had been no reason given for delay. He thought the Messrs. Martin should be requested to begin the work at once. Mr. Lenahan asked if the Messrs. Martin could be forced to go on with the work, irrespective of a strike. The Lord Mayor thought not; he added that on the 9th of May last he had asked Messrs. Martin to be good enough to commence the work. Messrs. Martin replied that they were prepared to begin the work if the men gave an undertaking that they would not go out on strike.

Mr. Henry Woodyer, architect, late of Graffham, Surrey, died on Monday last at Tedworth Croft, near Reading, aged 80 years.

A new lifeboat house was opened at Cullercoats, near Tynemouth, on Saturday. It has been built at the cost of, and by the workmen employed by, the Co-operative Wholesale Society, and measures 50ft. by 21ft. It is faced with red bricks, with stone dressings, and has a concrete base. The roof is open-timbered, of pitch pine. A new slipway, carried out in Portland concrete, has been provided, giving a uniform slope from the door of the house down to the beach. The glazed bricks used in the building were supplied by the Burnantoffs Brick and Tile Company; the red pressed bricks by Mr. W. Forster, of Pelaw; the timber by Messrs. Palmer, Hall, and Company, and the slating has been executed by Mr. John Hewitson, Leazes Park-road. The architects were Messrs. Oliver and Leeson, of Bank Chambers, Newcastle. The cost of the lifeboat house itself, with the new road and slipway, has been about £750.

Mr. Henry Erskine, the borough surveyor of Langholme, N.B., has committed suicide by poison in the new Masonic Hall, which was on the eve of completion. Mr. Erskine, who was the secretary of the local Masonic Lodge, was 42 years of age, and leaves a wife and family. Amongst other public appointments, Mr. Erskine held the post of registrar of births, deaths, and marriages. Before leaving his office on the evening when he put an end to his existence, he filled up the usual form used in case of death with full particulars of his own decease, giving the exact time of his death, and the circumstances all go to show that the fatal act took place at the time stated in the certificate form. There can be no doubt that the suicide was a very deliberate one, but there has probably never been a previous case of a registrar doing all in his power to register his own death.

New board schools in Alma-road and Matilda-street, Rotherham, were opened on Saturday. They have been built from plans by Mr. H. L. Tacon, of that town, the contractors being Messrs. Chadwick and Co., accommodate 639 children, and cost nearly £7,000. The style adopted is modern Classic, and the walling is of Dunford Bridge stone, with ashlar dressings.

The great Conference Hall, Mildmay Park, is to be relighted and ventilated on the "Stott-Thorp" combined system of lighting and ventilation, and the work will be carried out by James Stott and Co., of London, Manchester, &c.

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TENDERS.

* Correspondents would in all cases oblige by giving the addresses of the parties tendering—at any rate, of the accepted tender: it adds to the value of the information.

AMMANFORD.—For the erection of infants' school, for the Llandeibie United District School Board. Mr. David Jenkins, F.R.I.B.A., Llandilo, architect:—

Jones, D. C., Gloucester	£2,489	0	0
Thomas and Evans, Ammanford	2,470	0	0
Bennett Bros., Swansea	2,430	0	0
Jones Bros., Ammanford (accepted)	2,350	0	0
Groom, E., Cardiff	2,348	0	0
Morgan, E., Landore	2,340	0	0
Davies, L., Penygroes	2,305	0	0
Mainwaring, G.	2,250	0	0
Rowland and Lloyd, Trealaw	2,180	0	0

BARNET.—For the erection of house at New Barnet. Messrs. Clark and Moscrop, Dartington, architects.

Quantities by Messrs. Leaning and Sons:—

Higgs and Hill, South Lambeth	£5,998	0	0
Bell, W., and Sons, Saffron Walden	5,550	0	0
Lathey Bros., Battersea Park	5,500	0	0
Miskin, C., St. Alban's	5,473	0	0
Garrett and Son, Balham Hill	5,400	0	0
Sharpe, G., Stratford	5,169	0	0
Willmott and Sons, Hitchin	5,045	0	0

* Accepted.

BRIGHTON.—For the erection of a sanitary tower at the Sussex County Hospital, Brighton. Mr. Frank T. Cawthorn, architect:—

Longley and Co., Crawley	£1,295	0	0
Lockyer, G., Brighton	1,185	0	0
Freeman, V. P., Brighton	1,160	0	0
Sattin and Evershed, Brighton	1,160	0	0
Baines, J., Brighton	1,128	0	0
Peters, P., Horsham	1,025	0	0
Parsons and Sons, Hove	1,014	0	0
Saunders and Son, Brighton	999	15	0
Field, W. A., and Co., Brighton	993	10	0

* Accepted.

CAMBRIDGE.—For first contract at Trinity Hall, for the council, including heavy iron drains, manholes, "Detector" traps, gullies, &c. Mr. C. E. Gritton, A.M.I.C.E., M.S.A., Westminster and Selhurst, engineer and surveyor:—

Winser and Co., 52, Buckingham Palace-road, S.W. (accepted)	£465	0	0
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CARDIFF.—For the erection of Lansdowne-road Schools for 1,184 children, with cookery school and caretaker's cottage, and including boundary-walls and playground formation, for the Cardiff School Board. Messrs. Veall and Sant, architects. Quantities by the architects:—

	Gross.	Reductions.	Net.
Hirst, Barry	£19,841	£792	£19,049
Davis, D.	17,918	780	17,138
Groom, E., Llandovery	17,960	863	17,097
Evans, E. R., Bros.	17,869	841	17,021
Symonds, W., and Co.	18,164	1,226	16,938
Lissaman, W.	17,900	1,131	16,769
Newby and Co.	17,552	1,052	16,500
Lewis, O.	17,918	1,565	16,453
Turner and Sons	17,162	802	16,360
Howell, A. J., and Co.	16,895	711	16,184
Williams, W., Pontypriid	16,931	749	16,182
Shepton and Son	17,462	1,313	16,149
Allan, J.	17,056	973	16,083
Dunn, C. C.	16,767	775	15,992
Lathey and Co.	16,666	1,000	15,666
Cadwallader & Hockridge	16,075	793	15,282
Rutter, G., Barry (accepted)	15,928	1,055	14,873

(All of Cardiff, except otherwise mentioned.)

CARDIFF.—For business premises in Romilly-crescent, for Mr. Lewis Ellis. Messrs. Veall and Sant, architects. Quantities supplied:—

Ridgway, E. V.	£2,102	0	0
Lissaman, W.	2,060	0	0
Griffiths, G.	2,033	0	0
Thomas, W., and Co.	1,857	0	0
Haines Bros.	1,876	0	0
Lathey and Co.	1,865	0	0
Price, C., and Son	1,855	0	0
Blacker Bros.	1,835	0	0
Symonds, W., and Co.	1,801	0	0

(* Accepted subject to certain reductions. All of Cardiff.)

CARDIFF.—For the Beaufort Restaurant and renovation of premises, 20, High-street, Cardiff, for Messrs. Chas. Clarke and Co. Messrs. Veall and Sant, architects. Quantities supplied:—

Lewis, A.	£397 0 0
Thomas, J.	330 0 0
Davies Bros.	314 0 0
Couzens, G. and F. (accepted)	300 0 0

CHESHAM.—For the erection of two semi-detached villas, Stanley-avenue, Chesham, for Miss M. A. Catling. Mr. Geo. H. Green, Willesden Green and Chesham, architect and surveyor:—

Nash, A. W., Dunstable (accepted)	£1,225 0 0
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CHESHAM.—For additions to boot factory, Townsend-rod, Chesham, for Mr. Jos. Glasgow. Mr. Geo. H. Green, Willesden Green and Chesham, architect and surveyor:—

Mead, J., Chesham (accepted)	£224 15 0
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CREWE.—For sewerage Hungerford-road, for the town council. Mr. G. Eaton Shore, borough surveyor:—

Lunt, F. (accepted)	£1,306 4 0
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CREWE.—For making-up Middlewich-street, for the town council. Mr. G. Eaton Shore, borough surveyor:—

Bennie, F. T. (accepted)	£815 18 9
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DOVER.—For the erection of stables and coachman's rooms, near Dover, Kent. Mr. St. Pierre Harris, A.R.I.B.A., 8, Ironmonger-lane, E.C., and Orpington, architect:—

Jebb, S. T. (accepted)	£310 0 0
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(No competition.)

EDMONTON.—For the erection of the first section of St. Peter's Church, Lower Edmonton, for the Rev. E. J. Austin. Messrs. Newman and Newman, 31, Tooley-street, London Bridge, architects. Quantities by Mr. H. B. Saunders:—

Downs, W.	£5,015 0 0
Balaam Bros.	4,805 0 0
Hunt, J. A.	4,869 0 0
Roberts, L. H. and R.	4,378 0 0
Dorey and Co.	4,282 0 0
Godson and Sons	4,069 0 0
Goddard and Sons	3,875 0 0

FARNBOROUGH.—For the building of stables at Oak brewery, Farnborough, Kent. Mr. St. Pierre Harris, A.R.I.B.A., 8, Ironmonger-lane, E.C., and Orpington, architect:—

Payne, D.	£1,923 0 0
Knight, T.	1,919 0 0
Otway, J.	1,877 0 0
Somerford and Son	1,845 0 0
Crosley, T., and Son	1,794 0 0
Lowe, R. A. (accepted)	1,755 0 0

FELIXSTOWE.—For the erection of a main shelter on the cliff, for the local board. Mr. S. S. Horton, surveyor to the board:—

Thurman, F. C., Felixstowe	£2,109 0 0
Parlington, T., and Son, Ipswich	2,100 0 0
Wawman, W.	2,086 0 0
Durrant, W. (too late)	1,940 0 0

(No tender accepted, the lowest being considerably above the estimate.)

GRANTHAM.—For painting the interior of the town hall, for the corporation:—

Smith and Hopkinson (accepted)	£58 0 0
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HAMPSTEAD, N.W.—For alterations at the Haverstock p.h., Haverstock Hill, for Mr. Arthur Banks. Mr. Albert E. Fridmore, 2, Broad-street Buildings, E.C., architect:—

Lamble	£259 0 0
Brown	208 0 0
Pearce	199 0 0
Wiltshire	184 16 0
Marchant and Hirst (accepted)	178 10 0

HASELEY.—For extending the adits at the waterworks at Haseley, for the Warwick Town Council:—

Bell (accepted) about £1,750.

HORNSEY.—For alterations at the Hope and Anchor, Tottenham-lane, Hornsey, for Mr. R. Egan. Mr. Edward Brown, M.S.A., 161, Commercial-street, Bishopsgate, E.C., architect:—

Builders:—	
Sheffield Bros.	£947 0 0
Goodall, S.	918 0 0
Young, W. (accepted)	832 10 6
Gasfitters:—	
Evered and Co.	110 0 0
Steadman, J.	102 17 6
Dix, C. R. (accepted)	101 12 6
Pewterers:—	
Davis, R., and Son (accepted)	62 0 0

HUDDERSFIELD.—For painting the interior and exterior of the workhouse at Deanhouse, for the Huddersfield Board of Guardians:—

Quarby, G., and Sons, Holmfirth	£128 0 0
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(Accepted.)

IATHINGTON.—For reseating the parish church in oak, adding a new vestry, supplying heating apparatus, and other works of restoration. Mr. T. Taylor Scott, F.R.I.B.A., of Carlisle, architect.

Accepted tenders:—

Building, masonry, and slating:—	
Mark, Laversdale Lane End.	
Plumbing:—Henderson, Carlisle.	
Reseating:—Head, Manchester.	
Painting:—Atkinson and Elliot, Brampton.	
Joiner work:—Hayward and Edgar, Brampton.	
(Total amount of accepted tenders, £500.)	

IPSWICH.—For painting the county police-station, for the East Suffolk County Council:—

Grayston, W. (accepted)	£37 7 6
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(Lowest of five tenders received; highest, £44 10s.)

LIVERPOOL.—For various works, for the corporation:—

Accepted tenders:—

For erecting and completely finishing the new Steam Disinfecting Buildings, Smithdown-road, Toxteth Park:—

Haugh and Pilling	£927 0 0
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For the removal and re-erection of the monument in Monument-place:—

Tomkinson, W., and Sons	£147 0 0
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For painting and cleaning the Wholesale and Retail Fish-Markets:—

Tomkinson, W., and Sons	£529 0 0
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For painting the exterior of St. Martin's Market and repairing the skylights of the Wholesale Fruit and Vegetable Market:—

Tomkinson, W., and Sons	£127 0 0
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For painting, &c., required at Newsham Park and Sheil Park:—

Desoer, C., Liverpool	£465 0 0
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For painting required at Wavertree Park:—

Desoer, C., Liverpool	£149 17 6
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For painting required at Falkner-square, Abercromby-square, and Great George Square-gardens:—

Mooney, W.	£78 0 0
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For the erection of lodge and Propagating-house in Newsham Park:—

Paterson, J., and Sons, Liverpool	£1,799 0 0
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For providing linen cupboards, &c., at the City Hospital, Parkhill:—

Mather, W.	£47 15 0
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For the erection of a discharging block at Parkhill Hospital:—

Burt, C., Liverpool	£319 0 0
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LONDON.—For new factory, Nos. 42, 43, and 44, Minories, London, for Messrs. J. Taddy and Co. Mr. E. J. Sadgrove, 22, Surrey-street, Strand, W.C., architect:—

Stephens, Bastow, and Co., Ltd.	£13,491 0 0
Landel	13,460 0 0
Bywaters	13,420 0 0
Gould and Brand	13,322 0 0
Foster and Dicksee	13,187 0 0
Mitchell	12,996 0 0

LONDON.—For conversion of Nos. 27, 28, and 29, Colville-square, Bayswater, into flats. Mr. Peter Dollar, architect:—

Marks, W., Waltham-green (accepted),	£1,885.
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THE BUILDING NEWS

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STONE AND IRON.

OF the two kinds of artistic design—those of stone and of metal—it may be aptly said that the proverbial schoolmaster “has been abroad.” These two crafts appeal to a large class of the public: they are prominently before the eye of every passer-by in our public streets; they present themselves to us in various forms in our homes, in our churches, and even in our cemeteries. In one form or another there is no getting away from stone and iron, and yet of their two opposite qualities no one seems to think very deeply. When we see stone wrought into the most grotesque shapes in the dressings of our houses, or as memorials for the departed even, twisted and wrought into rope patterns like cables, and metal cast into shapes which represent flexible materials or interlaced patterns suggested by plaited work and textiles, it is time to ask ourselves whether there is any meaning or motive in such work. When iron is cast into forms which represent ropes and other flexible materials, and stone is cut into anchors and other devices for which it has no affinity, the inference is that there is nothing which art cannot do, however absurd, and that the same motives can be applied to all materials alike. The obvious conclusion is that stone and wood and iron are passive and plastic materials in the hands of the designer. No doubt the public mind holds this view. Mrs. Malaprop selects a brooch which represents a piece of chain or a cable; it is pretty and fanciful, and she does not for a moment question the propriety of such a pattern for a rigid fastening to her dress. If she chooses a firegrate, irons, or a pair of fire-dogs, human figures or animal forms are conspicuous; the poker and tongs are made in the form of stiff chains or twisted cables. Her silver cruets or table ornaments represent wicker basket work or equestrian statues, gladiatorial combats, or other atrocities copied from the antique. Who is to tell her otherwise? Her visitors admire and exclaim “How pretty!” and it would hardly be in good taste to criticise. So the mischievous example is repeated. All this is grievously wrong from an art point of view; but people go on preferring these vulgar caricatures and the “rococo” designed mantel timepiece case, with its profusion of cupids and inane figures cast in bronze or carved in marble. The Sir Georgius and Lady Midases count for much in the market, and their tastes must be studied. The designs submitted at the Goldsmiths’ Company competition and those of the Turners’ Company often err in this treatment of the material, and we speak here more as to the shaping of the material in the mass than to its decoration. It is the general shape which appeals more directly to the popular mind. Without making any distinction as to material, whether it is in stone or marble or iron, the purchaser of ornamental objects looks to some concrete embodiment of shape. It must represent something, even if it be only a flower or a chain or a group of antique sculpture. For instance, a rope pattern, or chain in stone for a tomb railing is wrong, but the same pattern may be applied as decoration. It is used in this way in painting borders, in pottery ornamentation, in intarsia, in the soffits of arches and vaults, architraves of doors, in friezes, in torus mouldings, and other architectural decoration. Both the chain band and the interlacing band are used in all styles. We cannot point to a better example of our meaning than in the Celtic and Scan-

dinavian designs in stone; the Celtic cross is enriched by interlacing ornament on its faces, often very complicated and very rich. The interlacement band is the most usual ornament incised or carved in relief.

A very flagrant misapplication of stone is seen in most of our cemeteries where the vagaries of the monumental mason find a congenial soil and an unrestricted field. Art principles do not appear as yet to have entered into those sacred precincts. No doubt it is a flourishing business, and the profits of the trade seem to be a bait to those who cannot succeed in constructive masonry, but here find a place for their talents. Monumental stone-cutting and carving are peculiar arts in which principles of art are sacrificed to the popular sentiment. Why it should be so we cannot say, except that those who buy and pay for monuments are generally their own masters in the selection of designs. We all know the grotesqueness and redundancy of the cemetery memorial; the sickly sentimentalism, the profusion of exuberant flowers carved on crosses and headstones; the heathenish urns, broken columns, inverted torches; the sprawling Cupid-like cherubs; theatriciously sculptured figures of children and maidens, and other hideous manifestations of sentimental grief. In every one of these instances the material has been disregarded, and the sculptor has copied—burlesqued, it would be truer to say—some group or figure found in some “Poets’ Corner” or church that was not intended as an out-of-door memorial. The pagan idea of women weeping over urns is happily disappearing to make room for more emphatic and sensible symbols like the cross. The churchyard cross, in its simple ancient and Celtic types, does not satisfy the mere sentimental mind: it must be overlaid or smothered with wreaths or a profusion of flowers in bad taste, carved in high relief, only suitable for wood or metal, or some plastic material. Again, we see anchors and like emblems cut out in stone, extended arms, and other finely-wrought figures which, by their very fragility and thinness, cannot endure an English winter. Truly it may be said the limits of materials, or those which it imposes on the artist, are never so glaringly defied than in some of these “God’s acres.”

In like manner the ignorance of the laws of design is manifest in the domain of construction. Engineers know very little of the treatment of stone, and when they get a masonry bridge to design, they show their utter incapability of understanding the principles of stone design. They erect towers of steel for a suspension-bridge, and then incase them by a veneer of stone. At other times they construct iron-rib bridges in such a way as to represent stone arches externally. The temptation to copy old forms has been strong in every age. We know that the prototypes of Assyrian, Greek, and other Asiatic buildings were of wood; we can trace the forms of the wooden originals in the stone and rock-cut tomb or temple, and therefore we cannot wonder that the modern engineer should have fallen into the same habit, and imitated stone arches in his iron bridges. Again, the desire of making a bridge monumental has suggested stone forms. The observations of a writer in the *Engineering Magazine*, Mr. G. C. Gardner, on the “Architecture of Bridge-Building,” which we gave in our last issue, is worth quoting. Speaking of the monumental character of these structures, he says: “It is easily possible here to maintain the visible distinction between the utilitarian and the monumental—the lack of which distinction is so often fatal in the attempts to combine the two in one structure.”

True, by trying to make an iron girder look monumental, the utilitarian is sacrificed. We must not smother one quality to achieve the other. If they cannot both be expressed, the utilitarian must be preserved. Stone and metal have invariably puzzled the archi-

tect and engineer whenever they have tried to reconcile them by compromise, as by treating one like the other, or giving the same character to both materials. The two materials are so fundamentally unlike both in their physical and aesthetic properties, that it is the height of folly to imagine that one can be treated like the other. Take, for example, a wrought iron grille to a window opening. It is intended as a protection: the earlier examples show them as simple bars upright and across, with ornamental pieces between. But the modern idea in some cases has been to make the grille more or less like a piece of fine tracery to imitate stone. Instead of the simple scrolls and geometric patterns of the Gothic grille, the modern baroque has massive scrollings. The bars and cross-pieces which originally were the fundamental basis of the design became lost in the later periods, the pattern, or geometric fillings, was developed instead. And it is precisely the same with doors and gates of iron: the earlier designs showed the metal bars vertical and cross, with simple added ornament between; but in the later styles the iron expression is lost in the most elaborate patterns, which partake more of modelling or carving. The development of art-smithing supplies us indeed with very notable instances of the desire to represent in metal objects of other materials. In the first attempts of forged work the framework of bars was conspicuous, but in the later developments we find panels substituted, and these were filled in with ornament till the framing became lost in the elaboration of patterns. The art of “forging out of the piece,” as it is called, consisted of a design as a whole made up of welded parts without the aid of screws and rivets. No doubt this led to the imitation of forms only suitable to stone or other materials. The rivet and screw or collar as a means of joining or connecting the pieces was ignored altogether. So it is with much of the metal-work of to-day—our iron railings and gates and verandahs. Technical facilities and machine labour have abetted this state of things. They have made it easier and cheaper to reproduce other modes of decoration in metal. From our overmantels of cast iron down to our coal-scuttles and fire-irons, wood designs have been imitated. Cast and forged work in brass and copper in innumerable shapes are copied in thin sheets of metal beaten up—a kind of repoussé work.

Our topic leads us also to the question of metal as a decorative means. Every metal, as Mr. Nelson Dawson said some time ago at the Association, can be treated as cast, forged, or as sheet work. They are separate trades, and the designer in metal should not mistake one for the other, as he so often does. The three processes of manipulation require different treatments. Cast work includes, of course, all statuesque or sculptor’s work; forged work includes the iron grilles, gates, and other art-smith’s work in which construction apart from mere ornamentation is required; while metal in sheet form can be used mainly for decorative purposes and surface relief. Not only must these three processes be expressed in the design; but it must be remembered that certain metals bear one treatment better than another. For instance, it is very obvious that sheet-copper is well adapted for hammered work; it can be beaten up for panels or surface relief, and has a good effect at a little distance. It is not desirable that it should be finished or chased or sharply cut; but its hammered face, blurred though it may be, is better for many kinds of work than brass or other metal. It is a glaring mistake to imitate cast or chased work in sheet metal, as we often see in modern decoration.

The limits of stone and metal have prescribed restraints which seem hard to learn by those who design, and this difficulty appears to be owing largely to the impatience with which

all forms of art restraint are received. No doubt the system of art instruction has something to answer for, in setting before the student examples to copy, before he has been instructed in principles having special reference to each material. We look to our technical art schools for the corrective. Much also of the redundancy and inconsistency of our designs is owing to the public desire to have forms that please in a cheaper material. A great deal of our modern stone-carving—that especially seen on commercial premises, and on house-fronts—executed by carvers in soft stone, and the cast-iron work of gates and railings, ridge-crestings, and finials, answer to this description. They are pleasing and displayful in proportion as they lose sight of any law or restraint in their design.

EXTRA SERVICES.

UNDER what conditions a professional man can charge for extra services rendered in the discharge of his ordinary employment is a question of some moment. In the first place, it is not always clear what the word "extra" implies, for on this point the whole question turns. In the discharge of his duty of carrying out a design an architect has frequently to render services which cannot be considered strictly to come within the scope of his professional routine. He may, for instance, be required to negotiate for the acquisition of a site, or be called upon to make a survey of old premises, or to value an easement; and in such cases he has a claim for remuneration in addition to his architectural duties. But if a borough surveyor who is employed at a regular salary undertakes any such special work, it is doubtful sometimes whether he can make an extra charge. For instance, he is called upon to make designs for a new market or public building or town offices, which entail upon him additional labour. Can he charge a commission for the preparation of the design? No doubt this is an exceptional case, for although the town surveyor has to advise his corporation on a host of subjects, and to be competent as an architect in the construction of various buildings like municipal offices, lunatic asylums, hospitals, mortuaries, baths and washhouses, cemetery chapels, police stations, abattoirs, &c., he is not therefore compelled to carry out such work within his salary. Nor, indeed, is there anything in the Public Health Act relating to his appointment or duties which may require him to act as an architect, the term "surveyor" being always used. Generally, we believe, the duties of a borough surveyor are expressly defined by a sub-committee of the corporation or sanitary authority—a very necessary proceeding; and from the list of such duties—often very long—which certain towns have drawn up, it would appear that the surveyor has to perform a great variety of services, including many which belong to the architect's province. One of these authoritative lists includes, among 33 different items: "To advise on and execute all engineering works, to prepare plans, specifications, and estimates of, and take out quantities for, such sewers, buildings, bridges, and works as may be required, and to superintend the erection and execution thereof"; also to "examine and report upon all plans and elevations of buildings proposed to be erected or altered upon land sold or leased by the corporation." What class of buildings are supposed to come within the first clause it is impossible to say. Under such a clause, however, it would be impossible for a surveyor to exclude any building which his board wished him to prepare plans for; and, therefore, it would be doubtful if he could make a special charge for designing and superintending any building which may be required. In the absence of such a definition of duties it would certainly be

reasonable to expect that any buildings would lie outside the regular work of the surveyor, and that he would have a right to charge for any services rendered in connection therewith. There are many occasions when the professional adviser or surveyor to a board is called upon to undertake duties that lie outside his ordinary routine of labour, and it is only reasonable for him to expect such services to be paid for. For example, an architect makes a valuation for his client; attends in court or before arbitrators to give evidence in a case of dispute, about light, party-walls, or other matter, in which cases he has certainly a right of remuneration, and the Courts will recognise such a claim based on reasonableness. As we have often said, no professional scale of remuneration such as that of the R.I.B.A. schedule is binding on the public. We sometimes hear of architects and engineers being employed at a salary by large firms of manufacturers or companies. They are required to perform certain duties, to superintend the buildings and machinery, to prepare specifications and plans for any alterations, to advise the employers, and to act as surveyors. But sometimes a particular occasion arises;—the works or buildings of the company are extended or rebuilt, and the official employed is instructed to prepare plans and specifications for the new works or buildings, for which he claims an extra remuneration. No doubt in such an instance, if there is no agreement to the contrary, or no understanding has been entered into respecting work or duties of this kind between the parties, the official or superintending architect has a claim upon his employers. The quite recently-reported case of "Bateman v. Lever Bros., Ltd.," may be cited. Here the plaintiff, an engineer, brought an action to recover a sum not only for wrongful dismissal but for extra services rendered the defendants, large soap manufacturers, for supervising the erection of buildings and other works over and above that included in his contract. The plaintiff, in fact, alleged wrongful dismissal, and claimed 5 per cent. on the outlay of the buildings. On one side it was contended that when plaintiff was appointed he was told he would be expected to do the class of work for which compensation was sought; on the other, that the defendants had no right to expect plaintiff to undertake constructional work. For the defendants it was urged that the work in question was within the scope of the plaintiff's employment. Setting aside the question of dismissal, which may have been aggravating, the point that chiefly concerns us is the liability of a company or board to pay for work of a special kind. As the judge said, the "question was whether the terms of the engagement were such that this extra work came within his salary, or whether it had been done under such circumstances that he, as a reasonable man, would suppose would entitle him to be paid for under an implied contract." In the end the jury found for the plaintiff, awarding him £500 damages. The decision is important: it shows that the jury considered such a work as not coming within the scope of the engagement as engineer, and that there was an implied contract which, according to the report, appears to have been almost acknowledged by the defendants, and which entitled plaintiff to compensation. As a general rule, there are certain circumstances which cannot be strictly defined, but by which an architect, surveyor, or engineer employed under a salary, may fairly judge of his position. If the scope of his general duties are stated or implied, any special service of this kind cannot be questioned. The erection of new buildings or their enlargement can hardly come within the range of supervision or repairs, which latter are generally matters which fall to the duty of the surveyor or official architect or engineer. Anything that is extra to the ordinary routine, such as

the erection of a new building, may be regarded as a work for which extra remuneration ought to be paid. The charges in such cases can only be regulated by circumstances, and they ought to be provided for in the agreement.

CHURCH ORGANS AND ORGAN-CASES.*

THOSE charged with the construction and preservation of church organs are not unfrequently held responsible for certain defects connected with the use of these costly instruments—defects for which they should not be blamed, and against which they often contend in vain. We are referring to defects which not only impair the usefulness and musical quality of the organ, but which are also apt to prove injurious to the reputation of the manufacturer and to his monetary interests, and those of the church owners as well. In most cases the individual organ-builder finds it impossible to secure the adoption of his recommendations on the part of the architect, or the building committee; or, prompted by considerations of business sagacity, he refrains from taking a decided stand against existing adverse conditions; or, perhaps, it may be already too late to enforce the proper conditions for the placing of the organ when the organ-builder is approached. In such instances the result is generally unsatisfactory, and blame is thrown on the builder for what could easily have been avoided, if the needs of the organ had been properly studied at the right time.

The Union of German Church Organ Builders, therefore, deems it necessary, in the interest of the art-branch which it represents, to call attention to a few important points by the publication, from time to time, of appropriate articles on the subject. In the following lines, it will be its aim to deal principally with the evils encountered in furnishing organs for new church edifices. The primary condition is that, in planning, sufficient floor-space should be assigned to the organ for the proper placing of the pipes. With this condition unfulfilled, the various sets of pipes are often so crowded together as to make access to them in many places difficult. This, again, renders any sort of adjustment or repairing work difficult and costly. Another great advantage is that, by crowding the pipes, the production and quality of tone are sure to suffer. In many cases, the size of the organ-loft is determined by the architect, while a musical expert is called to decide upon the number of stops, before the order for the work is given to the organ-builder. The latter, in his endeavour to live up to the specifications, finds himself facing the necessity of deviating from the most approved plan of arranging the pipes, and is compelled to make the best of the available space. It is, therefore, to be recommended to architects having the interest of their clients at heart, to obtain the opinion of an expert organ-builder as to how many stops are required in view of the size of the church before the planning of the organ-loft, and what length, width, and height are needed for their proper arrangement. From these data, to which must be added the needful space for the choir, the size and the elevation of the organ-loft may be determined. It will then be feasible for the organ-builder to arrange the pipes according to an approved system, which, in itself, is a great point gained toward the successful accomplishment of his task. It is also necessary for the architect to inform himself about the weight of the organ and case, to enable him to properly compute the strength of the floor. Perfect rigidity is a requirement of the first importance, the continued trembling of insufficient supports being simply ruinous to an organ.

The question of lighting, too, requires due consideration. Experience teaches that it is best for the organ to receive its light from the front only—viz., through the side windows of the church, so that the inner portions of the instrument may remain pretty well in the dark. Direct sunlight falling on the outside, or the inside, of the organ always proves injurious to it. In recent years, in Germany, the west window (so-called even though its position may not be west at all) has become the fashion again, much to the annoyance of the officiating priest or clergyman, who has to stand at the altar, or in the pulpit, with the glare shining in his eyes. This window in the wall

* Translated by F. G. LIPPERT, for the *American Architect and Building News*, from a paper prepared by order of the Union of German Church Organ Builders, and published in the *Deutsche Bauzeitung* of Berlin.

over the front entrance may have been a necessity centuries ago when churches had no organs, or small ones at best. Then the architect was seeking for a feature to enliven and decorate that large wall-space. Nowadays, when the musical portion occupies an ever-increasing prominence in divine service, this west window is no longer a necessity; but, considered in its effect upon the organ, is a decided evil. The window occupies the space that ought to be given up to the organ. As the architect is not likely to consent to a partial covering of the window, the remaining space below and at the sides of it will in most cases prove insufficient for the advantageous placing of an organ proportioned to the size of the church. Looking upward from the aisle to take in the effect of the organ-prospect, the eye, blinded by the light falling through the great west window, will see nothing except the black upper outline of the organ-case, an effect which must be pronounced an artistic failure. To this should be added the injurious action certain to be caused by the sunlight falling into the organ from behind, even though its intensity be subdued by stained glass. Add, further, the periodical heating of the organ-pipes by the sun, the injurious effect of cold draughts and dampness affecting the delicate mechanism of the instrument, all occasioned by that window. Supposing a pane to be broken by some cause or another, nothing will prevent rain or snow from entering the organ-case. Frequently the broken pane may not be discovered for a long time, yet even when discovered, the mending of the window, on account of its inconvenient position, is often delayed. The window, moreover, during the summer and autumn attracts hosts of flies, who make their way into the pipes, where they die, thus spoiling the intonation.

We believe the majority of architects have not the remotest idea of the disadvantages they create for the organ by introducing this favourite window, by which, after all, a satisfactory interior effect cannot be obtained for reasons explained before. On the contrary, this window brings into view the larger wooden pipes and the big swell-boxes which ought to be hidden from sight, but which the organ-builder finds impossible to place where they will not show, and thus the artistic effect of the organ-case is marred.

To dry a new church-building rapidly, coke fires are often employed in Germany. So long as the organ has not been placed in the church, no objection can be raised against this practice. With the organ, however, in position, the action of the gases issuing from the coke fire is pernicious. The tin pipes become tarnished and blackened, the brass bolts and pins, wires, springs, &c., become oxidized and so brittle as to break at a mere touch. An organ injured in this manner requires very extensive repairs to render it useful again.

In some cases, the expedient of washing the tile floor of a church with diluted muriatic acid has been the cause of blackening the highly-polished front pipes* of a new organ, giving them in a few days the ugly appearance of lead, which cannot be undone by simple rubbing, but requires a thorough abrasion of the surface and renewed polishing to restore the pipes to their original bright appearance. The employment of injurious chemicals for cleaning purposes is, therefore, a thing to be avoided.

Not less important than the proper erection of the organ is the preservation of the same. We will, therefore, state the most important causes which, being more or less permanent, may work injury to the organ. Where churches are heated by gas-stoves without the needed provision for carrying off the fumes of combustion, or where the church is lighted by gas-jets, a certain injurious effect upon the organ-pipes similar to that caused by the coke fires, though less pronounced, will be noticed. Heating the building, as a general thing, unless continued throughout the week, has the effect of putting the organ out of tune. The front and smaller interior pipes become heated first and thereby higher in pitch, while the larger wooden pipes become warm more slowly, and do not rise in pitch until after a lapse of eight to sixteen hours. The warming up of the inner pipes may, however, be hurried up by furnishing the case with open-work panels,

which may be inserted during the winter months in place of the solid panels which are preferable in summer on account of better keeping out the dust. To obviate the difficulty of inequality of pitch, it is recommended to start the heating of the building from eight to twelve hours before the beginning of the service.

One of the worst enemies of organs to guard against is dampness. This is especially noticeable in the spring. In much-frequented churches, the exhalations issuing from the crowded assemblage, unless carried off by proper means of ventilation, are deposited along the ceiling and on the walls and pillars of the edifice. Often streams of water may be seen trickling down the walls, or the water may drip from the ceiling. In winter, still larger quantities of water are deposited on walls and ceiling by freezing on, only to thaw, at the rise of temperature, and make every object inside the church, the organ included, dripping with moisture. Wherever in a close space the atmosphere is full of moisture in conjunction with foul air the building materials will rot in a comparatively short time: woodwork falls an easy prey to worms, leather is covered by mould growth, the glue holding the parts together decays. The mechanism of the organ, owing to the swelling of leather and woodwork and the oxidising of the metallic parts, becomes impaired and refuses to work smoothly. The wind-slots of the wooden pipes become contracted, reacting unfavourably upon intonation and harmonic quality. The most carefully-made piano, put in such a place, would in a few weeks become totally unfit for use. There are cases on record of new churches in which, after one year's usage, dry-rot was found to have attacked the pews and other woodwork, so requiring their partial renewal. It is true that, in constructing organs, the manufacturer, being familiar with the harmful effect of dampness, does observe every possible precaution to impart to the organ a considerable degree of resistance in this direction. An organ may, by conscientious painstaking, be brought to perform its functions well in spite of prevailing dampness. But, unfortunately, the latter condition is by no means permanent, alternating in the summer months with a drying-out process almost as harmful. In some localities, where rain is scarce for months at a time, organs known to be a hundred years old and over have been observed to become so dried up during some of the recent dry summers that they have utterly refused to work. The main source of harm, then, lies in the alternation of dampness and dryness.

To combat these evils effectively, there is but one way open—viz., to provide an effective, constantly-working system of ventilation. This may be arranged in various ways. We recommend the following on account of its simplicity: All around the outer walls of the building, about 10ft. apart, circular openings are cut through the walls of 6in. diameter, covered on the outside by a wire netting to keep cats, rats, and mice from getting in, and closed on the inside by turned wooden stoppers fastened to chains. These stoppers serve to close the openings during divine service, thus preventing draughts. In their stead, slides, or registers, the same as for hot-air flues in heating houses, may be used. Through these openings fresh outside air is constantly introduced into the church. The ceiling should be provided with a few large circular openings covered with open-work metallic rosettes (of hammered zinc plate) of 24in. to 32in. diameter, through which the ropes holding up the chandeliers may be conveniently passed. Avoid placing any openings right above the organ, or anywhere near it. Also avoid any doors behind, or near it, through which a draught of air might be generated. The organ must stand out of all draughts. Above each rosette a wooden lid, raised like a table on four legs about 1ft. high above the opening, is then placed in the loft, as a safeguard for workmen against stepping through the opening. In the roof ample provision must be made for carrying off the air rising through the rosettes, either by open dormer windows, or inserted hollow roof tiles, or by conducting the foul air into the steeple, from whence it may escape into the outer air. It is obvious that the combined area of the outgoing air-ducts must equal that of the openings in the ceiling as well as the wall-openings at the base of the church.

If you provide a new church with this simple ventilating apparatus, you may safely erect your organ even before the church walls have become

perfectly dry. In a church not so provided, it is safer to wait a full year before erecting the organ, as the latter is exposed to greater injury during the first year in a new church not perfectly dried out than in the following ten years combined. It is greatly to be recommended, and will richly pay for the expense to introduce this method of ventilation into old church buildings also.

The organ should also be protected from the attacks of birds, mice, and others of the smaller animals which may work injury either by leaving their dirt behind, or by eating away the leather and woodwork. Bats seem to have a preference for the bright metallic pipes, leaving behind corrosive spots, which, once dried up, can only be removed by abrading the surface. Bats and birds are also apt to get into the pipes and sound-cups of the reeds, where they are caught, and perish. Not only do the pipes thus choked up become useless, but upon the decaying bodies worms will feed, and, in multiplying, find their way into the bellows and valves, causing trouble wherever they reach.

Finally, dust, small particles of plaster, and grains of sand dropping from the ceiling, as well as undue vibrations of the gallery-floor, act injuriously upon the musical quality of the organ. To guard against the flying dust raised in sweeping the church, the use of damp sawdust thrown upon the floor of the church and galleries before the sweeping, may be recommended.

That a leaky church roof will in time work injury to the organ is too obvious to need more than mentioning.

A church organ is a very complicated instrument, composed of thousands of small parts and a number of different materials, which, in the nature of things, must gradually wear out, and therefore require, at regular intervals, careful and intelligent inspection. There are organs which have not felt the touch of an expert hand for many years; but this is poor economy. One pipe after another refuses to respond, intonation and harmonic effect become gradually more and more deficient. One stop has to come to the support of another, until finally the organist has to give up playing in despair. To play upon such a worn-out instrument during divine service constitutes, in our opinion, an offence against the good musical taste of the congregation obliged to listen to the performance Sunday after Sunday. The regular listeners gradually get so accustomed to the defects of the worn-out organ that their musical perception becomes dulled and corrupted, while to an outsider the defects in the instrument are at once noticeable.

We, therefore, emphatically recommend to the church authorities, governing boards, and trustees to intrust, against a fixed remuneration, their organs to the charge of an expert organ-builder who shall carefully examine them once or twice a year, or at least once in two years, adjust the mechanism and tune the pipes. In doing this he will have frequent opportunities to discover, and bring to the attention of the authorities, any drawbacks and defects, and to nip in the bud any dangers that may threaten the costly instruments, thereby often saving the expense of extensive repairs.

WIDENING A TRUSS BRIDGE.

THE *Engineering Record* describes and illustrates the widening of an iron truss bridge—the Washington-avenue Bridge, Minneapolis. It is 1,672ft. long, and spans the Mississippi river; built in 1885, has deck spans of two parallel lines of trusses of the Pratt type, about 32ft. deep, spaced 20ft. 5in. from centres. The trusses carry an 18ft. roadway and two 5ft. 6in. sidewalks, and are supported on granite-faced piers. The increase of traffic rendered it necessary to double the width of roadway. An electric train passes over the bridge every two-and-a-half minutes in addition to the street railway trains. The piers were allowed to remain. The engineer, F. W. Cappelen, M.Am.Soc.C.E., "devised the plan of cutting oblique footings into the piers, and setting on them steel columns with a reversed batter, so that they diverge enough at the top to reach the centre lines of the new positions of the trusses." These raking columns are to be tied together by horizontal anchors across the faces of the piers, and so are kept in balanced equilibrium. By thus moving the outside trusses 9ft. further out on each side a roadway of 36ft. is obtained, with cantilever sidewalks of 6ft. 6in. each. The old floor materials of both sidewalks and half the roadway were utilised.

* It may be here stated, by way of explanation, that in Germany preference is given to a plain, but highly polished, metallic surface over the multicolour decorative treatment generally employed on the front pipes of church organs in this country.

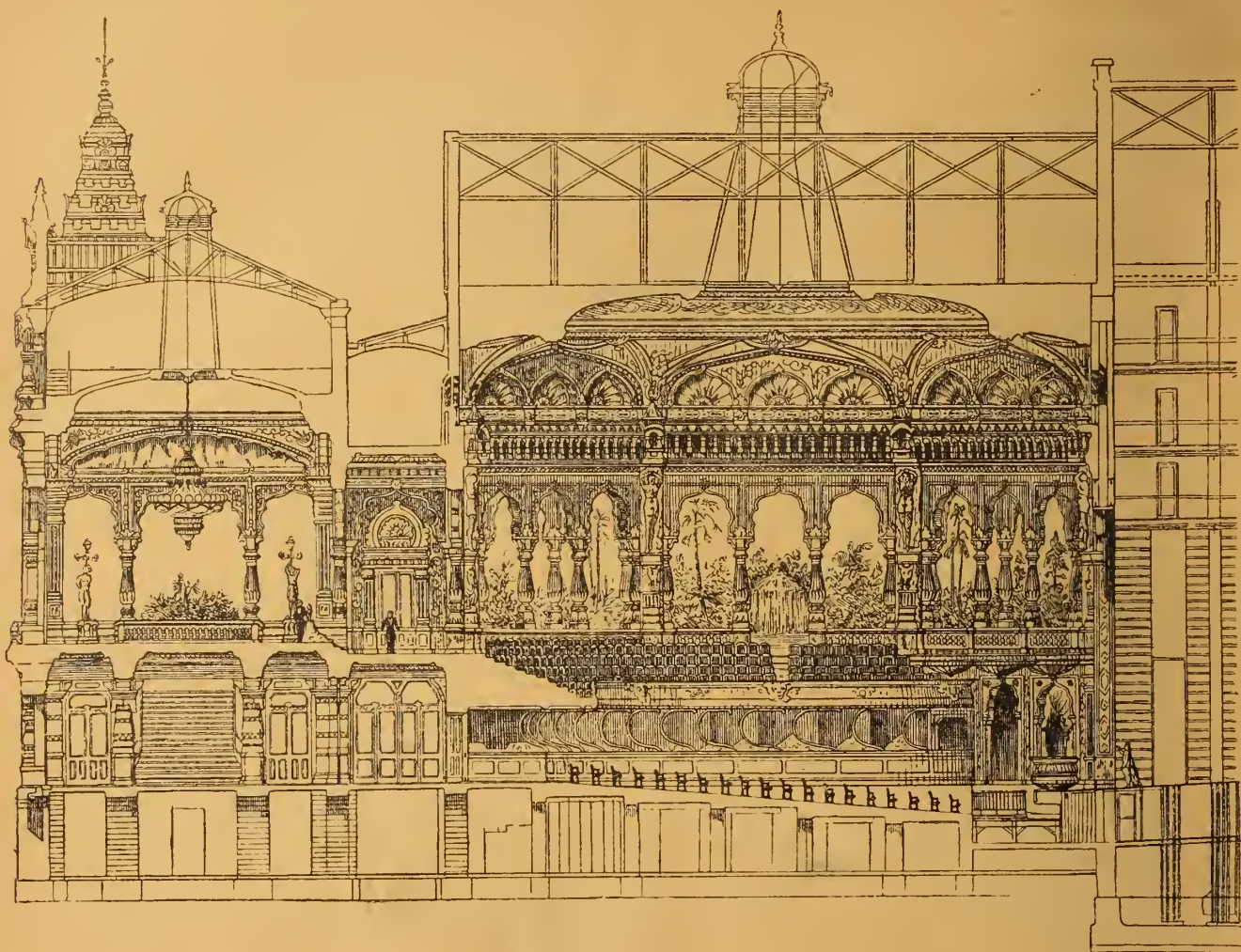


FIG. 1.—THE EDEN THEATRE, PARIS (NOW DEMOLISHED).

The maximum strains on outer trusses are given as follows:—8,600lb. per square inch on the top chord, 11,300lb. per square inch on the bottom chord, 10,000lb. per square inch in the diagonals, 6,000lb. per square inch in the posts. The centre truss has greater strains. The structural details are illustrated in the *Record*. The details of the tower and its connection to the masonry are shown. The latter consists of four 1½ in. vertical anchor-bolts 36 in. long, which fasten the base-plate to the masonry, and seven 1½ in. horizontal stone-bolts 3 ft. long leaded into holes drilled in side of pier that pass through the webs of each of these horizontal channels, and connect the pair of towers together. The towers are of lattice construction of angle iron. The scheme is an ingenious and economical one that can be applied to other structures of a similar kind when the masonry piers are sound. By using the old floor material and the side trusses a great saving is effected; on the other hand, overhanging towers of lattice work make the structure somewhat top-heavy;—they have the effect of props or struts from the main piers. But engineers who are employed to widen bridges have no alternative in most cases.

CONCERT-HALLS AND ASSEMBLY-ROOMS.—XXVI.

By ERNEST A. E. WOODROW, A.R.I.B.A.

AMONG the variety theatres, there has, perhaps, never been a more famous house than the Eden Theatre, Paris, which unfortunately last year had to be pulled down, having failed as a financial enterprise. This hall was a typical example of a class which is essentially French, consisting as it did of one large hall proper with lounge and promenade leading to a *fêtes* hall, which assumed the character of a winter garden.

The task intrusted to the architects of the Eden Theatre, Paris, was to construct a house suitable for concerts and varieties, as well as for elaborate spectacular performances, which necessitated a stage of large proportions. Ample provision had also to be made for promenades, smoking-rooms,

and bars. At the time of its erection the only other hall of a similar kind was the Folies Bergère. It is well known that that Duclos and Klein, the architects to whom the work was given, successfully combined the objects for which the theatre was intended. Building operations were commenced and completed in the very short space of a few months. Two stringent requirements had to be met by the architects and greatly influenced their design—namely, that the time occupied in construction should be as short as possible, and that the superficial area covered should be no greater than was strictly necessary, owing to the high price of ground in that part of Paris. On both these grounds an exceptionally large use of iron was made—in fact, the structure may be said to have been an iron skeleton with a clothing of cement, plaster, and masonry.

The architects regarded this construction simply as an enormous framework, so that the principal façade and vestibule were apparently the only parts built with a view to permanency. The principal façade was ornamented with columns of Scotch granite, with bronzes, &c., in Venetian enamel. The ground floor rested upon brick walls, and was constructed of iron girders, calculated to bear a weight of 1,000 kilograms to the superficial metre.

The circle of the first tier was formed by a wall, and the interior divisions furnished the necessary support to the roof over the whole structure. The grand saloon and fêtes hall were in the form of an octagon, which was 25 metres in diameter.

Messrs. Klein and Duclos employed in the Eden Theatre two sets of supports:—first, an iron post built up of truss-work, with an iron plate for a back and angle irons to insure rigidity; second, cast-iron columns on cast-iron bases, placed upon stone piers and the walls of the ground floor. The greatest difficulty in the construction was the Ménilmontant, the same stream which passes under the Opera House, and the large shops in the Printemps. About half the space occupied by the theatre was inundated with water; the architects, therefore, adopted a system of concrete caissons in erecting this building.

The decoration of the interior was carried out in an Indian style, marked by great elaboration of detail of a somewhat coarse character, and rather heavy in the general effect (see detail of a doorway, Fig. 2). There was little difference in the arrangement of the auditorium from that usual in ordinary theatres.

At the back of the house accommodation was provided for six hundred performers, while the depth of the stage was as great as that of the opera. In the courtyard in front of the dressing-room there was stabling for fifty-five horses which were required upon the stage for the spectacular ballet performances. The roof was covered in zinc. The service staircases were made of iron, while the grand staircase and vestibule were composed entirely of stone. The ventilation of the house was effected by means of openings above the central light of the auditorium, foyer, and Indian saloon, while in summer the roof of the latter could be removed by hydraulic power, adding greatly to the comfort of the audience in hot weather. Almost the whole of the building was lighted by gas, electricity being only found in the gardens.

In order that this large auditorium might be comfortable in the winter, a hot-air apparatus was used for all parts of the building except the stage, where steam was considered safer and more satisfactory, as giving a less dry heat and being one which is more endurable to the artistes.

Two broad staircases, one on the right the other on the left of the vestibule, used to lead to the first floor, which contained the circular promenade from which an excellent view of the stage could be obtained, allowing the spectators to follow the representation, and at the same time to change their point of view. This promenade led on the right to an Indian Court, and to a winter garden on the left. In these two hall were bars of different nationalities divided by pillars, and the walls were covered with looking-glasses, giving an unusually long perspective vista. The area floor was occupied by stall seats, while raised slightly above this in the rear were the private boxes. The first tier consisted of open seats with the promenade behind. The stage was provided with

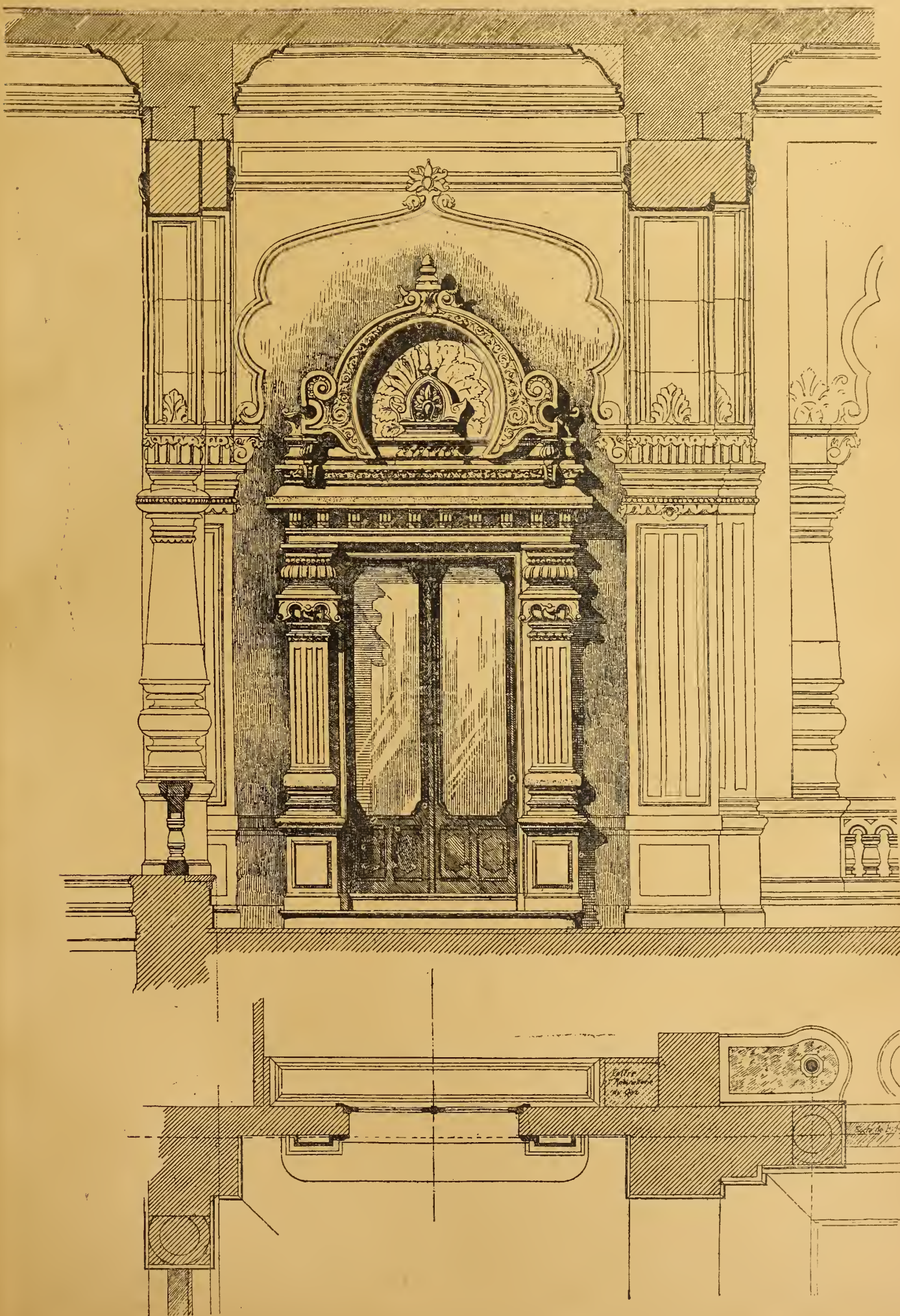


FIG. 2.—DOORWAY AT THE EDEN THEATRE, PARIS.

elaborate machinery, because the spectacle represented upon it was of the highest order. Messrs. Godin, with the assistance of M. Arnadot, one of the chief machinists of Paris, carried out the machinery for this stage, and it is worth while here noting that in large theatres of variety the stage and stage machinery are as complete as in any theatre; in fact, the machinery required for the rapid changes in a spectacular ballet needs, if anything, to be more complete than that where a theatre is merely devoted to the drama. It is because quick changes and elaborate sets are used on the boards of a variety theatre that the music-hall is as liable to fire as any theatre, and it is only right that they should be placed under the same regulations with regard to protection and prevention from fire as the opera-houses and theatres.

ARCHITECTURAL ASSOCIATION SKETCH-BOOK.*

THE third series of the Association Sketch-Book, Vol. I., Parts 1 to 12, appear to maintain the standard of this publication. The plates of reproductions, of which there are 72, comprise drawing of buildings and details from Cambridge, Durham, Exeter, Gloucester, Lincoln, Northampton, Suffolk, Norfolk, Leicester, Middlesex, and works from France, Germany, Italy, and Spain. From Cambridge we have a series of measured drawings and details of Clare College, comprising the centre quadrangle, library, and entrance gateway, measured and drawn by Henry V. Ashley in a Late Domestic style; also a drawing of the oak desk in Pembroke College Chapel by R. I. Dods. The vaulting, elevation, and details of the Chapel of Nine Altars, Durham, by Chas. S. Spooner, are interesting examples drawn to large scales, and show the beautiful 13th-century vaulting and arcading. The Prior's Door, Ely, and gate of Archbishop West's Chapel, by J. J. Joass, have some very interesting detail and wrought-iron work. The Bishop's Throne, Exeter, is a very fine oak example, feelingly drawn by S. K. Greenslade, the canopy being one of the most beautiful in England. A careful interior sketch of Glatton Church, Huntingdon, dated 1843, by the late George Hawkins, is of interest on account of the Norman and Transitional arcade, screens, and benches. Gloucester Cathedral is a favourite hunting-ground of the architectural sketcher—perhaps a trifle overtrodden—though the measured drawings of cloisters and famous fan-traceried north and south walk sketched by Alfred J. Dunn are of interest, especially the section of cloister walk. Two of the most effective perspective sketches in the volume, by J. J. Joass in colour washes, have been reproduced in ink photography by Sprague and Co., of Heckington Church, Lincoln. Mr. Joass is a skilled master of the brush; his sketches of the noble tower and spire of St. Andrew and the south porch are broad and crisp. Of Late Decorated work we have an example of Kersey Church, Suffolk, measured elevation of north aisle and details of south porch by Albert Howell. The porch is a good example of the flush stone and flint work so common in Suffolk. We should have been glad with a few more notes—those which are given are written too small. The series of measured drawings and details of Kirby Hall by M. S. Hack, representing the south and east ends of court and entrance, scarcely do justice to this fine example of English Renaissance; the elevations are rather "lily," and we lose the effect of shadow of the pilasters and projecting parts. Careful and sympathetic drawings are given of the chancel of Little Claybrooke Church, Leicester, by Alfred Dunn—a good Late Decorated work; also of the north transept of Lincoln, by J. R. Wigfull; the rose window, by R. K. Greenslade; and a nice view of the chapter-house, by John Begg. Of London examples, the measured plans, elevations, and sections of the Brewers' Hall, by Arthur Stratton; a shaded interior of St. Stephen's, Walbrook, by F. N. Kent; drawings of Trinity Ground, Mile-End, by John Allen—an interesting old brick relic of the 17th century—may be named. Old wood-work is not largely represented; but two capital panel sketches are reproduced of the interior of St. John, Timberhill, Norwich, by C. A. Nicholson, showing the screens. The other plates reproduce sketches from Blois, Tours, and several

from Italy and Spain. Of these the restored detail of Painted House, Vicenza, by Alfred H. Hart, is a fairly good example of colour decoration by the ink-photo. process. These are to be continued, and double-page plates are to be given. The plates include several examples of Late work. On the whole there has been a marked improvement in the selection of the specimens and the quality of the litho reproductions. In the volume before us we have measured and pencil and water-colour sketches and colour decoration reproduced by the photo-litho process by C. F. Kew. There are 12 parts of six plates each, measuring 17½ in. by 13½ in. If we may make a suggestion, the marginal notes relating to material or construction or colour should be a little fuller and written to a larger scale; sections and large-scale details and mouldings of important examples should be given, and, where possible, sketch-plans of the buildings illustrated. Every architectural student and architect in practice will find in these plates a repertoire of architectural detail of much value.

NOTES ON NEW METHODS OF BUILDING CONSTRUCTION EMPLOYED IN PARIS.—II.

THE Hennebique system of cement armé is one based on theoretical principles permitting the employment of formule and the various calculations of the resistance of materials. The perspective section shown in the preceding article in last week's issue, p. 215, affords a sufficient idea of the system as employed for floors. The example illustrated by the perspective is, however, a special case employed for the pillars and wide-span arches supporting the first floor of the building being constructed in Paris for the Society of Civil Engineers of France. It would be too long to enter here into the calculations which have determined the various sections of the iron bars and cement concrete entering into the construction of floors of this system; the generalities of practical work will be sufficient for the purpose of explaining the method of construction.

The system, as far as its principle is concerned, is excessively simple, consisting of a series of beams or joists formed of cement concrete strengthened by light iron bars imbedded in the mass of concrete, and placed in such a manner as to give to the cement the property which it especially lacks—that of resistance to the force of tension. All beams or joists of whatever material—wood, iron, or cement—supported at both ends and uniformly loaded, are subjected to the forces of compression and tension, the first acting on the fibres or molecules above the neutral line, the second on those below this line, and to these forces may be added the effects of shearing, which begin to act as soon as the beam commences to bend under its load. A beam formed simply of cement concrete, although well able to resist the forces of compression above the neutral line, would, owing to the nature of the material, be perfectly unfit to withstand the tensile strains below the neutral line, and would give way at once under the shearing effects. The employment of round iron bars imbedded in the cement at the weakest portion of the beam—viz., below the neutral line (Fig. 1)—would, therefore, be logical, and such a beam should offer sufficient resistance to the two horizontal forces of compression and tension. The theoretical beam, however, to which we are accustomed, is that composed of three essential parts, the upper and lower flanges of the iron joist or girder offering respectively resistance to compression and tension, and the rigid web uniting these flanges, composed either of one solid piece or of a truss web. The cement and iron beam, as shown in Fig. 1, contains the elements necessary to resist these forces, the upper portion of concrete forming the resistance to compression, and the iron bars affording resistance to the tensile strain. It is, however, imperfect when compared with an iron joist or girder, for the concrete, unlike the iron web, forms an insufficient tie between the upper and lower cords of resistance, and is unable to withstand the efforts of shearing which, acting horizontally and vertically, produce a maximum strain at the two supported ends of the beam, and a minimum strain at the middle of the beam.

The cement beam is therefore further strengthened by a series of iron straps (Fig. 4), which pass under the lower round bars, and are bent up on either side to nearly as far as the

upper surface of the beam (Fig. 2), and thus, in a manner similar to the web of an iron joist, form the connecting link between the lower and upper portions of the beam. These straps are spaced proportionately to the resistance necessary to withstand the effects of shearing, which increase as the ends of the beam are approached. The straps are therefore placed nearer to one another towards the ends, and spaced much farther apart at the middle of the beam. The bent upper ends of the straps are firmly supported by the upper portion of concrete under compression.

This beam or joist, formed simply of several iron bars imbedded in the lower portion of the concrete, affording resistance to tensile strains, and the iron straps affording a tie between the lower and upper chords of resistance, and security against the shearing strain, was thus employed at the outset of practical work with this system of cement armé; but an improvement was judged useful and necessary for economy and the proper strength in the case of wide spans. The sizes of the lower bars were calculated to resist the maximum effort of tension produced at one portion of the beam. It happened, therefore, that the same diameter of iron at the middle of the beam was excessive and unnecessary—an evident waste of iron and lack of economy in cost. The truss bars (Fig. 2) of round iron of the same diameter as the tension bars, were added, permitting a decrease of the diameter of the tension bars, and giving to the middle portion of the beam the section of iron necessary to resist the maximum of the bending efforts. The trusses are bent upwards on approaching the supported ends of the beam, and thus afford additional strength and resistance to the shearing strain.

Floors constructed after this system consist of principal beams, secondary beams or joists, and the floor panel supported by the beams and joists (Fig. 5). The principal beams or girders are composed of three or four trusses imbedded in the concrete; the number of the trusses and the section of the iron bars depend on the span and the load to be carried. Such a beam and its construction is shown in the section illustrating the previous article; in this case the number of the trusses is four, composed of ¾ in. iron bars. These girders are supported by pillars constructed of cement armé, but they may in ordinary cases be supported by the walls of the building. The secondary beams or joists are constructed in a similar manner; they are placed at right angles to the girders, and contain one or two trusses, the ends of which rest on the upper portion of the concrete of the principal beam. The hourds or floor panels between joists are usually constructed of concrete strengthened by lower tension bars only, the ends of which rest on the cement joists, and the straps connecting these bars with the upper portion of concrete under compression. In special cases of wide spans between joists or girders, truss bars are added for additional security. The thickness of the concrete for the floor-panels varies from 3 in. to 6 in., depending on the span; the iron bars are from ½ in. to ¾ in. diameter. Generalities only can be given; the diameter of the tension bars and trusses, and the height and width of the beams and joists are calculated for each special case.

The pillars often employed for supporting the girders are formed of a certain number of vertical bars of round iron imbedded in the mass of concrete forming the pillar (Fig. 3). The uprights are spaced and held together by the pierced iron bands placed at intervals of about 2 ft. The mass of concrete surrounding the iron uprights is admirably adapted to resist the vertical compression produced by the floor and its load: its cohesion is so great, that the iron uprights which would otherwise tend to increase their diameters, under the force of vertical compression, are compressed longitudinally by the surrounding concrete, and give an extraordinary rigidity. These iron uprights are generally from ½ in. to 1½ in. diameter, calculated according to the height of the pillar, its load, and the number of uprights employed. The pillars, beams, and joists are constructed during the formation of the floor, unlike the Coignet system, the joists of which are brought on the building in their built-up form. A sort of mould is formed of planks nailed together, and placed in the position required for the beam or joist; a certain thickness of concrete, composed of good cement and large gravel, is placed at the bottom of the mould, and well compressed. The tension bars are placed on this layer of concrete, and the straps and trusses arranged in their proper position. The mould is

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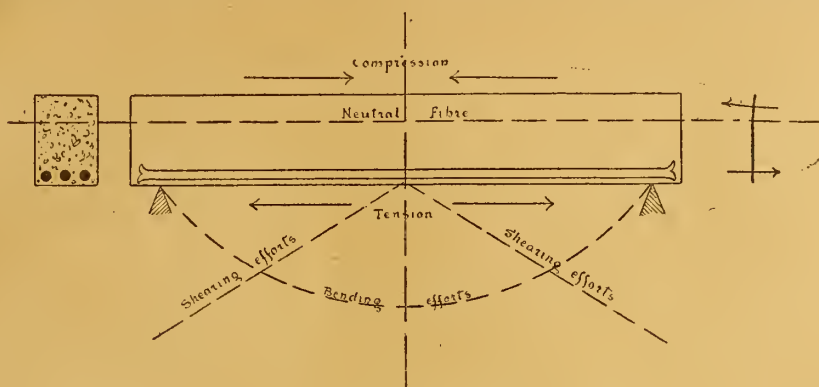


Fig. 1.

then filled in with successive layers of concrete, carefully punned around the iron bars to the desired thickness of the floor. The whole is allowed to set for three or four days before the wooden moulds are withdrawn. The portion of concrete forming the floor panels is placed in layers on planks held between the joists. The tension bars are then arranged in their proper

elasticity, giving proof of the excellence of the system. The non-oxidation of iron imbedded in cement is an accepted fact, and this is certainly an advantage as far as durability is concerned. The question of rapidity of execution depends, of course, on the contractor and his workmen. This system, to afford a satisfactory result, must be well and

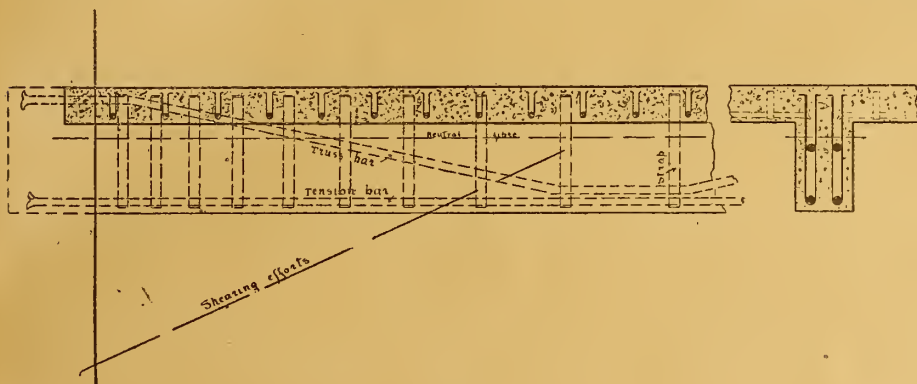


Fig. 2.

positions and spacing, and covered with cement to the required thickness; the planks are withdrawn as soon as the concrete is set.

The advantages claimed for this system of construction are economy, incombustibility, strength, and solidity, protection of the metal from atmospheric action, and rapidity of execution. The question of economy is entirely comparative: in many cases this system compares very favourably in cost with that of ordinary systems of iron

carefully executed by men accustomed to the work. Round iron bars are very easily procured, and very little preparation is required. This system also obviates all the delay necessary in

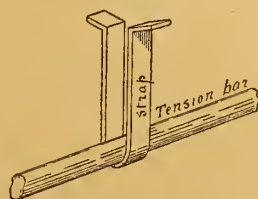


Fig. 4.

hoisting and placing the heavy pieces employed in the construction of iron floors. A chief advantage is one taken from a sanitary point of

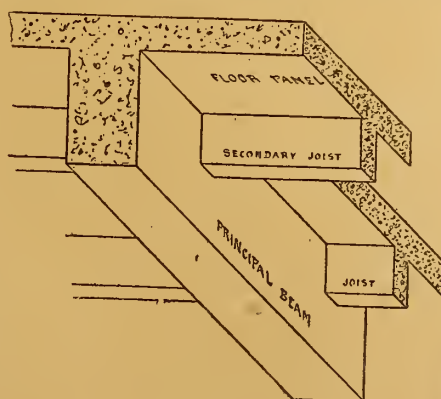


Fig. 5.

construction, especially when employed for industrial buildings. In the case of floors for ordinary purpose, the question of economy may be left open for discussion. A number of experiments on a large scale have been made to prove the superiority of this system as regards its resistance to fire; the evidence appears conclusive, but a large accidental fire in the building constructed on this principle would, perhaps, afford a more certain guarantee. The advantages of strength and solidity are more evident: it is an undisputed fact that floors and pillars built after this system possess remarkable strength and resistance to heavy loads, together with great

view. The cement concrete, being porous to a slight degree only, is not likely to harbour insects or noxious germs; the surface of the concrete,

left in its natural state or covered with stucco, permits frequent washing if necessary. Again, this system, like all the systems of cement armé, if employed by an architect imbued with modern ideas, permits adaptation to many interesting and original forms of ornamentation, and allows scope for the imagination of new effects of polychrome decoration.

Paris.

ARTHUR VYE PARMINTER.

ADAPTABLE SPECIFICATIONS.—V.*

RUBBLE WALLING: FACTS AND MEMORANDA.

VARIETIES OF RUBBLE WALLING.—These are numerous, and differ greatly in character. *Dry rubble* is chiefly used for field walls; but occasionally, also, for sheds and cart-houses. It harbours too many snails to be suitable for garden walls. Where, as on the Cotswold Hills, roughly flat-bedded stones are plentiful, it can be built very rapidly and cheaply, no kind of mortar is used; but the work, except in the top courses, is stronger than it looks. It is sometimes made more durable by setting the top-courses on edge, as a kind of rough coping. In Cornwall, copings of this sort are strengthened by what might be termed "vertical through-stones." A bonder, long enough to reach through the stone-on-edge coping, and through two or three courses below it, is set up on end, 2ft. or more below the top of the wall, and built up to by the horizontal courses, and afterwards by the coping. This is done every 3ft. or 4ft., and a coping so stiffened is difficult to remove. *Uncoursed rubble* consists of stones roughly selected to fit, but not laid in horizontal courses. For strength it depends largely on the mortar or cement. Round London, Kentish Rag is frequently laid in this way. In Worcestershire, walling of Malvern Hill stone belongs to the same class; but is even further from any approach to level bedding. The stones on its face are usually irregular polygons. In all uncoursed rubble a number of small spaces are sure to be left between the uneven surfaces of the stones. These should not be left open or merely filled with mortar, but should be carefully packed with "spalls," or angular fragments, such as are broken off the larger stones in roughly fitting them together. In the best work of this class no "spalls" appear on the face, the stone there being fitted closely enough to do without them. The rough rubble of Northumberland is sometimes of this kind. Uncoursed rubble should have at least one bonder to each square yard of surface, going through the wall if it is comparatively thin; and where it is thicker, going through about three-fourths of its thickness. In the latter case, the bonders should appear alternately on the outer and inner faces of the wall. Uncoursed rubble is sometimes strengthened by horizontal bonding-courses of plain tiles in cement at intervals, the tiles being in two or three layers, breaking joint.

Irregular Coursed Rubble.—This sort of walling is suited to a stone with some natural bed in it, so that it can be laid in courses which are roughly horizontal. It is generally used when a considerable part of the stones are very thin. Two or three shallow courses will run for a short distance, after which they will be stopped by one or more deeper stones, and the bed, perhaps, slightly raised or dropped to suit these. This work commonly goes by the name of "random coursed rubble." The stones are roughly squared, and may be either rough or hammer-dressed on the face. "Coursed header work" is either uncoursed rubble or random coursed work, as the case may be, brought up to a level and uniform bed every 18in. or so in height.

Regular Coursed Rubble is composed of flat-bedded stones, sorted out so that each course runs horizontally, and remains of the same thickness everywhere. The different courses vary in thickness, and it is usual to keep the thickest near the base of the wall.

Pointing to Rubble Walls.—In rubble which is destitute of horizontal beds, like the Malvern stone, the joints are often finished with a narrow projecting V. This is the very reverse of the joiner's V-joint, the V having a solid angle of mortar or cement which stands out beyond the general face of the work. A flat joint is good, while for coursed rubble a struck weathered one is still better. Round Manchester there is a fashion of dressing away both the top and bottom edges of each horizontal course of parapoint

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walling, leaving the centre to project. The wall thus looks as if it were composed of so many layers of cushions, one above another, and the mortar joints are recessed far behind the general face.

Localities for Rubble-Stone.—In the oolitic limestone district, which includes large portions of Gloucestershire, Oxfordshire, Northamptonshire, Rutland, and Lincolnshire, almost every village has its own quarries or "quors" of rubble-stone. The walling stone for a building there can usually be dug within a mile or two of the site, and sometimes even on it. There are considerable rubble quarries near the railway at Raunds in Northamptonshire, at Stow-on-the-Wold, Gloucestershire, and at other points on the Banbury and Cheltenham line. A deep-red ironstone, which is effectively used in the shape of bands in many old buildings in and near Northampton, is quarried near that town. Yorkshire supplies an excellent rubble-stone, known as "parpoint." It consists of the edges and dressings removed from York pavings and landings; and being thus a kind of by-product, it can be had cheaply. The beds are naturally level; the edges of the stones can be left "quarry-faced," or can be hammer-dressed in various ways. St. Giles's Church, Camberwell (one of Sir G. G. Scott's earliest works), is faced with this material, which has stood fairly well the test of half a century's exposure to London smoke. Good parpoints are obtainable at Dunford Bridge, at Hourham, near Bradford, and at various other places in that district. Those containing iron spots should be avoided. The courses of parpoint vary from 2in. or 3in. up to 6in. or 7in. in depth, and as long boulders are plentiful, very solid and substantial work can be made.

In Northumberland and Durham very hard sandstones are available for walling as well as for masonry. The smaller and poorer stones are commonly used for the former purpose. The stone is flat-bedded, but not laminated to anything like the same extent as the Yorkshire paving-stones. The courses, therefore, are deeper, and require more labour in dressing if the beds are to be tolerably level. The tints vary from cream colour to light brown. The older rubble buildings at Newcastle seem to have obtained much of their material from the Elswick quarries, in the west of the city. The stone dug there, however, though it may be satisfactory in colour while it is fresh, is, after a year or two, apt to "bleed"—that is, to exhibit holes and streaks of a deep red colour. They are, probably, patches containing silicate of iron, which, originally, have only a slight greenish cast, and are hardly noticeable; but when they are acted on by the carbonic acid of the air—which, according to Watts, will in time destroy nearly every silicate except that of magnesia—the silica is separated, and the iron is converted, first into carbonate, and then into ordinary rust. The more powerful acids in the air of a manufacturing town are likely to aid in producing the same ultimate result. In recent works, therefore, other quarries have come more into favour, such as that at Byker, and especially those at Denwick, near Alnwick, further north.

In the London district rubble-stone hardly occurs. At Godstone, in Surrey, a very soft and easily-worked kind is found—so soft, indeed, that it shrinks perceptibly, like wood, in the process of drying. Its colour when new is not unpleasant; but how entirely it fails to stand the London atmosphere may be seen at a chapel in Lower Clapton, built about 1871. Kentish rag used to be the favourite material in the Metropolis for uncoursed rubble; but this also perishes rapidly, perhaps because in rubble work little regard is had to its natural bed. The oolites make good walls at a reasonable price. Ancaster rubble is durable and effective, and that from Little Casterton (Rutland) is said to last equally well, whichever way it is bedded. This is a coarse, shelly limestone, which, as it is used in some modern works at Cambridge, contrasts effectively with the finer masonry of the dressings. Flint walling has been little used in London. Christchurch, Chiswick, was faced with it in 1843, and St. John's, Kensal Green, in 1844. In the Eastern Counties, flint, either rough or squared, used to be almost the only walling stone available. At Cromer there are some old walls of large round pebbles, with apparently no more bond in them than there is in a pile of cannon-balls. They remain simply through the excellence of the mortar.

In South-West Devon much of the rubble-stone is an imperfect slate. There is no trouble in

Strength of Different Stones to Resist Crushing:—

	Crushes with about 1,200lb. to the square inch.
Bath stone (Corsham)	800lb. " " "
Ditto (Box Ground)	1,900lb. " " "
Caen stone	7,700lb. " " "
Idle stone (near Halifax: Vint's Quarry)	7,900lb. " " "
Red Corsehill stone (Dumfriesshire)	5,000lb. " " "
Craigleith stone	2,300lb. " " "
Whitby stone	10,000lb. " " "
Blue Aberdeen granite	10,200lb. " " "
Red Peterhead granite	9,800lb. " " "
Blue Peterhead granite	7,800lb. " " "
Penryn granite	5,800lb. " " "
Yorkshire landings (average about)	2,700lb. " " "
Portland stone	1,500lb. " " "
Roche Abbey stone	7,600lb. " " "
Spinkwell stone	2,200lb. " " "
Douling stone	9,000lb. " " "
Bangor slate	6,700lb. " " "
Proudham stone (Northumberland)	7,500lb. " " "
Forest of Dean stone	8,800lb. " " "
Robin Hood stone	1,500lb. " " "
Ketton stone (Rutland)	7,900lb. " " "
Ancaster (brown bed)	9,000lb. " " "
Red Mansfield stone	

building with it or bonding it; but it lets the rain through freely. The old buildings, therefore, are often, as at Totnes, covered with slate-hanging, sometimes cut into odd and fanciful shapes, and sometimes as in a few houses at Penzance, treated in pleasing and suggestive ways. Hard limestones suitable for walling purposes are quarried at Plymouth, Torquay, and Chudleigh. Beer stone, found on the South Devon coast, near Axminster, is an easily worked limestone, more familiar in masonry than in walling, but suitable for both. Various kinds of trap rock are used near Exeter, and granite is worked to a small extent on Dartmoor. It is much more plentiful in Cornwall. Elvan, too, is freely used there for walling, generally in the form of uncoursed rubble. In the Lizard district great blocks of serpentine may be seen intermixed with the rubble of the ancient churches. But the most singular walling material is "blown sand." This occurs just above high-water mark on the beach at Newquay, and at other places on the North Coast of Cornwall, and seems to be still in process of formation. Specimens may be picked up so soft that they can be carved into any shape by a pointed stick; but after a few months' exposure to the air they become as hard as ordinary Bath stone, though coarser in texture. The old church at Crantock (formerly Carantoc), near Newquay, is built of blown sand in squared blocks, and that at Brantton, near Ilfracombe, was restored a few years ago with dressings of the same material.

Composition of Rubble Walling.—According to Colonel Seddon, a cubic yard of rubble walling usually requires about one-fifth of a cube yard of mortar, and one cube yard and a fifth of rubble-stone. This, however, depends greatly on the roughness or regularity of the stone, and a flat-bedded stone like Yorkshire parpoint would take very much less mortar than an uneven one like Kentish rag.

MASONRY: FACTS AND MEMORANDA.

Durability of Various Stones.—This does not depend altogether on chemical composition, or the pure sandstones, many of which contain very little besides silica, would be absolutely permanent. When such stones as these fail—a not uncommon occurrence—it is not because the sand grains in them have been acted on by anything in the air or in the rain-water; it is simply that the material which held them together has been weakened. This material may be very small in quantity, and so may appear, in a statement of the analysis, to be a very trifling and unimportant constituent of the stone. In reality, however, it may be the one thing which holds it together, and which has transformed it from the state of loose sand to that of compact building material. On the other hand, a stone may consist almost entirely of carbonate of lime—a substance which, in a powdery state, the weakest acids will dissolve; and yet, if the carbonate of lime is thoroughly crystallised, it may resist, as Sicilian marble does, a destructive atmosphere for long periods. Stones containing magnesia are very liable to be attacked by the sulphur compounds which originate in coal-smoke; but even these stones, when crystalline, prove very durable. In almost every quarry there are better and worse beds. The former may last for centuries, while the latter begin to decay in a year or two. The same stone, Bolsover or Church Anston, was used in the Houses of Parliament and in the Jernyn-street Museum. In the

former, whole courses of it decayed; in the latter, there are very few defective stones. Portland, too, varies much in quality. The "base-bed," or lowest stratum, in the Portland quarries is liable to rapid decay when exposed to the weather, but being soft, there is a demand for it in the market. It is important to notice that the term "base-bed" has been corrupted into "best-bed," and to specify the "best-bed" of Portland stone is, therefore, the way to obtain the least durable variety of it. The "white-bed," which lies higher up, contains the really durable Portland stone, and it is this that should be specified except for inside work.

Amongst the Bath stones, Box Ground, which used to be recommended as durable, is probably the least to be trusted in the destructive atmosphere of a town. Monk's Park, or even Corsham Down, is more to be relied on. Ancaster, of the best quality, is a more permanent stone. It is soft when quarried, but soon acquires a skin which ordinary tools will hardly touch. Unfortunately, it does not bleach with exposure as Portland does, but turns brown in London. Some of the Rutland and Northamptonshire stones are excellent. That of Barnack, largely used in the old work at Peterborough Cathedral, has lasted well, and Ketton stone is equally durable. The price alone keeps it out of the London market; but it has been used in modern buildings at Cambridge. Ham Hill stone has stood well at the old mansion of Montacute, and Chilmark stone at Salisbury Cathedral. Mansfield is an excellent and durable magnesian limestone, much used near Nottingham. Of sandstones, Darley Dale in Derbyshire, and Kenton, Proudham, and Denwick in Northumberland have a high reputation. Red sandstones seem particularly liable to decay, as may be seen at Chepstow Castle, at Bristol Cathedral, and at many other places. At Oxford a shelly oolite, like that from Taynton, has resisted the destructive influences of time, while a softer limestone from Heddington, used in most of the public buildings, has utterly failed. All these statements refer to external work. Many stones which will not bear exposure to the weather are durable enough when sheltered.

Some granites, such as the soft white ones of Cornwall, disintegrate rapidly. Serpentine loses its polish in the London atmosphere.

Examples of Particular Kinds of Stone.—These, as far as possible, have been selected from buildings at least a quarter of a century old, so that an examination of them will show how far each kind of stone has resisted destructive influences. The following are in London where not otherwise stated:—

1. Church Anston or Bolsover stone: Houses of Parliament, 1840-57; Museum of Practical Geology, Jernyn-street, S.W., 1837-48; St. Stephen's, Rochester-row, 1847-50.

2. Bath stone: R.C. Chapel, Duncan-terrace, City-road, 1841; St. George's R.C. Church, Lambeth-road (part Combe Down Bath stone and part Caen), 1840-48; All Souls' Church, Langham-place, 1822-5; Exeter Hall, the Strand entrance, 1830; Henry VIII's Chapel, refaced with Bath stone, 1822.

3. Caen stone: Baptist Chapel, Bloomsbury-street, 1848; St. Martin's Schools, Castle-street, Long Acre, 1850; Buckingham Palace, east front, 1846; St. Barnabas, Pimlico, 1846-9; St. Mark's, Old Street-road, 1846.

4. Granite: Bow Bridge, Stratford (Aberdeen granite) 1838; Duke of York's Column, 1830-6; General Post Office, St. Martin's-le-Grand (the

lower part), 1823-9; London Bridge, 1824-31; Waterloo Bridge (Cornish granite), 1811; Somerset House (lower part of the river front), 1776.

5. Keston stone (Rutland): St. Dunstan's, Fleet-street, 1831-3; schools at Fulham, 1854.

6. Portland stone: St. Paul's Cathedral, 1675-1717; nearly all Sir C. Wren's churches; the Monument, Fish-street-hill, 1675; St. George the Martyr, Borough, 1735; the Strand Law Courts.

7. Aneaste stone: St. Pancras Hotel, Welsh Chapel, Charing Cross-road; West Kensington Congregational Church.

8. Mansfield stone (white): Offices in the Venetian Gothic style, Louthbury, E.C.; Insurance office, &c., Fleet-street.

9. Farley (Darley Dalestone): Hôtel Métropole, Northumberland-avenue.

10. Mount Sorrel granite: Altar steps, St. Paul's Cathedral.

11. Penryn granite (Cornwall): Lloyd's Bank, Lombard-street.

12. Proudhon stone (Northumberland): Winchester House, Broad-street, E.C.; Army and Navy Hotel, Victoria-street.

13. Huddleston stone: Used in the interior of the Grocers' Hall.

14. Idle stone (near Halifax): Tower piers; Congregational Church, Chaloner-street, West Kensington.

15. St. Stephen's granite (Cornwall): Walls of Truro Cathedral.

16. Spinkwell stone, Bradford (used for steps and landings): Foreign Office, Whitehall; South Kensington Museum.

17. Red Corsehill stone (Annan, Dumfriesshire): Hand-in-Hand Insurance, Blackfriars, E.C.

18. Doulting stone: St. John the Evangelist, Wilton-road, Pimlico; St. Benet's, Stepney.

19. Tisbury stone: Southwark District Post-office; offices at the corner of Cornhill and Gracechurch-street.

20. Red Mansfield stone: Biddulph's Bank, Charing Cross.

CAST IRON IN BUILDER'S AND CONTRACTOR'S WORK.—XXXIII.

By JOSEPH HORNER.

(Concluded.)

THE remaining elements present in all cast irons are of little practical value—that is, they could be better done without, because, even though they fulfil in a lesser degree some of the offices fulfilled by carbon and silicon, yet they are less under control than these, and when present in excess are greatly injurious.

Phosphorus, sulphur, and manganese are never eliminated altogether from pig iron, and their presence in excess reduces its tensile strength. Their proportions vary with the conditions of working of the blast furnace, and are to a limited extent capable of regulation, and they are only deleterious for foundry expenses when they become excessive in amount. Phosphorus tends to the formation of combined carbon, and therefore conduces to hardness and brittleness. Though it renders iron more fluid, it does so at the sacrifice of strength. From .2 to .3 per cent. is the limit at which it should occur in foundry irons. Though phosphorus in small quantity renders iron fluid, suitable for running into light ornamental castings, if it reaches or exceeds 1 per cent., it produces brittleness or cold-shortness. Sulphur prevents the precipitation of carbon as graphite, and therefore is a hardening element. About 0.1 per cent. is the limit at which its presence seems permissible in foundry irons. Since in large quantities it produces white iron, the less sulphur the better. It is of no value, and even 0.1 per cent. is objectionable. The so-called cinder pig is obtained by reducing the slags of puddling furnaces, together with an admixture of ore. As these slags contain much sulphur eliminated from the puddled iron, this enters in excessive amount into the resulting inferior pig. Manganese hardens cast iron by assisting in the formation of combined carbon. This, however, can be done equally well by the reduction of silicon. Manganese in excess acts in other respects contrary to silicon, reducing tensile strength, and producing hardness and brittleness, and increases the slag. Its evils are more apparent in weak than in strong irons; but it should not be present in greater proportion than from .2 to .5 per cent.;—1 per cent. in iron for foundry use is decidedly objectionable.

Ultimately, therefore, the quality of any foundry iron depends chiefly upon the amount

and condition of the carbon present in it, the other elements acting upon it mainly through the changes which they effect in the form in which the carbon occurs. Since, then, the hardness, or softness, or strength of cast iron depends principally upon the quantity and allotropic condition of the carbon present, and since these are largely under the control of the founder, these practical results follow:—It is possible to obtain any required grade of iron, if a man understands his business, by simply mixing various brands in the cupola. It is possible, having a single brand of iron, to change its character by remelting, or by slow, or by rapid cooling. Iron which contains a suitable quantity of carbon can be rendered as hard as steel on the surface, and for a considerable distance inwards, by cooling it rapidly against a metallic surface (chilling). In fact some cutting tools are made in this way, of cast iron, when specially hard metal has to be tooled. Hard iron, on the other hand can, by slow cooling, be softened in a moderate degree. These results are due to the somewhat unstable character of the carbon, which is ready to assume either the graphitic form necessary to the production of grey soft iron, or of the combined form which yields white hard iron. An excess of graphite produces very soft iron, an excess of combined carbon produces very hard iron. Soft iron has the minimum of shrinkage, hard iron the maximum. In soft Scotch pig the graphite will average roughly about 3.0 per cent. In ordinary soft castings it will range from about 3.0 per cent. down to 1.5 or 2.0. The combined carbon will not exceed from .1 to .2 per cent. In the mottled or strong irons used for engineers' castings, the proportions will range between the extremes of grey and of white. Grey iron is weak, but accommodates itself more readily to shrinkage stresses than mottled or white iron, and is, therefore, less liable than these to fracture suddenly. White iron is strong to resist simple stress, but is too brittle to stand sudden impact or alternating stresses.

It will now, I think, be evident why the value of irons for foundry purposes cannot be determined merely by chemical analysis. Percentages of elements are always relative to each other, and partly so in relation to the bulk of a given casting, and to the conditions of its manufacture. It is quite possible, and does often occur, that two castings made from the same kind of metal have widely differing characteristics. Up to the present time it is clear that Reep's tests afford the only practicable methods of utilising chemical knowledge in the foundry. Ferro-sodium and ferro-aluminium are simply cleansing agents, and do not sensibly affect the chemical composition. Mr. Reep makes the test-bar the means of regulating the chemical composition of his foundry mixtures. He makes the amount of shrinkage of the bar the means of estimating the quality of the metal in it. Hence the bars are all cast between metal gauges, by which absolute uniformity in length is assured, and by which the ends are chilled. He argues that if a heavy and light casting can be made to shrink to the same extent, then they will be of equal strength. The difference in strengths of small and large castings, always in favour of the former, is due to the greater closeness of grain of the former. By varying the amounts of silicon he is able to produce precisely the same rates of shrinkage in light and heavy castings. In this way, by experiment, a direct relation is established between the quality of metal in a test-bar of given dimensions, and that in another bar or casting of different dimensions. It is a fact, as I have insisted on in these articles, that a test-bar of given dimensions does not afford adequate information respecting the behaviour of castings of greatly different dimensions, and of different shapes. Machines are not made for testing bars of large dimensions. But by varying the amount of silicon present in various proportions to insure uniform shrinkage and strength, a bar of any given size is made to determine the behaviour of bars or castings of other dimensions. The rule is simple: To diminish shrinkage, increase the amount of silicon; to increase shrinkage, diminish the amount of silicon. The value of this to practical men is obvious. Although based on chemical reaction, no chemical analysis is required, and no knowledge of chemistry in fact on the part of the foundryman. The shrinkage of his test-bar is the measure of the chemical composition of the bar, or rather of so much of the chemical composition as concerns him as a foundryman. For Mr. Reep has further de-

monstrated that much error underlies the popularly received notions of metallurgists and founders respecting the injurious effects of certain elements upon castings.

There are two points upon which all founders are agreed. One is that the presence of sulphur is responsible for many bad castings. Many a time have I seen castings with small blow-holes with a bluish tinge pointed out as proof positive that the bluish tinge was due to the presence of sulphur in the coke, and that the sulphur was the direct cause of the faultiness present. That this is in the main true is, no doubt, correct; but Mr. Reep's experiments prove that a high percentage of sulphur (say 0.1 per cent., even more in some experiments) does not impair the strength of the iron to withstand a dead load. In an indirect way its presence in large quantity is objectionable. It lowers the temperature of the cupola, and causes the iron to melt cold, which tends to the production of white iron. The other popular error is regarding the two carbons, combined and graphite, as two permanent forms of the same element. That is, given an analysis of an iron, the relations of combined and uncombined carbon must remain constant in the casting. This is not correct. And this is the crux of Mr. Reep's methods—namely, the regulation of the relative proportions of the two carbons in the manner best adapted to the work in hand, and to utilise to the best advantage the pig or scrap which happens to be available. By increasing silicon the combined carbon will be diminished, and the graphitic increased. The result is, of course, that the iron is softened, made more open-grained, more fluid, and weaker. Moreover, as carbon is always combined when the iron is in the fluid condition, and the graphite separates out during cooling, and this separation takes time, it follows that if a bar is removed from the mould immediately that it is set and plunged into water, the whole of the carbon will remain in the combined condition, and the bar will be chilled; but if allowed to remain a few minutes the combined carbon will have separated out partially, or almost wholly into the graphitic form, depending on the quantity of silicon present. The power of controlling the relative amounts of each allotropic form in irons having suitable percentages of total carbon renders Mr. Reep's methods of high practical value. It is not that the silicon in itself is valuable as a constituent of the iron. Its value is of an indirect character, and consists in its chemical property of lessening the bonds between cooling iron and combined carbon. It is necessary, of course, to have an iron sufficiently rich in total carbon for the silicon to act upon. Given that, it is easy so to regulate the quantity of silicon added that the exact quality of iron which is desirable for a given purpose shall be obtained. For stove castings, about 2.75 per cent. of silicon in the castings has been found most suitable. Moreover, it does not matter how often the brands of iron or qualities of scrap are changed, the founder is always able by a few experiments to bring the new iron to the required standard. No chemical analysis is required, only the shrinkage and tests for strength, and inspection of a few bars. Anyone with common intelligence can make the tests. After iron has received sufficient silicon to cause the formation of graphitic carbon desirable, the effect of a further addition of silicon is to harden the metal.

There is another recent development in the chemical treatment of cast iron which seems to promise good results. It is the use of sodium and of aluminium as cleansers of molten iron. Since dirty iron—i.e., iron mingled with slag and oxide is a fruitful source of unsound castings, various methods are resorted to in the foundry for cleansing it before pouring it into the mould. Chief among these is thorough melting, melting hot, or dead melting, as it is termed. This renders the iron as fluid as is possible, and facilitates the separation of the slag from it. It is also necessary to use good pure coke: otherwise the iron would become contaminated by contact with the dirt in the coke. Another plan adopted in the Stewart cupola is to agitate the molten metal with a hot blast. Lastly, all metal is skimmed in the ladle. No matter how clean the surface is when tapped from the cupola, slag always separates and collects on the surface as long as the metal stands in the ladle, and it continues to separate in the mould as long as the iron remains fluid. Now the value claimed for sodium and for aluminium is that the affinity which these metals have for some of the deleterious elements in cast iron sepa-

rates them as slag, and the chemical reactions which go on generate sufficient heat to render the iron very fluid, so facilitating further its mechanical purification. The metals are each used in combination with iron as ferro-sodium, and as ferro-aluminium.

The foregoing remarks embody the most recent developments in the practical chemistry of cast iron. Ferro-silicon is used now to a rather large extent in American foundries, ferro-sodium and aluminium slightly in English foundries. Whether their use becomes general or not, it is clear that the study of the chemistry of cast iron is of little or no practical value apart from the conditions of daily practice—conditions which are so variable that the trained judgment of the foundryman and the engineer are to be relied on in preference to the analysis of the chemist. When scrap from a hundred sources is brought into the foundry to be melted up, it is highly desirable that some exact method of regulating the quality of the mixtures made from it shall be available and readily applied. It is claimed that the ferro-silicon alloys effect this, and a man may use them without knowing anything about chemistry.

In conclusion, I trust that these articles may have proved of service to many who are not engineers. They have been written from the standpoint of the workshop, and embody knowledge which can only be gathered there—knowledge, nevertheless, which professional men and inspectors who often have to do with work in cast iron should possess in some degree. I do not think that the practice of casting in iron will change much in the immediate future. The principles and methods and facts embodied here should therefore possess some permanent value.

ON CANTILEVER BRIDGES.*

By Professor EDGAR MARRBURG.

THE origin of the word "cantilever" is somewhat obscure.† The term seems to have been first used in architecture to designate a projecting bracket supporting a load. In modern engineering, a cantilever, strictly speaking, denotes a girder fixed at one end and otherwise unsupported. To resist the bending moment at the fixed end, some form of anchorage must be provided. In practice, an anchor arm, or anchor span, usually serves this purpose, in addition to its functions as a simple or non-continuous truss for its own loading. A suspended truss is introduced between the ends of the cantilevers for economical reasons and in order to permit the free deflection of the cantilevers, independently of each other, so that all stresses may remain statically determinate. Common usage has led to the application of the collective term "cantilever bridge" to a structure of which a cantilever proper forms a component part, embracing usually (a) the cantilever arms, (b) the anchor arms (or anchor span), and (c) the suspended span. A cantilever bridge may be then defined as a partially continuous girder, in which the points of contra-flexure are definitely and permanently fixed for all conditions of loading by actually severing the chords at these points. It differs in this important respect from the continuous girder, and further in that the shear can be transmitted across these points of contra-flexure in one direction only—namely, from the suspended truss to the cantilever arms. In properly-designed cantilever bridges all stresses are determinable by the ordinary principles of statics. The construction of cantilever bridges of other than the most primitive kind is of comparatively recent date. The first iron structures of this type were built in 1876, although their advantages under certain conditions had been more or less completely elaborated between the years 1860 and 1870. The construction of the steel arch bridge of three 502ft. spans over the Mississippi at St. Louis (1867-74) deserves mention as an early and notable example of the application of the cantilever principle during erection by means of a temporary, auxiliary construction. The first iron cantilever bridge in America was built in 1876, across the Kentucky river gorge, by C. Shaler Smith. It consists of three 375ft. spans, with trusses of the Whipple type, of uniform depth. During the same year (1876) a cantilever

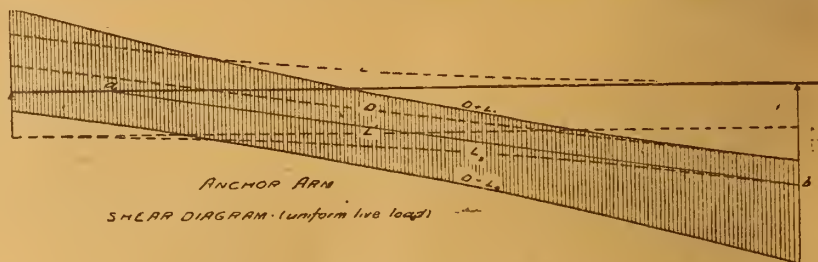


FIG. 1.—D, dead load; L', live load covering cantilever arms and suspended span; L₁, live load on anchor-arm, advancing towards left; L₂, live load on anchor-arm, advancing towards right, combined with L'.

bridge of 148ft. span, with polygonal upper chord and single-web system, was built in Germany across the Warthe river, near Posen. During the past fifteen years numerous cantilever bridges have been constructed. The largest of these, that over the Firth of Forth, Scotland, embraces two 1,710ft. spans. The Sukkur bridge over the Indus, and the Memphis bridge across the Mississippi follow in the order named with spans of 820ft. and 790ft. respectively. Among the cantilever bridges recently proposed, the most noteworthy are the one at Detroit, 1,130ft. span; that at New Orleans, 1,058ft. span; the Blackwell's Island bridge, including two 850ft. spans, and the six-track Hudson River bridge, at New York, for which the unprecedented span of

section that in the subsequent report of the Board of Engineers officers,* on the maximum practicable span for suspension bridges, this limit was placed at 4,335ft. for a six-track structure, as "a conservative value of the maximum span, based upon assumptions well within the limits of theory and experience." In the present paper it is proposed to confine attention more especially to the non-continuous bridges, and to the conditions affecting their relative cost. Certain general matters relating to the economic designing of cantilever bridges will be also presented. For moderate spans cantilever bridges are, under ordinary conditions, uneconomical compared with non-continuous ones, for the following reasons:—First, the trusses of the

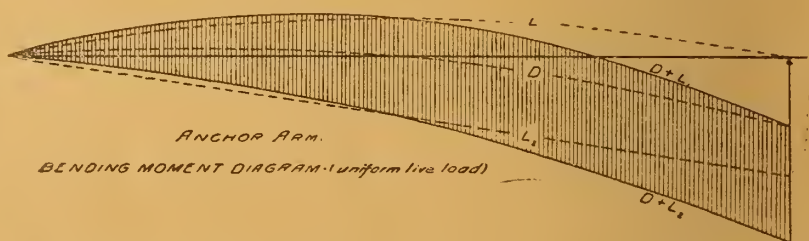


FIG. 2.—D, dead load; L₁, live load covering anchor-arm; L₂, live load covering cantilever arm and suspended span.

2,300ft. between centres of towers is contemplated. For railway purposes, the cantilever type of bridge seems destined to occupy a field intermediate between that held by the simple truss for moderate spans—to about 600ft.—and that which will probably be covered by some form of suspension system, for spans exceeding 1,500ft. to 2,000ft. The principal objection to suspension bridges—namely, their lack of rigidity—becomes less valid with increasing span-length, or greater ratio of dead to live load, and may be further reduced by improved details of design and construction. The fact that the stresses are principally tensile, and that the use of wire cables permits the adoption of unit stresses at least three times as great as those for steel eye-bars, while the pound-cost of the former is only about twice that of the latter,* thus effecting a direct saving in the cost of material, as well as a diminution of the dead load, are circumstances greatly in favour of the suspension cable system for spans of extraordinary length. In the report recently made by the Board of Engineers, upon the proposed Hudson River bridge at New York, the general conclusion was reached that the cost, inclusive of substructure, of a cantilever bridge having a clear span of 3,100ft., would be almost double that for a 2,000ft. clear span, the total length of the two structures being equalised by the assumed addition of viaduct approaches included in the estimate. It was further estimated by the Board that the cost of a 3,100ft. clear suspension bridge, "designed for its whole length for the same moving load as the 2,000ft. cantilever bridge, would be less than one-third† more than that of the latter." It is important to note that the differences in these comparative estimates were due almost wholly to the estimated differences in the cost of the superstructure, as distinguished from the substructure. It is interesting to recall in this con-

nection that in the subsequent report of the Board of Engineers officers,* on the maximum practicable span for suspension bridges, this limit was placed at 4,335ft. for a six-track structure, as "a conservative value of the maximum span, based upon assumptions well within the limits of theory and experience." In the present paper it is proposed to confine attention more especially to the non-continuous bridges, and to the conditions affecting their relative cost. Certain general matters relating to the economic designing of cantilever bridges will be also presented. For moderate spans cantilever bridges are, under ordinary conditions, uneconomical compared with non-continuous ones, for the following reasons:—First, the trusses of the anchor arms (or anchor spans) are considerably heavier than non-continuous trusses of equal length, owing to (a) increased and reversed web stresses from loads on the cantilever arms and suspended span; (b) increased and reversed chord stresses from such loading. These effects are relatively much greater in the case of "anchor spans" supporting cantilevers at both extremities than for "anchor arms" sustaining only a single cantilever. The partial or total reversal of stress necessitates the adoption of unit stresses much lower than would be otherwise permissible. Second: The shore anchorages in cantilever bridges of the Niagara type add materially to their cost, the percentage of increase depending mainly on the disposition of the piers, as determined by local conditions. In the Niagara as well as in the Red Rock bridge the weight of metal in the anchorages was slightly in excess of 5 per cent. of the weight of the entire superstructure. Considering for the present the question of relative cost only, the disadvantages just cited are neutralised in part by the following favourable features:—First: The combined weight of the trusses in the cantilever arms and the suspended span is less than that of a non-continuous truss equal to their aggregate length. Second: The cost of erection is less, since usually the greater part of the structure can be erected without false-works. For moderate spans, a net comparison will show an economic advantage on the side of the simple trusses, even with an arrangement of piers more favourable to the cantilever system; unless local conditions are such that the construction of false works would be attended by extraordinary expense. With increasing spans, certain advantageous features peculiar to the cantilever system become more emphasised, until a limit is reached, which may, perhaps, be placed very loosely at 600ft.,† beyond which favourably conditioned cantilever bridges

* Report of Board of Engineers upon New York and New Jersey Bridge, 1894.

† This estimate was reduced to about 15 per cent. by assuming train loads 1,000ft. long, simultaneously on the six tracks—a condition which would develop nearly the maximum stresses in the 2,000ft. cantilever bridge—instead of considering all tracks fully loaded for the entire length (3,200ft.) of the span.

* Report of Board of Engineer Officers as to the Maximum Span Practicable for Suspension Bridges, 1894.

† The exact limit will obviously depend on a variety of conditions, such as clear height, as affecting relative saving in masonry and false-works; minimum clear width required; ratio of live to dead load; specifications—especially for reversed stresses, &c.

* From the Proceedings of the Engineers' Club of Philadelphia.

† Cantilever, cantiliver—probably from the Latin *quantum libra*, of what weight or balance.—Century Dictionary.

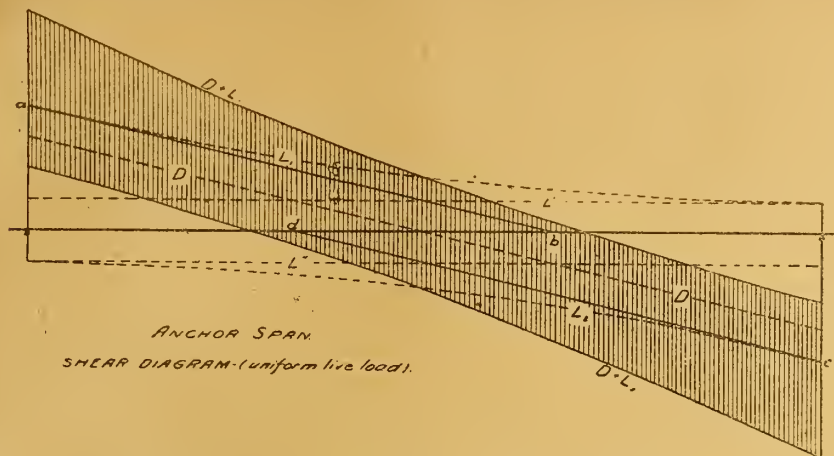


Fig. 3.— D , dead load; L' , live load covering cantilever arm and suspended span to the left; L'' , live load covering cantilever arm and suspended span to the right; L_1 , live load on anchor-arm, advancing towards right, combined with L' ; L_2 , live load on anchor-arm, advancing towards right, combined with L'' .

are more economical than simple trusses resting on the same piers. Before treating this question in more detail, some matters affecting the economic designing of cantilever bridges will be considered. Theoretic investigations as to the most advantageous location of piers for cantilever

bridges will show that the disposition of piers is determined almost invariably, either wholly or in part, by local conditions, irrespective of incidental increase in the cost of the superstructure. The difficulties underlying a general solution of this problem are, however, by no

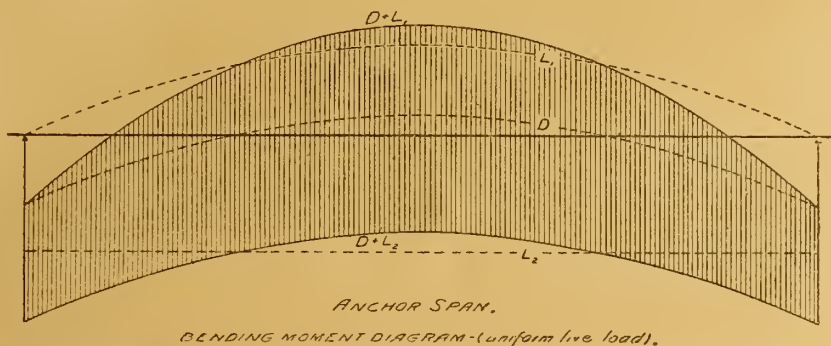


Fig. 4.— D , dead load; L' , live load covering anchor span; L_2 , live load covering cantilever arms and suspended spans, on both sides.

bridges possess little value practically. Even were it possible to establish definite conclusions in respect to the least-cost subdivision of the superstructure, a considerable variation in the resulting arrangement would be attended by a relatively small increase of cost, so far as the superstructure alone

means confined to the practical considerations just stated. The problem would be sufficiently involved if the investigation were limited simply to the question of least-weight subdivision of the superstructure *per se* for a given number of spans. The analysis would have to be based (a) upon an

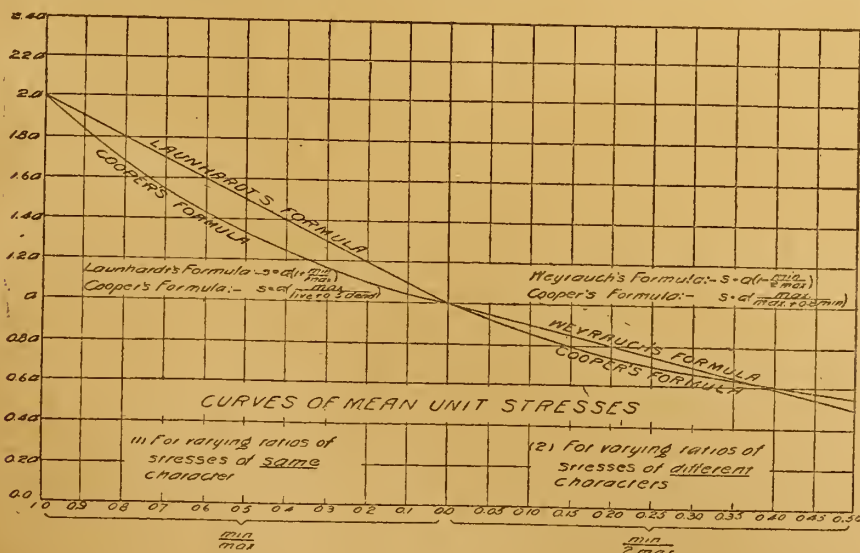


Fig. 5.

is concerned. On the other hand, the cost of the substructure is in most cases largely affected by any considerable shifting of the piers. In the case of navigable streams, the location of the channel and the usual least-span requirements give rise to further practical limitations which cannot be disregarded. An examination of existing

assumed distribution of the moving load, (b) a similar assumption for the fixed load, and (c) some assumption, whether expressed or implied, in respect to unit stresses. While no essential error is committed by assuming the live load as uniformly distributed, particularly for spans of considerable length, such an assumption for the

dead load is so widely at variance with actual conditions as to practically destroy the value of any conclusions that may be reached. To assume the dead load as uniformly distributed, but of a different intensity for the several principal subdivisions of the bridge, is scarcely less unsatisfactory, and is in fact approximately correct only for the suspended span. In the cantilever arms, both shears and bending moments increase rapidly as the pier is approached. This is true also, though to a less degree, for the anchor arm. For the case of an anchor span the error involved by the assumption named is a less serious one. But, furthermore, the relative intensity of dead load upon these several divisions is itself dependent on the relative distances between supports, on the ratio of dead to live load, and other circumstances. Any general assumption in advance as to its distribution is therefore unwarranted. The typical distribution of maximum shears and bending moments over the anchor arm and anchor span is shown in Figs. 1 to 4 inclusive.* In the construction of these diagrams, the following approximate data were used:—

ANCHOR ARM (FIGS. 1 AND 2).				
Ratios.	Anchor Arm.	Cantilever Arm.	Suspended Span.	
Of lengths	2	1	2	
Of dead load, per foot.	1½	1½	1	

ANCHOR SPAN (FIGS. 3 AND 4.)				
Ratios.	Anchor Span.	Cantilever Arm.	Suspended Span.	
Of lengths	3	1	2	
Of dead load, per foot.	2	1½	1	

The live load was regarded as uniformly distributed, and of an intensity 2, to the ratio-scale indicated in the tables above. The bending moments and shears from the dead load are plotted as though this loading were also uniformly distributed over each span. An inspection of Figs. 1 and 2 will show that such an assumption for the anchor-arm is entirely inadmissible. For the anchor-span, Figs. 3 and 4, the error is less important, as already stated. These diagrams were prepared more especially, however, to exhibit the great range of the reverse stresses, both from shears and bending moments—especially the latter—in the anchor-trusses. It is to this circumstance, as has already been pointed out, that the lack of economy of cantilever bridges, for moderate spans, is chiefly attributable. The maximum variations in the shears and bending moments are represented by the vertical intercepts of the shaded portions of the figures. In modern bridge practice the permissible unit stresses are reduced as the ratio of the ordinates to the upper and lower boundary lines of these shaded figures is increased, especially where these ordinates lie on opposite sides of the horizontal datum line, indicating values alternately positive and negative, for varying positions of the live load. The values of the allowable unit stresses for stresses both of the same and of opposite characters, according to the usual modern formulas, are represented as ordinates in the accompanying diagram (Fig. 5). The formulæ designated as Launhardt's and Weyrauch's will be recognised as the modified forms of those originally proposed, which have found most general acceptance in American practice. The curves representing the variations of unit stresses, as by Cooper's specifications, are equilateral hyperbolas. The comparison between Launhardt's and Cooper's formula is correctly shown only for those cases in which the dead-load stress represents the true minimum. Where Launhardt's formula is specified, the usual requirement is to include the effect of any partial reversal of the dead-load stress—that is, to use the *absolute* minimum stress, in entering the formula. It will be seen from Figs. 1 to 4, inclusive, that this may result in a material decrease of the allowable unit stresses. This decrease is relatively greatest for the main web members in panels containing counters, for which the value of the minimum stress by Launhardt's formula must be placed at zero. This leads to an allowable unit stress of only a (Fig. 5), both for the dead and live load stress; whereas by Cooper's formula no account is taken of the possible reduction of the stress to zero in members not designed to sustain a stress of opposite character. The ordinates to the curves L_1 in Fig. 1 and L_1 and L_2 in Fig. 3 represent the maximum shears, on the assumption that the live load ex-

* The writer is indebted to Mr. F. P. Witmer, Active Member of the Club, for the preparation of the drawings from which the illustrations accompanying this paper were made.

tends entirely over the cantilever arm and the suspended span, and that a second uniform loading is at the same time placed in position for maximum shear for the section considered. If this condition of loading be dismissed, by reason of the improbability of its occurrence, and a continuous load be alone considered, then the ordinates to the full line *ab* (Fig. 1), intersecting *L* at the centre of the span, will denote the shears for the load covering the anchor arm entirely, as well as the cantilever arm and suspended span. In that half of the anchor arm towards the shore end, greater negative shears will then result by assuming the load as covering only the cantilever and the suspended span, with no contemporaneous loading on the anchor arm. Such shears are represented in the figure by the ordinates to the horizontal line *L'*. The lines *ab* and *cd* in Fig. 3 have a similar significance to that of *ab* in Fig. 1. It is to be noted finally that the variations in the values of the shears and bending moments as represented in Figs. 1 to 4, on which the values of the allowable unit stresses are directly dependent, are themselves subject to great variations from changes in the relative length of the anchor trusses, cantilevers, and suspended span, and from the ratio of the dead to the live load. It is not possible to properly include all these elements in a theoretic treatment, and if the problem be simplified by introducing certain assumptions more or less arbitrary, the deductions are of little or no value for practical purposes. It is, therefore, held that a reliable determination of the most favourable location of the piers can be made only by considering each case on its own merits. For important bridges, detailed estimates should be prepared for a number of actual designs, as the only safe basis of comparison. A theoretic analysis for establishing the least-weight length-ratio of the suspended span to the total span presents fewer difficulties and is of more general interest, for the reason that the conclusions are only slightly influenced by the relative positions of the piers, and further, because the most favourable length-ratio can be always adopted without reference to local conditions, as affecting the cost of the substructure. The effect of the live load will be first considered. This load may, with little error, be assumed as uniformly distributed. In fact, for long spans such loading is usually specified, except for the floor-system and secondary members.

(To be continued.)

THE FIRE-RETARDING QUALITIES OF WIRED-GLASS.*

ON November 1, 1893, the Committee of Science and the Arts of the Franklin Institute adopted a report recommending the award, to Frank Shuman, of the John Scott Legacy Premium and Medal, for his machine and process for producing wired-glass. This report, at some length, discusses the varied uses to which wired-glass can be put, and its superiority in numerous applications over the ordinary glass. The question of the fire-retarding qualities of the wired-glass, however, was passed over without special comment.

In the autumn of 1893 my attention was called to some fire-doors in the large establishment of the J. B. Stetson Company, of this city. These doors, which were provided for the purpose of protecting the opening in each story to a brick elevator-shaft, had a large sheet of wired-glass inserted as a transparent panel. The manager of the factory, Mr. Theo. C. Search, had made a number of fire tests of wired-glass, and, as a result, had come to the conclusion that the material would answer as a fire-retardant. The writer is of the opinion that the case cited is the first instance of using wired-glass for this purpose, although, as stated in the report of the Committee of Science and the Arts, the first patent for wired-glass was granted in 1855 to an Englishman named Newton for a "fire-proof and burglar-proof glass."

In December of the year 1893, Mr. W. S. Lemmon, Inspector of the Newark (N.J.) Committee of the Underwriters' Association of the Middle Department, requested an owner in that city to place wired-glass in two windows of his warehouse, to protect it from external exposure. This resulted in a test of the fire-retarding quality of wired-glass in Newark, which is described by

Mr. Lemmon, in a letter, as follows:—"A small brick building, about 6ft. by 10ft., was built, in which were placed the following windows, all glazed with wired-glass, $\frac{1}{2}$ in. in thickness:—One 20in. by 80in., one 28in. by 80in., and one 30in. by 80in. In the building a fire was made for half an hour, a high degree of heat being developed. When the glass became red-hot, cold water was turned on by the city fire department, under 60lb. pressure, through the regular fire-hose. In addition to the throwing of water on the glass, the chief of the fire department tried, without success, to throw a half-brick through the glass while it was red-hot; this was to show the result of falling walls against the glass when in actual use for exposure purposes."

In this test, the frames holding the wired-glass in place were constructed of angle-iron and of galvanised sheet-iron. The intense heat warped and bent the metal-work; but the glass did not fall out on account of the warping. Mr. Lemmon further reports that since December 1893, nearly 80 windows in his city had been constructed of wired-glass, in metal frames, to protect buildings against outside exposure, and in a number of cases actual fire tests proved the value of the wired glass for the purpose designated.

In our own city, besides being used in a number of fire-doors in stairway and elevator-shafts, wired-glass partitions have been erected in a number of buildings.

At the request of the Mississippi Glass Company, which controls the manufacture of wired glass, the writer, in conjunction with Inspector Wm. McDewitt, made a series of tests of the fire-resisting qualities of wired-glass, the main test being described in the following report made to the committee of the Philadelphia Fire Underwriters' Association:—

REPORT ON TEST OF THE FIRE-RESISTING QUALITY OF WIRED-GLASS.

A brick test-house, about 8ft. by 4ft., inside measurement, and 9ft. high, was constructed in the yard of the Pennsylvania Iron Works, near Fifth-street and Merion-avenue. In one side of this structure a wired-glass window was fastened in a wooden frame, covered with lock-jointed tin. In another side, a Philadelphia standard fire-door was hung. The upper part of this door had a pane of wired-glass, 18 by 24in., set into a wooden metal-covered frame. The entire roof of the test-house was replaced by a skylight, the sash being constructed of wood, metal-covered; one side of this skylight being provided with three lights of $\frac{1}{2}$ in. ordinary rough glass, the other side with three lights of wired-glass. The entire structure was constructed by John J. Husband, in accordance with specifications furnished by the Secretary. The wired-glass used was $\frac{1}{2}$ in. thick, and was manufactured by the Mississippi Glass Company, of St. Louis.

In order to make the fire-test as severe as possible, iron grate-bars were placed in the bottom of the test-house, and openings were left in the wall near the ground for free draught. The test-house was filled for two-thirds of its height with wood, approximately one-half cord being used. After treating the wood with a liberal allowance of coal oil and resin, the fire was started. In a few minutes the ordinary rough glass in the skylight cracked, and pieces began to fall into the fire. The wired-glass in the fire-door soon became red-hot, so that a piece of paper held against it on the outside was easily ignited. The three plates of wired-glass in skylight, subjected to the entire heat of the fire, also became red-hot, but retained their positions throughout the test. At the end of thirty minutes water was thrown on the fire and also on the hot glass. After the fire was extinguished, the three plates of glass in the skylight were found to be cracked into countless pieces, but still adhering together, forming one sheet. The window light, which, as the result showed, was not properly secured to the frame, was found to be of same condition as skylight glass, excepting that a large crack had developed. The plate of glass in the standard fire-door was cracked, the same as the skylight; but having been well secured into the door-frame, it did not give way. The action of the fire on the wooden metal-covered skylight and window-frame showed conclusively that this class of construction is far superior to iron framing, no warping or giving way of any portion of the frames being noticed. The fire-door in direct contact with the fire showed but little buckling on the inner side, and no signs of giving way. On removing the tin covering, it was found, however, that the inner layer of tin boards was completely charred through, but that the second layer was only slightly damaged.

The conclusions to be drawn from the test appear to be as follows:—

(1) Wired-glass can safely be used in skylights, and in such situations will withstand a severe fire and will not give way when water is thrown on it. A wooden framing for skylight, covered with tin, all seams lock-jointed and concealed-nailed, is superior in fire-resisting quality to iron framing.

(2) Wired-glass in wooden sash, covered with tin, all seams lock-jointed and concealed-nailed, can safely be used for windows toward an external exposure.

(3) Wired-glass can safely be used in fire-doors to elevator shafts and stairway towers, where it is necessary to light said shafts.

(4) In office buildings, hotels, &c., where it is undesirable to have elevator shafts entirely inclosed and dark, wired-glass permanently built into a brick or terra-cotta shaft, or arranged in a wood metal-covered frame, can safely be used.

(5) Wired-glass plates, securely fastened in standard fire-shutters, can safely be used toward an external exposure. In this case, the fact that a possible fire in a building, all windows of which are protected by fire-

shutters, can much more readily be detected from the outside through the wired-glass, is of importance.

Mr. Edward Atkinson, President of the Boston Manufacturers' Mutual Insurance Company, witnessed a test of the fire-retarding quality of wired-glass, in Boston. I quote from Circular No. 69, issued by him in April of this year, as follows:—

FIRE-RETARDANT WINDOWS.

There are many places in our risks where it would be very desirable to brick up windows if the light could be spared, but where the requirements for light render it necessary to leave the spaces as they are, often protected with automatic shutters, but sometimes under such conditions that the risk must remain unguarded.

The intervention of wired-glass will, in such cases and in many others, suffice to retard the passage of fire in a fully adequate manner. This glass, originally invented for skylights, is now being applied to fire-retardant purposes. It has been introduced in some of the western cities, around elevators, in place of the ordinary iron cages. It may be used in our risks for similar purposes.

First, it may be remarked that while, at the beginning, when used for skylights, some defects were disclosed in the differential strain on the glass and the wire under the heat of the sun, that fault is claimed to have been entirely removed. It would not affect the present purpose.

Second, a test of the fire-resisting properties of this wired-glass was witnessed by the undersigned in the vicinity of the Boston Plate-Glass Company, on A Street, South Boston. What might be called an iron stove was constructed in the form of a fireplace with a wired-glass blower. It was 3ft. high, 1ft. in depth from face to back, 2ft. wide on front. It was set up on bricks, so as to give a draught all around, and was open at the top. The plate of glass which formed the blower was 18in. by 34in. This fireplace was filled to the top with hard wood, and resinous wood upon which kerosene oil had been poured, which was set on fire, resting in front against the glass.

The first effect was to cover the inside of the glass with soot, but after about fifteen minutes the soot was burned off, leaving the glass clear, as at the beginning. The stove was re-charged, and this intense heat affected the glass for nearly half-an-hour. A stream of cold water was then thrown on the glass from the outside. Presently the fire was put out with another stream, and the glass was showered from within. The effect was to crack the glass into millions of pieces; but, being held by the wire, none fell out, neither did the glass spring or bend. It held its place even while the iron of the stove was twisted and bent.

This glass has already been placed at dangerous points in a few of our risks, and may be recommended in all places where the light must be retained, but where it is desirable to put in a fire-retardant material. We have as yet no experience in the test of this kind of window under actual fire.

The glass on which these tests have been made, which is intended for windows or doors, is $\frac{1}{2}$ in. thick, but it is made up to 1 in. in thickness. The $\frac{1}{2}$ in. is, of course, too heavy for the ordinary window-frame, nor should any wood be used in the setting of the glass unless absolutely protected. Instructions will be given for placing it in metal frames. This glass is made up to 1 in. in thickness, and that thickness, properly supported beneath, might in many places be suitable to put into floors for the purpose of giving light in dark basements or elsewhere; of course, being placed so as not to be subjected to trucks with iron wheels or other danger of chipping.

It is clearly indicated from the above that wired-glass can safely be used as a fire-retardant in numerous ways. From personal experience, I am led to believe that metal-covered wood framing is superior to iron frames for holding the glass in place.

In closing, I would say that the capability of the wired-glass to withstand a temperature beyond the melting point of glass, appears to be attributable to the fact that the network of wire in the glass acts as a good conductor of heat, and thereby prevents the accumulation of sufficient heat to melt the glass; and although it may thereby be softened and rendered pliable, the network of wire prevents the glass from giving way by reason of its own weight when softened by the heat.

In the advertisement on p. XIX. of our last issue, inviting builders to tender for the erection of the public baths for Shoreditch, the name of the firm of architects was, by a printer's error, given as Spalding and Sons, whereas it should, of course, have appeared as Spalding and Cross, of 15, Queen-street, Cheapside, E.C.

Arrangements have just been completed for the erection of a large new distillery at Greenock, at a cost of £50,000. The company have bought two disused sugar refineries as a site, and a foundry; the properties, which are all contiguous, are situated in Baker-street, and occupy fully ten acres of ground.

Mr. W. Howard Smith, who has been city surveyor of Carlisle for the past seven years, and who was formerly in the service of the Leeds Corporation, resigned on Friday his appointment, which was accepted at a special meeting of the Carlisle Town Council. Mr. Smith has not been in good health for some time, and his medical advisers recommended him to take a three months' sojourn in the Swiss Alps. Leave of absence without salary was granted by the council, but Mr. Smith preferred to resign his position, an alternative which he first suggested to the council.

* By CHAS. E. HENNER, C.E., Secretary of the Philadelphia Fire-Underwriters' Association, in the *Journal* of the Franklin Institute.

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THE "SKIPPER'S" HOUSE,* GHENT.—MR. CHARLES BARRY'S
DESIGN FOR THE SURVEYORS' INSTITUTION.—TRINITY
HOSPITAL.—HOUSES AT DULWICH.—"ALDERSHAW,"
LICHFIELD.—HOUSE AT LINCOLN.

Our Illustrations.

THE "SKIPPER'S" HOUSE,* GHENT: NATIONAL
SILVER MEDAL DRAWING, 1896.

THE "Skippers' House,"* Ghent, is situated on the Quai aux Herbes, at the back of the old Corn Market, and, as the date over the entrance indicates, was completed in 1531, being built for the Guild of the Skippers. The stone façade ranks among the finest to be found in Belgium. Originally the ground floor was a large hall extending across the front, and there are many interesting bits of detail in stone fireplaces, wrought-iron fittings to casements and shutters, hinges and lock-plates of quaint design, and carved oak beams to ceiling; these latter, and also main roof principals, averaging 15in. by 13in., are said to have been old ships' timbers. The building was probably converted into a residence in the last century; it is now divided up into small rooms, and owing to its being uninhabited for many years past, is falling into a sad state of decay. The reproduction is from a drawing which this year obtained the National Silver Medal, and was also awarded second place in the last competition for the Pugin Travelling Studentship.

JAMES A. SWAN.

THE SURVEYORS' INSTITUTION, GREAT GEORGE
STREET, S.W.

WE illustrated Mr. T. E. Collcutt's design for this building on July 24th last. We now give a view and plan of the design submitted for the same work by Mr. Charles Barry, the architect of the Institute of Civil Engineers over the way in the same Westminster thoroughfare. It is interesting to compare these two schemes for the same set of offices, and no doubt Mr. Barry's library would make a handsome apartment; but the projection of the staircase wall over the area in the return street was pointed out at the time of the competition as a difficulty not likely to be very readily overcome, and besides, by thus extending the premises, an advantage not secured by the other competitors was obtained.

THE TRINITY HOSPITAL IN MILE END.

THE first monograph of the series, promised by the large and enthusiastic committee formed for the survey of the memorials of Greater London, has just been published under the auspices of the Guild and School of Handicraft by Mr. C. R. Ashbee, M.A., the chairman, [whose name has for a long time been prominently associated with the movement. The subject chosen has fittingly furnished the material for this premier folio with timely consequence, because public attention has only so lately been directed to its existence, resulting from the proposal to pull down these

famous old buildings, familiar to those who know the Mile End-road, and interesting to all who have any care for the historic buildings which constitute the few still remaining landmarks in what is called "vanishing" London. The Corporation of Trinity House petitioned the Charity Commissioners for leave to break up the Hospital and pull down its buildings, but (as the endowment was not sufficient, and as there had been no failure of trusts) the petition was dismissed—a verdict, no doubt, largely due to the public outcry against the process of demolition to which we have referred. By the courtesy of Mr. Ashbee we are enabled to-day to illustrate the principal plan and elevations of these curious old almshouses from measured drawings made by Messrs. J. Allen and Ernest Godman, and we likewise give a reproduction of the capital bird's-eye general view, drawn by Mr. Matt Garbutt. The Classical style of the design of the hospital is characteristic of Sir Christopher Wren, though the scheme of the planning remains essentially Mediæval in its general disposition, with the little walled-off court and the chapel at the end for service, while the wise and beneficent purpose for which it was originally erected still is as appropriate as ever, and serves its intention thoroughly well now as heretofore. The buildings were built in the reign of William III. in 1695, and the peculiar historic interest of the hospital is that it remains the only memorial left to us of the Trinity Corporation, or, more correctly speaking, the "Guild of Trinity House," in the time when the guild was actually the English Navy. From its little board of smart officials sprang the Admiralty as we know it to-day. Other associations or Trinity guilds have records in the chief sea-faring towns of mediæval England—in Newcastle-on-Tyne, Boston, Hull, Lynn, Sleaford, and Wisbech. Of all these Mr. Ashbee gives several interesting particulars, as well as references "touching sea marks and martyrs," from the Act of Elizabeth in 1566 downwards. To the modern architect these old houses serve to supply many a lesson, and it is certain that none but a master mind could have conceived the ingenious method of masking with elegance and grace the ungainly frontage line presented by the boundary towards the Mile End-road. The dignity of the central entrance is admirably insured, and the whole inclosure screen is designed in a very clever and suggestive way. The general plan and the details above fully illustrate how it was managed. A second quadrangle behind the chapel was subsequently put up. The author of the hospital as we see it to-day was, in Mr. Ashbee's opinion, none other than Evelyn, with the assistance of Sir Christopher Wren, who, as surveyor-general, acted as the regulator of taste to all buildings, and examined plans as a sort of county council, and equally omnipotent, to set his imprimatur upon all kind of building operations. The amateurishness which gives so special a charm to this old hospital is quoted by Mr. Ashbee in evidence of his contention as to Evelyn's conception, and the old gardens, too, indicate his particular hobby. We see no reason to call in question the conclusion thus ingeniously put forward with so much skill and common sense. The drawings very greatly enhance the value of this admirable folio, while the concise and practical manner in which the author has contributed his account of the hospital, without padding or needless descriptions, serves to show how well the work has been done. It is in no sense meagre, and is not lacking in style; the references are ample, and the whole record is as complete as any such monograph need be. No better praise could well be accorded. We shall give a drawing of the chapel and a view of Sir Richard Maple's statue at an early day.

PAIR OF HOUSES AT EAST DULWICH.

MR. ARTHUR KEEN, the architect of these Dulwich houses, has succeeded in an endeavour to invest the ordinary small London house with a little more character than it usually possesses, and the fact of these houses having readily let seems to show that the popular prejudice against small window-panes is breaking down. The houses were built by Messrs. F. and E. Cooper, of Beckenham, and are illustrated from the architect's original water-colour sketch.

"ALDERSHAW," LICHFIELD.

THIS residence, now approaching completion, for Captain Harrison, occupies the site of an old house, of which nothing remains excepting the octagonal detached building shown on the view,

and which was used as a larder. The site is a very beautiful one, about two miles from the city of Lichfield, lovely views of the cathedral and the cathedral pools being obtainable from the windows. The house is approached through an avenue of beech trees, said to be the finest in the country; one of these trees, blown down on March 24, 1895, measured in height 75ft., extreme width 137ft., the girth round the butt was 19ft. 6in., and the diameter of the base of the tree on the ground line 21ft. The building is executed in local bricks of a light red colour with terracotta dressings, the gables are all half-timbered in solid oak, with the intervening spaces plastered and finished creamy white. The roofs are covered with local brown tiles. The house was begun under the superintendence of the late Mr. Samuel Loxton, and has been carried out by his successors, Messrs. J. H. Hickton and H. E. Farmer, architects, of Walsall and Wednesbury, the builder being Mr. A. Lynex, of the same town, and the total cost about £5,300.

HOUSE AT LINCOLN.

THIS villa residence is being erected in Lindown-terrace, Lincoln, for Mr. C. J. Fox. Messrs. Goddard and Son, of Lincoln, are the architects, and the builders are Messrs. H. S. and W. Close, of Lincoln.

CHIPS.

The Scarborough Board of Guardians adopted plans on Friday for the extension of the workhouse, at an estimated cost of £10,000.

Richard Blackwell, 45, timekeeper, and Charles Warden, 58, carman, pleaded guilty at the South London Sessions, on Thursday in last week, to stealing a quantity of solder and twelve sacks of cement, value £3 10s., the goods of Jennings and Co., of Lambeth; and Walter Weir, 37, builder, of Canterbury-road, Brixton, was found guilty of feloniously receiving the goods. The man Blackwell was in the employ of the prosecutors, and appropriated the goods, which he handed to Warden. Warden in turn sold them to Weir. Mr. Loveland sentenced Weir to eight months' hard labour, Blackwell to five months' hard labour, and Warden to three months' hard labour.

The restoration of the tower of St. James's Church, Bristol, has been completed. The work has been carried out by the contractors, Messrs. R. Wilkins and Sons, of Bristol. The tower of another of the ancient city churches of Bristol—St. Thomas—is at present undergoing extensive renovation at the hands of Messrs. W. H. Cowlin and Sons, of the same city.

The Chester-le-Street Board of Guardians adopted at their last meeting plans prepared by Mr. Cowe for a new board room, with refreshment-room, stabling for twelve horses, and accommodation for traps at the rear. The estimated cost is about £2,200.

The rural district council of the Isle of Wight have adopted plans by Mr. Lidstone, C.E., for the sewerage of the parishes of Freshwater and Totland, at an estimated cost of £15,000.

The grand organ at the Victoria Hall, at Leeds, is about to be repaired and enlarged, at an estimated cost of about £1,500. The work will be carried out by Messrs. Abbott and Smith, of Leeds, whose tender has been accepted by the corporation of that city.

A powerful Melbourne syndicate has bought up a number of brick-making properties in West Australia, with the view to their development on a most extensive scale.

A Baptist chapel is about to be built at Atherton from plans by Mr. A. W. Smith, of St. Ann-street, Manchester.

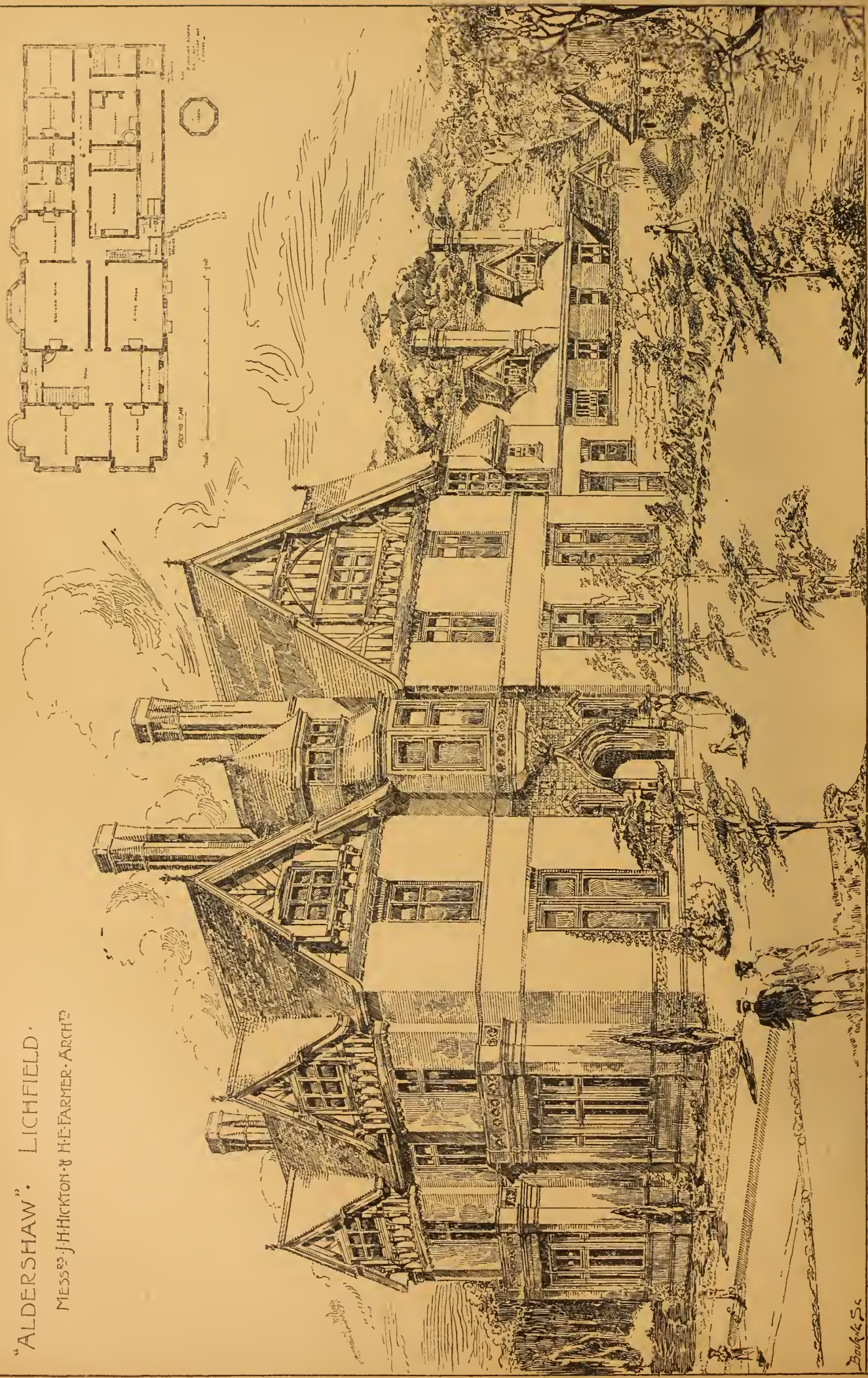
Four new stained-glass windows were unveiled on Friday at St. Cadoc's Church, Caerleon, out of funds left by Charles Williams, who founded the Endowment Schools, and died in the early part of the 18th century.

A fire broke out on Friday in the stables of Malcolm Cunningham, contractors, Graham-street, Bridgeton, Glasgow. The whole building was ablaze before the brigade arrived. In the first story were thirty-seven Clydesdale horses, only two of which were got out, the others being burned to death. The whole building was gutted.

Another method of preserving timber has recently been tried. It consists in dissolving in naphtha the heavy oils and waxes left after the distillation of petroleum, and forcing the solution into the seasoned timber in the same manner as in creosoting. The timber is then heated, when the naphtha evaporates, and is recovered in a cooling chamber, whilst the waxes, &c., remain behind in the wood, waterproofing it.

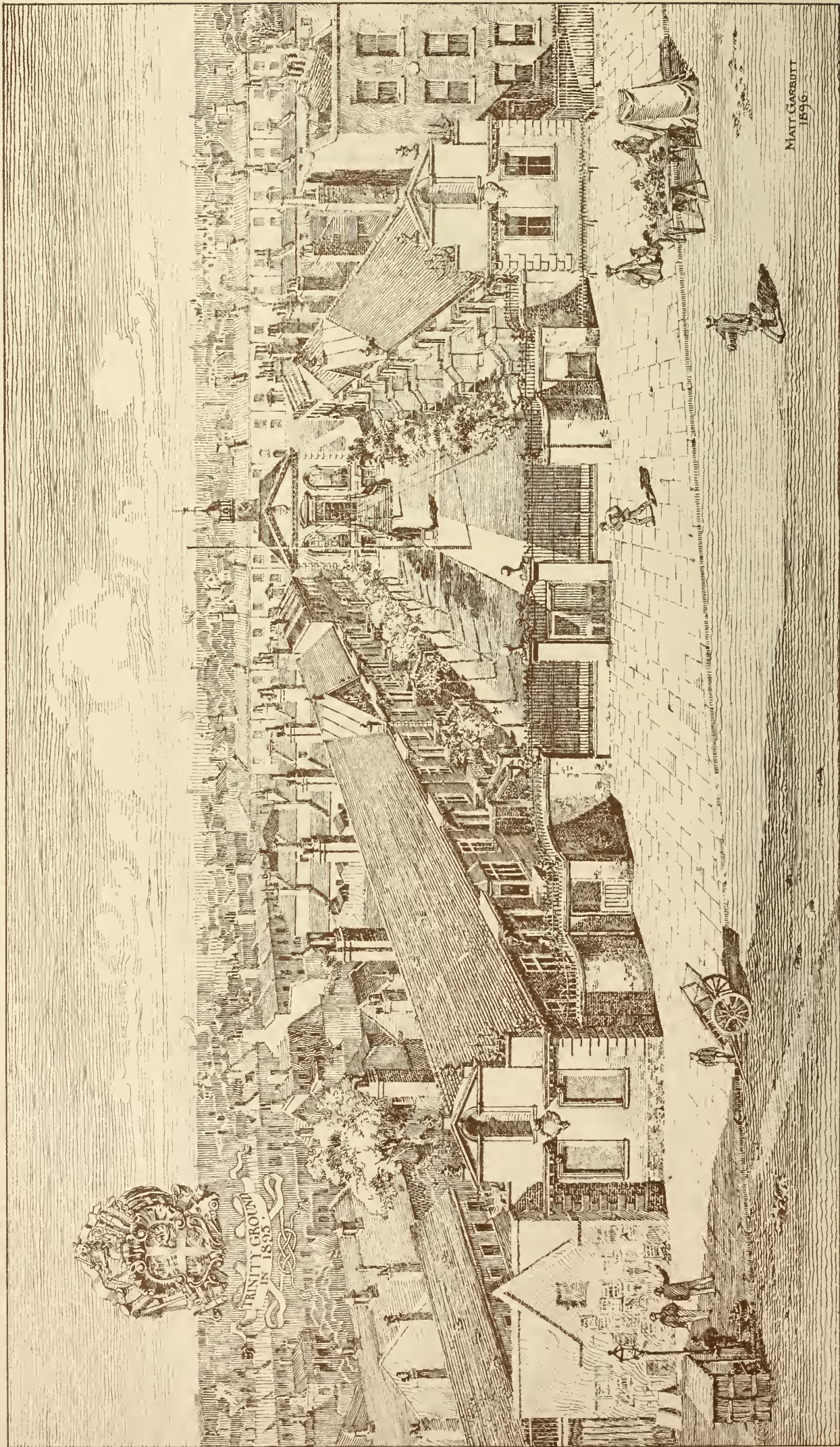
* A perspective of this quaint front, sketched by Mr. N. W. Harrison, was given in our issue of Nov. 22, 1890.

"ALDERSHAW". LICHFIELD.
MESSRS. J. HICKTON & H. E. FARMER, ARCHTS.



Boyle & Co.

THE BUILDING PEWS, AUG 21, 1896



MATT GARROTT
1896

The · Skipper · House ·

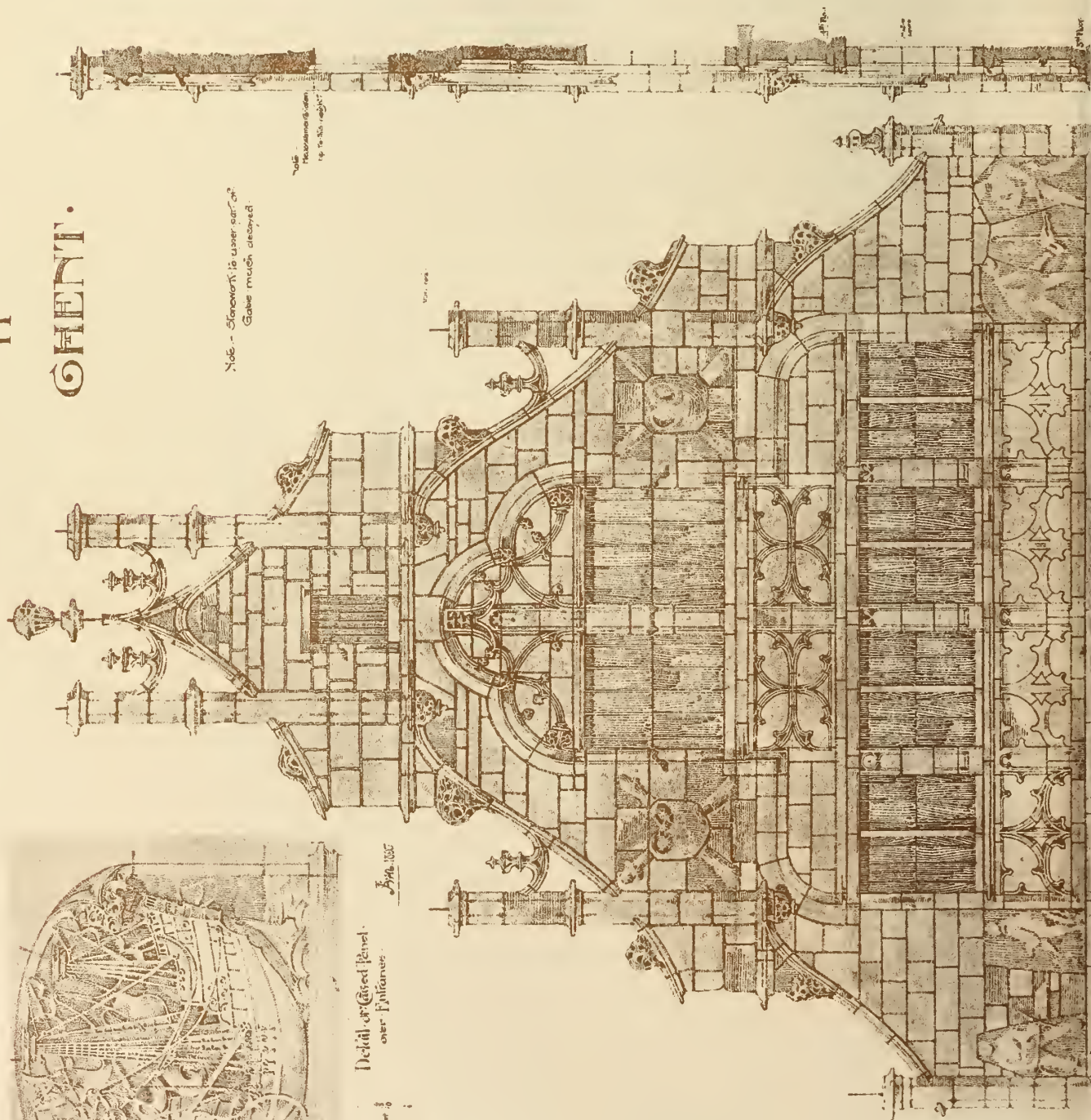
Ghent.

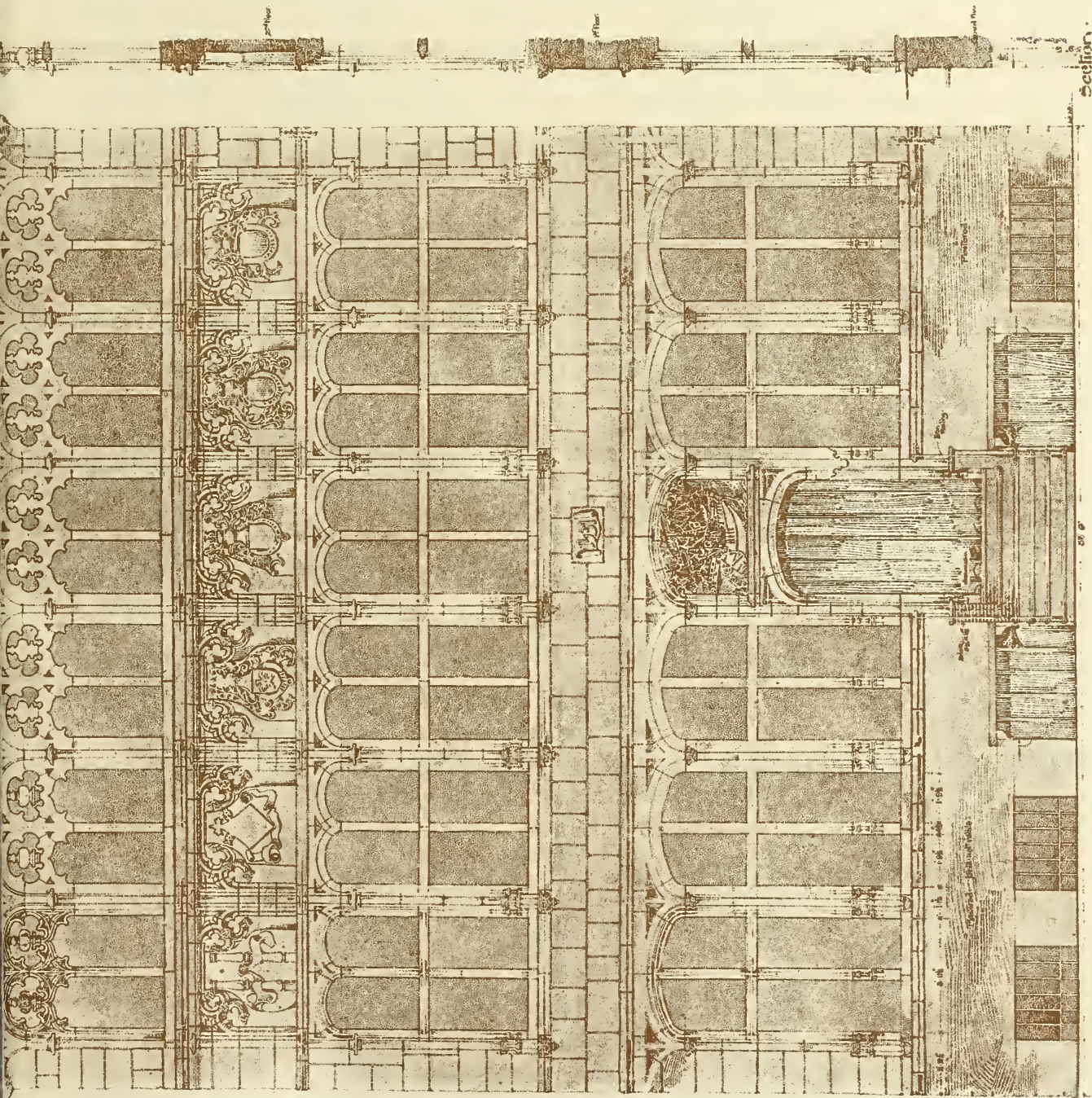


Detail of Carved Panel
over Fireplace.



Note - Stonework is under car of
Gable much decayed.





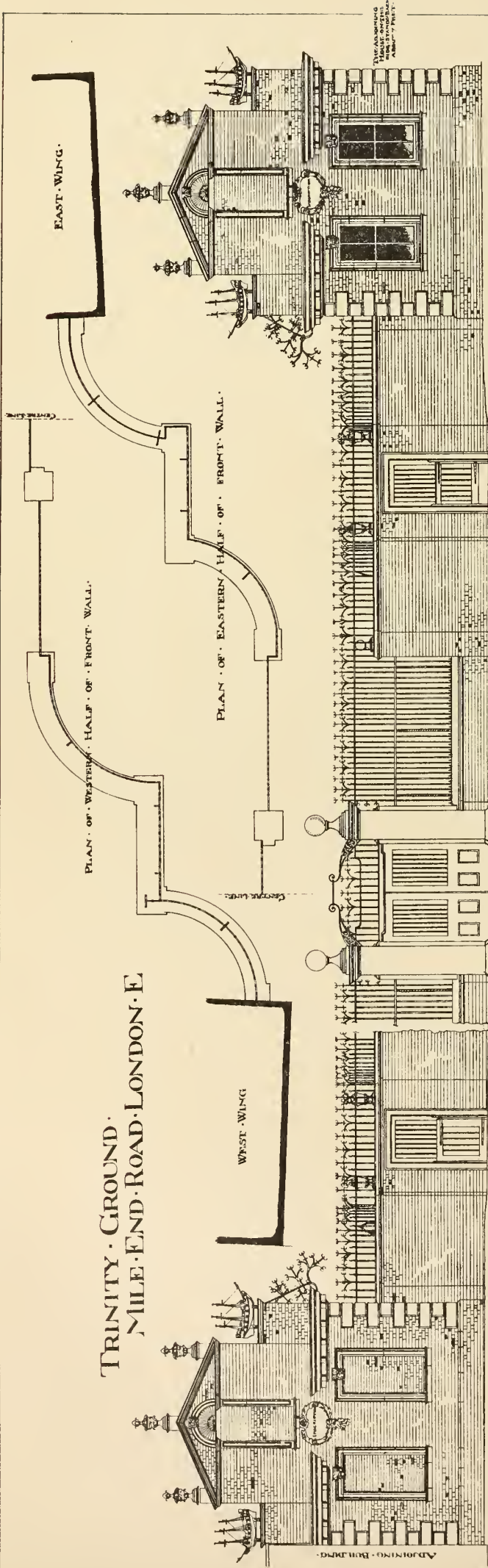
Detail of Facade

Section

Vertical section of the building
to the scale of 1/4" = 1 foot
Joints are shown with
neatness

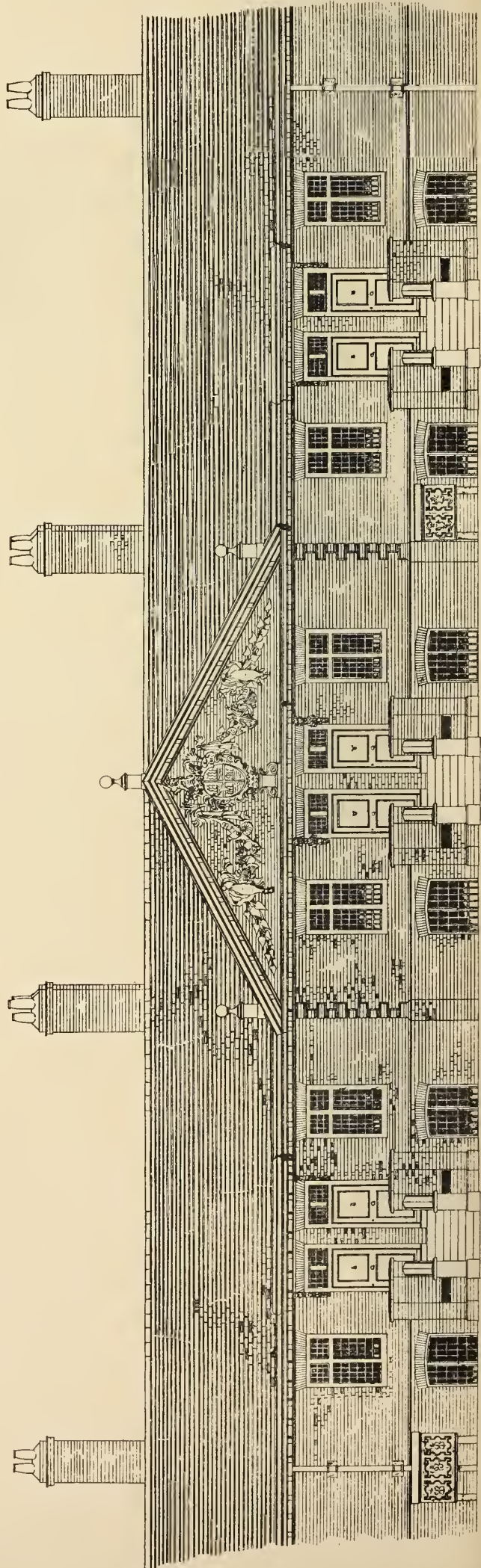


TRINITY · GROUND ·
MILE · END · ROAD · LONDON · E.

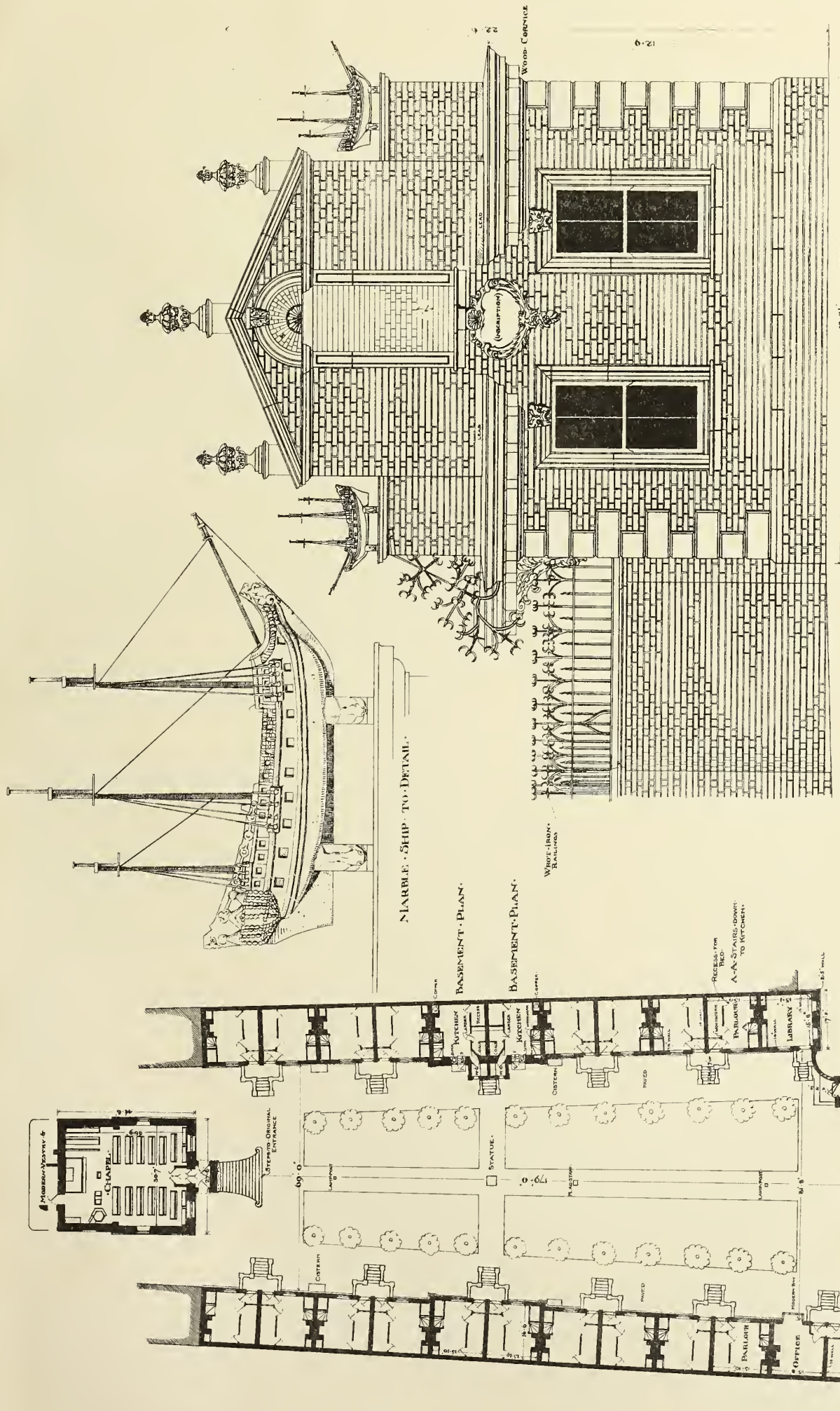


FRONT · ELEVATION ·

THESE ARE NO ADJUSTS TO
BE FOUND IN THESE PAGES



SCALE OF FEET. 0 10 20 30 40 50 60



ELEVATION OF EAST GABLE

SCALE OF PLAN

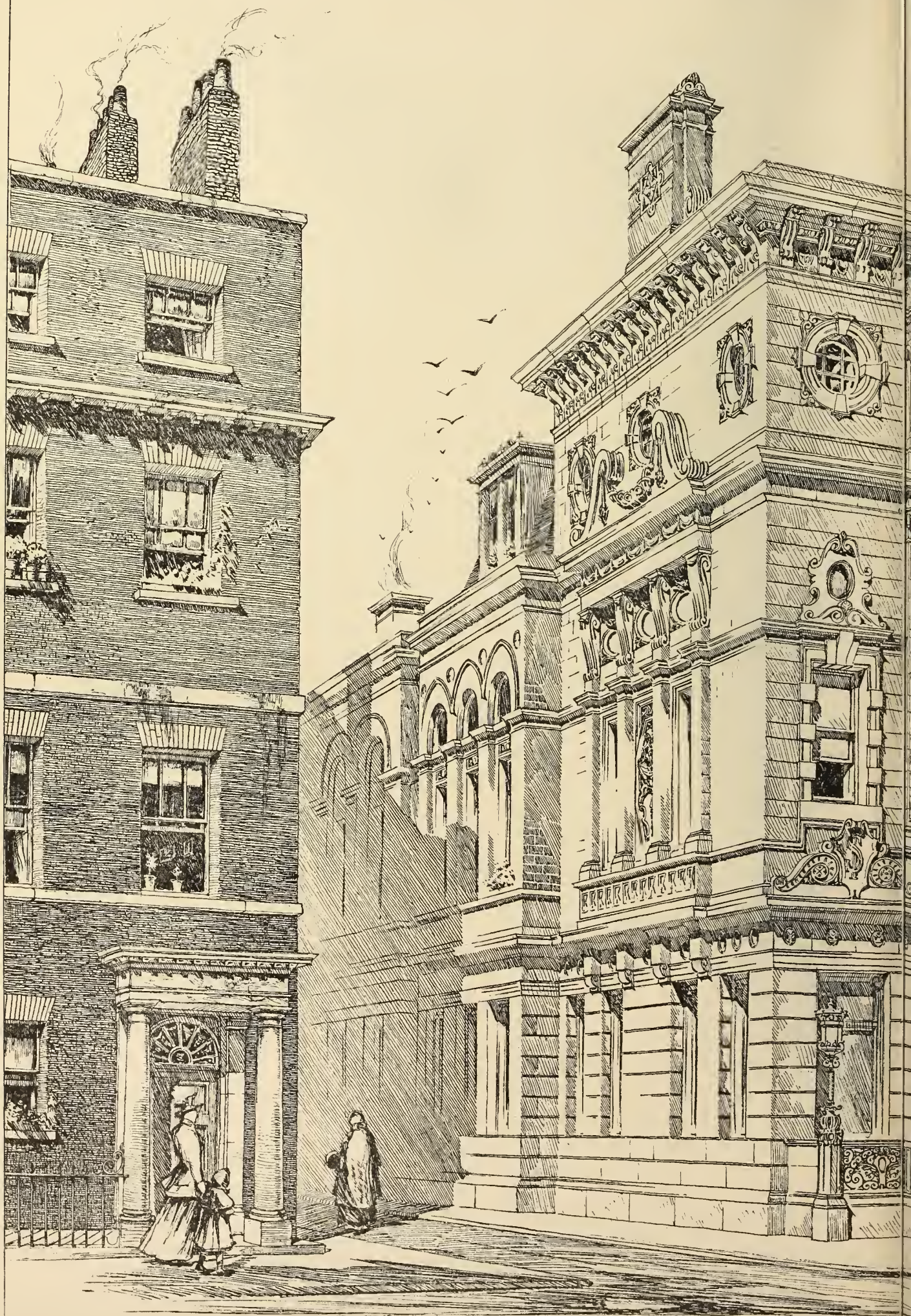
SCALE OF ELEVATION

SCALE OF SHIP

GROUND PLAN

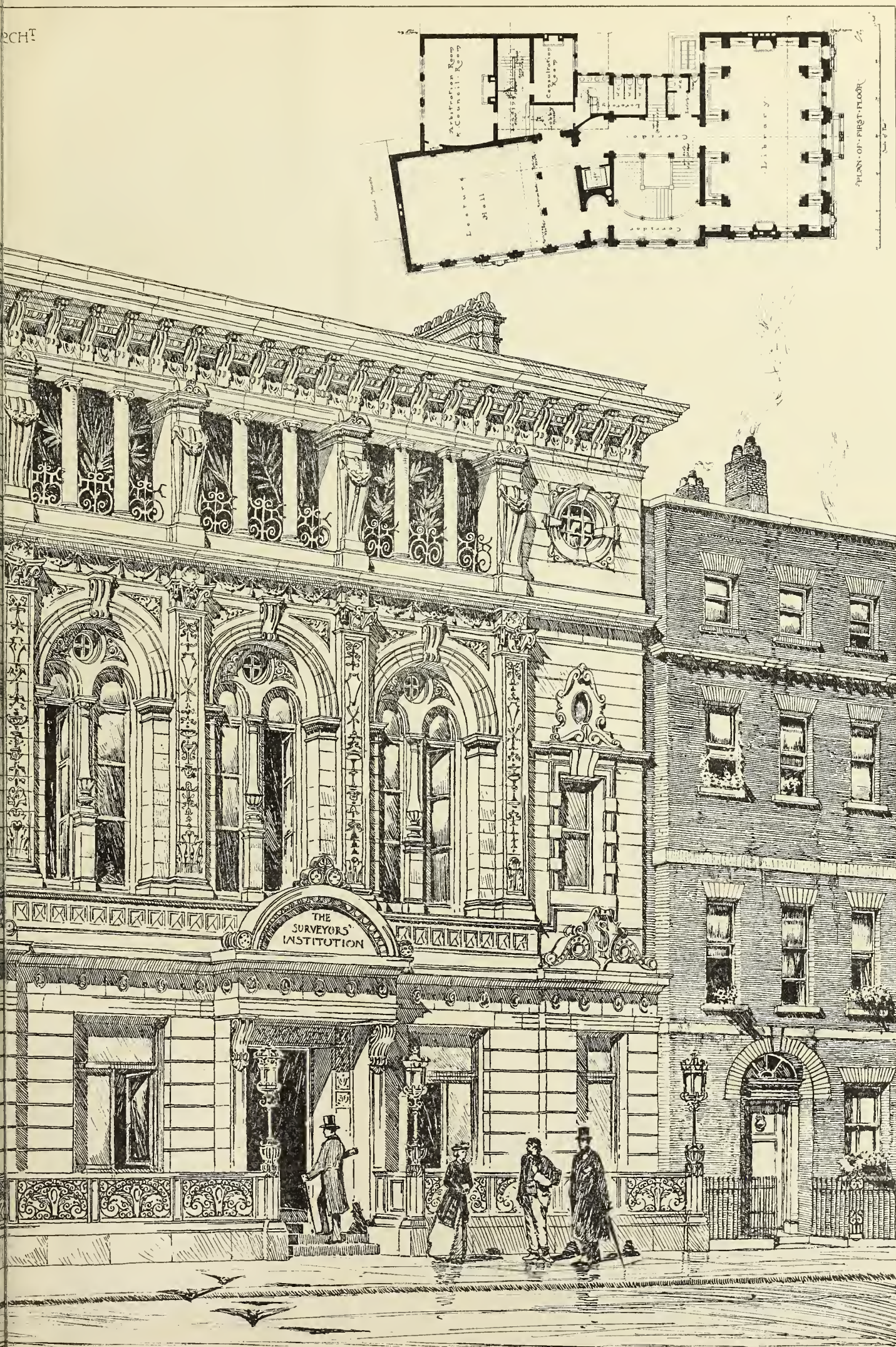
J. ALLEN
AND
ERNEST CODMAN

THE SURVEYORS' INSTITUTION PROPOSED NEW BUILDINGS DESIGN BY CHARLES BARRY FSA

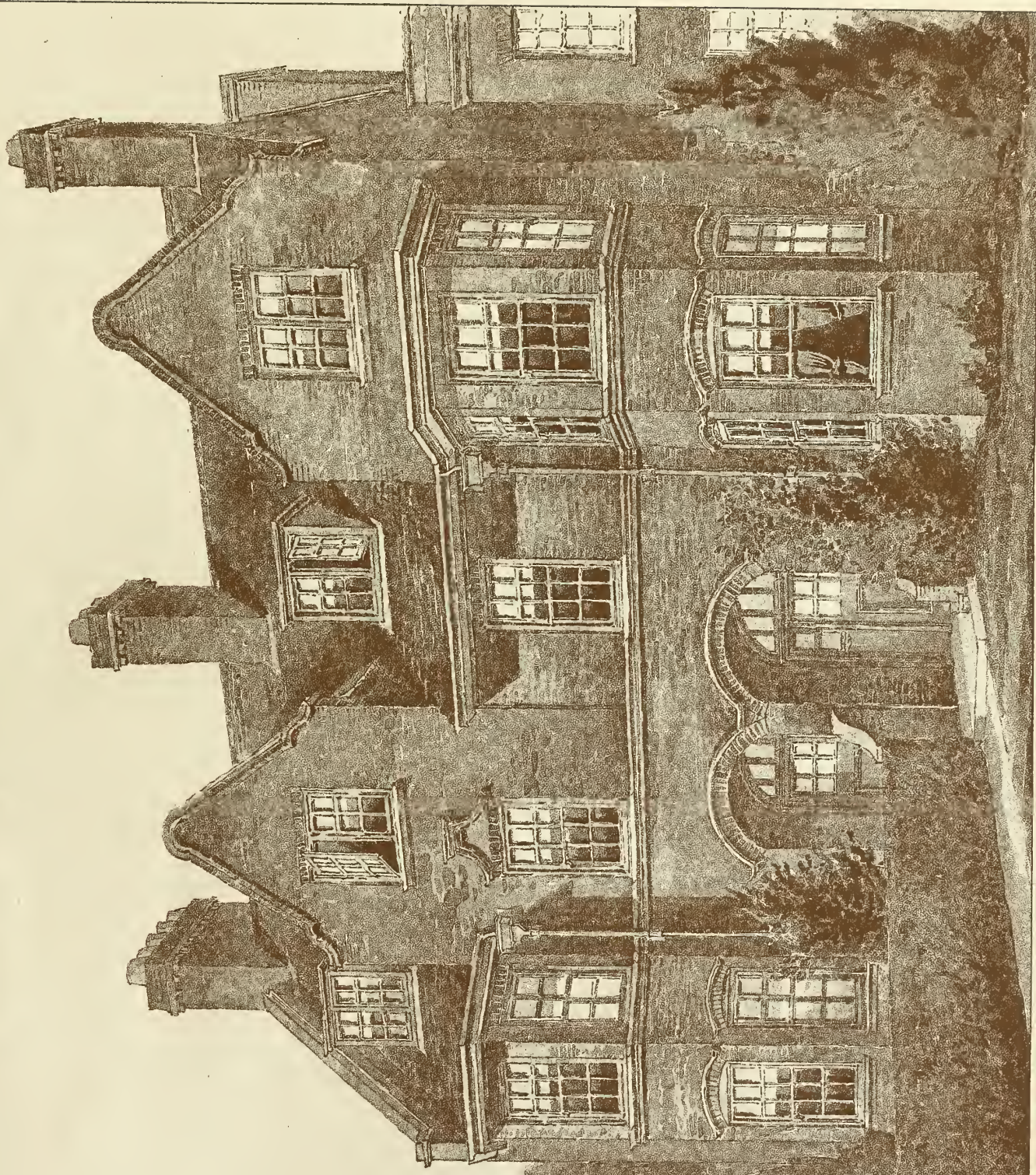
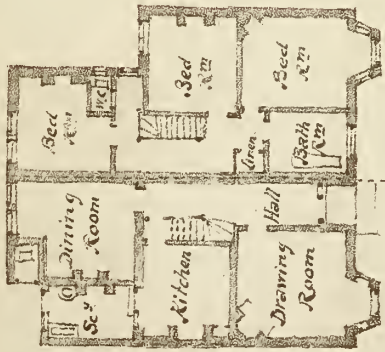


1896. Aug. 21, 1896.

RIGHT



Charles Barry, Architect



PAIR OF HOUSES · EAST DULWICH · ARTHUR KEEN ARCHT

PHOTO-TINT by James Aceman & Co. Ltd. "Pure Colour" W. H.



GROUND PLAN.

SCALE OF FEET.



FIRST FLOOR PLAN.



HOUSE AT LINCOLN

MESSRS GODDARD & SON ARCHT

OBITUARY.

THE imposing funeral at St. Paul's Cathedral yesterday (Thursday) noontide of Sir JOHN MILLAIS, reminds us that for the second time within eight months the Royal Academy has lost its titular head and most popular painter. Curiously enough, neither Leighton nor Millais is represented by a canvas either in the National Gallery, or in the National Portrait Gallery next door: each artist, however, accepted the invitation to contribute a half-length portrait of himself to the famous collection of autographic works in the Uffizi Gallery at Florence. In the Academy this year Millais' art was represented by his fine conception of "The Forerunner," and by four portraits, the Marchioness of Tweeddale, Sir Richard Quain, the Hon. Neville Manners (a boy of four), and Stanley Leighton, M.P. Coming, as it would do, six days after his decease, a detailed reference to the career and achievements of Millais, the last survivor but one of the famous band of Pre-Raphaelites, would be superfluous in these columns, having regard to the full notices that have appeared in the daily press. Suffice it to say that though Millais was excelled in portraiture by Watts, and in historical subjects by Orchardson and Burgess, and was almost equalled in landscapes by MacWhirter and Davis, yet, taken as an all-round painter, English art has lost, by the death of John Millais, her leading and most characteristic exponent.

MR. JOHN WILLIAM GRAY, M.I.C.E., formerly engineer to the Birmingham Corporation Waterworks, died at Leamington on Friday last, having nearly completed his 67th year. Mr. Gray was born at Montrose, where his father carried on business as a general merchant and shipowner. He served as a pupil with Mr. John Murray, the engineer to the Wear Commissioners, and with Mr. Murray's successor in office, Mr. Thomas Meik. Improvements to the river Wear and harbour were then in progress, and Mr. Gray was employed on this work, and in the marine surveys preparatory to an application to Parliament for powers to construct the south docks at Sunderland. At the end of four years' pupilship Mr. Gray went to London, and worked for six years under Mr. W. C. Milne, partly in the operations of the New River Company and also in the private business of his employer, including the building of a reservoir at Limerick and the rearrangement of the entire water supply to that city. He was also intrusted with the gauging of the streams in Lancashire, and arranging the compensations to be paid to be paid to the mill-owners in respect of the absorption by the new reservoirs of the Liverpool Corporation at Rivington Pike. Mr. Gray was next associated with Mr. Charles Greaves, a nephew of Mr. Milne, the engineer to the East London Water Company, and in 1860 commenced business on his own account, and among his various works were the erection of the first rifle butts at Wimbledon, the preparation of reports on proposed harbour works on the banks of the Dee at Holywell, and on the feasibility of a project for the supply of water to Odessa from the river Dniester. On his return to England in 1865 he became a candidate for the vacant office of engineer to the Birmingham Waterworks Company, and obtained the post, commencing his duties on the 1st of January, 1866. Many extensions and developments were entered upon by Mr. Gray's advice, and were executed under his superintendence. He augmented the engine power to Aston, and superintended the sinking of a deep well there. Mr. Gray designed the pumping machinery for raising the water of Plant's Brook to Aston, and carried out the sinking of the deep well at Selly Oak and the great storage reservoir at Shustoke. Authority for the two latter works was obtained by the Waterworks Company, but they were executed by the corporation, by whom the water supply was taken over in 1876, by purchase from the company, under the authority of an Act of Parliament. With this transfer Mr. Gray became waterworks engineer to the Corporation. The continued growth of the city ultimately rendered the question of further sources of water supply one of grave anxiety. Mr. Gray strongly supported the scheme of going to the Elan and Clacwin district, and prepared a number of the statistical tables upon which, after they had been verified by actuaries, the City Council resolved upon promoting the Welsh scheme. When the scheme was initiated it was intended that while Mr. Mansergh should be responsible for the works in Wales and for the construction of the

conduit to Birmingham, Mr. Gray should have charge of the works on the Birmingham side of Hagley, including the construction of a distributing reservoir at Frankley. But growing infirmity, due to advanced years and failing health, rendered this arrangement inadvisable, and in July, 1894, Mr. Gray retired, after 29 years' connection with the water undertaking. The City Council granted him a pension of £600 per annum, upon the understanding that his services would still be available in a consultative capacity.

LIEUT.-COLONEL JUSTIN CHARLES ROSS, C.M.G., who died on Monday at Bournemouth West, in his 55th year, was one of a remarkable group of engineers who, under the direction of Sir Colin Scott Moncrieff, did so much to increase the prosperity of Egypt by carrying out an effective system of irrigation. For the purposes of this system the country was divided into five circles of irrigation, of which four were intrusted to Anglo-Indian engineers summoned to Egypt in 1883 and 1884 for that purpose—namely, Colonel Ross, Mr. Willocks, Major Brown, and Mr. Foster. When Sir Colin became Under Secretary of State, Colonel Ross took his place as Inspector-General, and Colonel Ross himself was replaced by Mr. Garstin. "These six men, together with Colonel Western and Mr. Reid, who between them restored the Barrage, have," says Sir Alfred Milner in his "England in Egypt," "been the saviours of Egyptian irrigation." In the case of the Ismailia Canal, which connects the Nile with the Suez Canal, the changes introduced by Colonel Ross brought down the amount of silt deposit from 300,000 cubic metres in former years to 120,000 cubic metres in 1884, this representing a saving of £9,000 in the annual cost of dredging. Colonel Ross also designed the whole of the Sharaki works (Sharaki being the term applied in Egypt to those lands which have, in any given year, to be relieved of all taxation on account of their receiving no water whatever), and he solved the chief problems of basin irrigation. He had to keep in view two distinct objects—first, to make sure that each of the 120 basins, varying in size from 500 to 35,000 acres, should, even in a year of low Nile, be adequately flooded; and, secondly, he had to give to every part of each basin not merely water, but water of the fertilising quality. Colonel Ross retired in 1888 on a pension, and was created C.M.G. in the same year.

The organ in the Temple Church is undergoing restoration and extensive renovation during the Long Vacation. The work is being carried out by Messrs. Norman Brothers and Beard, of Norwich, under the supervision of Dr. E. J. Hopkins.

In the ventilation of Christ Church Schools, Harrogate, Messrs. Smith and Tweeddale, architects, Leeds, the "Clinax" patent direct-acting invisible roof ventilators are being used, and have been supplied by Cousland and Mackay, ventilating engineers, Glasgow, the sole manufacturers of these ventilators.

A picture by Andrea Mantegna, the celebrated 15th-century Italian artist, has just been added to the collection of the Irish National Gallery, Merrion-square, Dublin. Mantegna's pictures are very scarce. The London National Gallery has four, the Berlin Museum two, the Louvre four, and the Uffizi, Florence, four.

The monthly report for July of the Labour Department states that, generally speaking, the building trades continue busy, though the percentage of unemployed in unions making returns has risen from 1.5 in June to 1.8 in July, the percentage for July, 1895, having been 2.4. The furnishing trades, though still well employed, are scarcely so busy, the percentage of unemployed members at the end of July being 2.0, compared with 1.4 per cent. in June and 2.1 in July 1895.

A scheme is afloat in Newcastle-on-Tyne for building a permanent crystal palace and assembly-hall on a site in St. Thomas's-street, facing the Leazes. The preliminary plans, prepared by Mr. J. W. Taylor, of that city, show a building 400ft. by 120ft., with side galleries, capable of accommodating upwards of 20,000 persons. In addition to this, there will be the usual cloak-rooms, offices, refreshment and smoke rooms on the same floor. The orchestra, with retiring-rooms, is arranged so as to leave the whole of the floor space available for winter gardens or exhibition purposes, or to let off separately for concerts, demonstrations, and similar gatherings. The great organ will occupy the west end. As there is a considerable fall in the ground, it is proposed to utilise the space underneath as an ice-palace and promenade. The suggested estimate of outlay for site and buildings is £50,000.

ARCHITECTURAL & ARCHÆOLOGICAL SOCIETIES.

ARCHÆOLOGICAL AND ARCHITECTURAL SOCIETY OF DURHAM AND NORTHUMBERLAND.—The fourth meeting of this society for the year was held on Friday at Felton and Warkworth. Members assembled at Acklington station and drove to Felton by way of Brokenfield, where there is an old mansion house, formerly belonging to a branch of the ancient and important family of Heron, and which possesses some architectural features of more than ordinary interest. The church of Felton is partly a building of the 13th century, the aisles of the nave having been added in the following century. The east window of the south aisle has its head filled with Geometric tracery cut out of one stone, and is traditionally said to have been brought from Brinkburn Priory. The belfry of two stages is peculiar but effective. On leaving Felton the party proceeded to Swarland Old Hall, once the seat of the family of Haselrigge, a building of about the year 1640, and afterwards visited Long Framlington, where the church, now undergoing restoration, will be examined. It possesses a chancel arch of Late Twelfth Century work, with other parts of later and different dates. They next visited New Moorhouse, formerly belonging to a branch of the family of Manners, of Etal, now represented by the Duke of Rutland. Half a mile away was seen a pele tower, the fortified residence of the Manners before the latter house was built. On the road to Warkworth members passed by Brainshaugh, where the remains of the cell, which belonged to Alnwick Abbey, was examined. The nave and part of the chancel still remain. The situation is extremely beautiful and very characteristic of Coquetdale, as, indeed, is the whole district through which the day's drive was made. At Warkworth the church and castle were inspected. The castle was once the centre of the northern possessions of the great house of the Claverings, and at present and for many centuries past has belonged to their successors, the Smithson-Percies, and is a building which for size, position, and grandeur is scarcely second to any of the great castles of Northumberland.

CHIPS.

The following appointments have been made to the Northampton Institute, Clerkeuwell:—Mr. John Ashford, late of the Birmingham Technical Schools, has been selected as head of the Mechanical Engineering and Metal Trades Department, and Mr. John Williams, senior instructor and inspector to the Surrey County Council, the head of the Artistic Crafts Department.

The Queen has offered the appointment of laud steward on her Majesty's Osborne estate, recently held by the late Mr. Andrew Blake, to Mr. Andrew Slater, resident factor at Haystoun, Peebles, by whom it has been accepted.

The west window of the south aisle of the well-known modern church at Boddelywyddyn, near Rhyl, has, by the munificence of Sir William Grenville Williams, Bart., of Pengwern, been filled with painted glass, as a memorial to the late Lady Williams.

A series of fires occurred on Sunday on the Citadel Estate, Hull, among the stacks of deals and boards with which it is at present crowded. The damage is estimated at £5,000, and there appears reason to attribute the various outbreaks to incendiarism. The timber was the property of Messrs. Byson and Jameson.

The second and concluding section of the east-to-west branch railway in County Durham, between Birtley Junction, north of Chester-le-Street, and Blackhill, was opened on Monday. The first portion, that from Birtley Junction to Annfield Plain was completed by Messrs. Whittaker Bros., of Leeds, and opened in the early part of 1894. The second portion, from Annfield Plain to Blackhill, with intermediate stations at Leadgate and Consett, is 6½ miles in length, and has been constructed by Messrs. J. D. Nowell and Sons, of Victoria-street, W.C. The whole line has been carried out from plans by and under the superintendence of Mr. Charles A. Harrison, the engineer to the North-Eastern Railway Co.

The award in the Wine-street, Bristol, arbitration case has been received. The proceedings took place on the 29th and 30th July, before Mr. Vigers, of Loudon, Mr. Freeman, Q.C., and Mr. Weatherly appearing for the claimants, Messrs. Michael and Sons, whose premises will be affected by the Wine-street improvement scheme, and the Hon. A. Lyttelton, M.P., for the corporation of Bristol. The amount of the claim was between £14,000 and £15,000, and the arbitrator has awarded Messrs. Michael and Sons £10,408.

THE NEW STANDARD LIFE ASSURANCE BUILDINGS, CALCUTTA.

WE cull the following from a lengthy report in the *Times of India* (July 18, 1896) relative to these fine new premises, which, we learn, are just completed:—Situated in Dalhousie-square, next to the Hong Kong and Shanghai Bank, they occupy one of the most commanding positions in the city. The buildings were designed by Mr. F. W. Stevens, C.I.E. and F.R.I.B.A., architect, of Bombay. The resident clerk of works was Mr. W. G. L. Cotton, M.I.C.E., and Mr. J. McMinn the general contractor. The works were commenced in February, 1894, so that they have taken something less than two and a-half years in completion, a short time comparatively when the magnitude of the building and the class of work is considered. The buildings are in two blocks, divided by a *cul-de-sac* lane, Vansittart-row, which is bridged over, and surmounted by a fine stone-sculptured pediment over 30ft. long by 7ft. high, in which, in the round, is a spiretted carved representation of "The Parable of the Ten Virgins." On the apex above this pediment is a colossal statue of Atlas bearing the world, with the Standard Life Assurance offices, spotted all over the surface of it, upon his herculean shoulders. The extreme height of the building proper is 68ft., and the tower at the angle of Wellesley-place and Dalhousie-square 140ft. The structure consists of three stories. Porebunder stone (a material very much like Bath stone) has been used largely in the construction of the edifice. This stone has long been largely used in the western Presidency, but it is the first, or almost the first, time it has been employed in Calcutta. The bank premises are paved with marble. The teak counter fittings have brass accessories, and are the handiwork of Messrs. Weinbridge and Co., of Bombay. The exterior sculpture is by Messrs. Harry Hems and Sons, of Exeter, and the foliage carving by Mr. Rowjee Bhanna and his assistants, of Bombay, working from models prepared by Mr. Gomes, of the Bombay School of Art, under the direction of Mr. Stevens, the architect. The cast-iron work is by Messrs. Burn and Co., of Calcutta.

FACTORY CONSTRUCTION AND FACTORY ACTS.—VII.

By GEORGE H. BIBBY, F.R.I.B.A.

MANY old factories or workshops were constructed somewhat as shown in Figs. 16 and 17 with an outside staircase leading to the upper floor, the whole affair being often a massive piece of good construction; but in these days (at all events in the North of England), the sanitary arrangements were of the most simple description: a rail fixed about 2ft. above the ground, and let into two upright posts (or into a wall) formed the seat, which was usually not under cover, but exposed to the heat of summer or frost of winter, and undesirably near to the buildings. In other respects these factories were sometimes well arranged, being spacious, sufficiently lighted, and (from the nature of the work usually done) probably seldom overcrowded with workpeople.

The cottage-factory (in combination with a farm) appears to have been common to many parts of Europe. To save expense in the first erection, the apartments for carts, ploughs, and farming implements were frequently arranged upon the basement, while the living-rooms and workrooms for the spinners and weavers, &c., were above, the whole being under one roof. There are obvious objections to having such combinations under one roof with regard to sanitary arrangements; but such buildings exist in Norway and Sweden, and are to be found in Italy. The walls are frequently of stone or brick for the ground-floor only, the upper portions being entirely of wood, and frequently with exterior staircases only.

The structural form of all factories and workshops from the most remote times has naturally been influenced by the modes of manufacture carried on, and by the mechanical appliances introduced at various periods for the purpose of reducing manual labour. The alterations and improvements in the planning and design of factories and workshops can only have been made by very slow degrees, inasmuch as in very remote periods certain classes were as disinclined to appreciate the introduction of machinery as their successors in recent times, and this is evidenced by the existence of a kind of Factory Act passed in the year 1482 against "tucking mills," and by

another Act, passed in 1557, for the putting down of "gigge mills."

The plan of the factory or workshop of former times was probably arranged sometimes with more accommodation than was actually required for working purposes alone. In many instances the men were paid to a considerable extent in food and drink as well as in money, and when the factory was a large one with many workers, it is

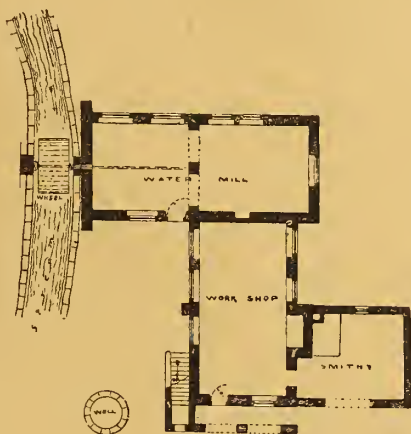


FIG. 16.

probable that apartments for eating and sleeping formed a portion of the factory structure. That such a system existed is clearly indicated by a clause in an Act of the 6th year of Henry VIII., which recited very much in the spirit of modern Factory Acts, "That master carpenters, masons, bricklayers, tilers, plumbers, glaziers, joiners, and other employers of such skilled workmen should give to each of their journeymen, if no meat or drink was allowed, sixpence a day." In a majority of establishments, no doubt, the men were fed as a portion of the household of the master-craftsman, and the workshops were arranged accordingly, and it appears probable that the factories were planned not unusually so as to include apartments for their domestic use. At a later period, when detached cottages for workpeople were provided in connection with certain industries (either in part payment for services or otherwise), the position of the workman must have been a very desirable one, in many respects, for in the 31st year of Elizabeth it was enacted, "that no cottage should be built

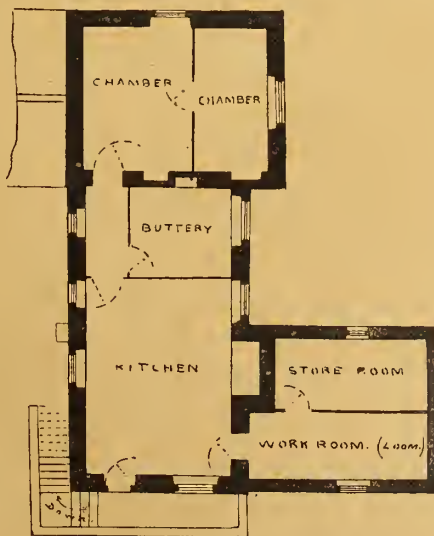


FIG. 17.

for residence without four acres of land, at lowest, being attached to it, for the sole use of the occupants of such cottage."

The sites for factories and workshops in ancient times were evidently selected under greatly different circumstances to those influencing factory builders of the present day; water for power, wood for fuel, and river or road for transit, were amongst the more urgent requirements for consideration. It was not until the year 1581 that an Act was passed which prohibited the

employment of wood for fuel in making iron. This act also forbade the erection of new ironworks within twenty-two miles of London, and restricted the number of those erected beyond that distance in Kent, Surrey, and Sussex. Similar enactments followed in later times, and the Sussex iron industry received a shock—several of the ironmasters gave up the business altogether, and others removed their work to other places, particularly to South Wales, where, during the Civil Wars, they suffered severely at the hands of the Parliamentary troops. After the Restoration this policy of discouragement to the iron trade was continued till 1740, when there were only ten furnaces in Sussex, and 49 in the remainder of all England.

The total absence of Factory and Workshop Acts (as we understand them in these days) in the earlier years of the 18th century does not appear to have militated against the erection of workshops, where large numbers of workpeople enjoyed some of those advantages to be secured in well-constructed and conveniently-planned apartments. Writing in the year 1757 upon the subject of an early factory for woollen goods, which existed in the Vale of Calder, in Yorkshire, John Dyer expressed himself thus:—

By gentle steps
Upripped from room to room we slowly walk,
And view with wonder and with silent joy
The sprightly scene; to see them all employ'd,
All blithe, it gives the spreading heart delight
As neither meats nor drinks, nor aught of joy
Corporal can bestow.

Had John Dyer lived in these days, I could have conducted him to more than one factory where are employed a large number of workpeople, closely packed and seated in long rooms, whose haggard faces and silent tongues (repressed by strictly-observed rules during excessively long periods of uninteresting labour) form with the dismal aspect of the apartments such a depressing contrast to his picture of the 18th-century factory, that his wrath upon viewing them would probably have been anything but silent. Happily, these excessively bad factories are but few, and it is quite exceptional to find the workpeople thus repressed, though far too frequently their working places are insanitary, ill-ventilated, and comfortless in their structural arrangements.

(To be continued.)

PLUMBING REGULATIONS.

THE Board of Public Works of Battle Creek, Mich., have recently adopted and issued some useful rules and regulations for plumbing work. Plumbers are required to be licensed, and have to pass an examination as to their competency by a committee of the Board. The rules relating to plumbers' work on the water supply require plumbers to furnish plans and descriptions of location, style, and kind of pipes and fixtures, if required, before any work is done; service pipes are to be of extra strong lead, asphalted and tar-covered cast-iron water-pipes 3in. or over in diameter; all fittings to be of galvanised iron or brass for galvanised iron pipe; pipes are to be hung with strong durable hangers, which must be approved by the superintendent—common turned wrought-iron straps, home-made rods, or other makeshifts will not be allowed; pan closets are prohibited, and no other kind allowed but the tank or wash-out sort. Referring to pipes, out-of-door pipes are to be laid 5½ft. deep, they are not to be nearer than 2ft. from outside of cellar or area wall, and shall slope 45° where they come into same from a higher point, or be given a gradual fall. In areas, cellars, and under closely-walled buildings where there is no cellar, pipes shall be laid 1½ft. deep if well protected by close walls with no openings for air to enter. Pipes between floors and ceilings, under floors where there is no cellar, and in other inaccessible and cold places, are to be covered with mineral wool and hair-felt pipe covering, and by special permit they may be boxed. Pipes are to be kept away from outside walls, and no water-pipes and fixtures are to be put in halls and stairways without special permit. Pipes must be left easy of access, no pipe being inclosed except by panel screwed on. A service-pipe supplying more than one dwelling, or for the use of more than one family, must have a stop and waste for each, located as to be conveniently used to prevent freezing, if any part of building is not in use, to shut off leaks, &c. The rules, of which there are only a few, are to be strictly enforced; written permission must be obtained before any

plumber can turn on water, under penalty; and if in doubt upon any point, they must confer with the superintendent before doing any work. They are to make good all damage, improperly executed work, or, in default, the work may be done by the board, and the cost, plus 20 per cent., is to be collected from them. These stringent regulations have no doubt been framed to meet the inferior and scamped work that has been executed in this part of the States; some of them would be usefully put into operation in our dwellings here.

ANDREWS' PATENT TREADS.

A NEW form of safety tread has now been for some time before the profession and trade generally, which consists of an improved form of Hawksley's tread so largely used by architects and engineers for railway stations and warehouse work. These new treads, introduced by the Andrews-Hawksley Tread Company, consist of cubes of hard wood, with the reed of the wood vertical and held together by a series of flat bars and bolts. The bars, which are of rolled iron or steel, are placed in between the various rows of blocks and form, in fact, a number of small girders or joists, which carry the load coming on the tread, the whole being held together by bolts and nuts at frequent intervals (about 1½ in. pitch). These treads being formed of wrought iron are very strong, and will carry a considerably heavier load than any form of cast-iron framework, having been, in fact, tested to three times the breaking load of the old cast-iron type without showing any permanent set. They are made in various sections to suit the circumstances under which they are used. Thus, No. 1 section, 1½ in. deep, is a self-supporting tread suitable for railway-stations, warehouse, or board-school traffic. No. 2 section, 1½ in. deep, is used to place on stairs which have become dangerously worn away, in which case the new tread is laid on a level bed of cement or other filling and doweled or screwed into the wood or stonework. No. 3 section, ¾ in. thick, is used for the steps and landing platforms of vehicles, such as trams, buses, &c. The works, which are situated at Napier-yard, Millwall, will fully repay a visit to anyone interested in this subject, as the machinery used in the manufacture of these treads is certainly unique. Another special feature of this tread is, it can readily be reversed when worn, back to front, and this operation can be repeated by turning the tread over, thus adding almost indefinitely to its strength and durability.

PAINTS FOR METALS.

SOME interesting researches on the value of paints for ironwork, made by Professor J. Spennrath, were recently published in the *Deutsche Bauzeitung*. As one result of these, Professor Spennrath concludes that none of the metallic oxides commonly used combines chemically with linseed oil. The drying process depends exclusively on an absorption of oxygen by the oil, which is facilitated in a purely mechanical way by the presence of the pigment. The value of the different pigments used varies. Thus, zinc-white, when used for outside work, rapidly swells to double its previous volume, owing to the absorption of carbonic-acid gas and water. Sulphuretted hydrogen will cause red or white lead to act in a similar way; but, when pure, Professor Spennrath considers these latter two pigments satisfactory. Carbon paints are very stable, as is heavy-spar, but the covering power of the latter is small. In order to test the relative durability of various paints, sheets of zinc were coated with a number of different kinds. The zinc was then dissolved away by acid, leaving a film of paint. All these films, it was found, could be destroyed by the action of dilute nitric or hydrochloric acids, while the vapours of sulphuric and acetic acids acted similarly. Alkaline fluids and gases also destroyed the paints rapidly. Pure water was found to be more injurious than salt water: hence the destructive action of sea-water is to be attributed mainly to the mechanical effects of wash. Hot water was found to act more rapidly than cold. The most important discovery made was, however, the great influence of temperature. Films similar to those already described completely lost their elasticity, and became brittle when exposed to a temperature of 203° F. There was at the same time a large contraction. Similar effects are produced by

prolonged exposure to considerably lower temperatures. Blistering he finds to be due to the inner coat of paint being so thick that it has not hardened thoroughly before the second coat is applied.

BOOKS RECEIVED.

A Handbook of the Law of Fixtures (with appendix of statutes, leading cases, &c., and index), by SIDNEY WRIGHT, M.A., of the Middle Temple, Barrister-at-Law (London: *Estates Gazette* Office, 5s.), is a concise manual of the law of fixtures, with references to all the principal statutes, cases, &c., brought up to date, and containing the subjects of and questions set in the examination of the Surveyors' Institution. It will prove very useful to landlords, tenants, solicitors, surveyors, house agents, and students, who have long been in want of a popular and concise, yet comprehensive, textbook of the subject.

A Handbook of Art Smithing, by FRANZ SALES MEYER, author of "A Handbook of Ornament, &c.," translated from the German edition, with an introduction by J. STARKIE GARDNER (London: B. T. Batsford).—The author of this handbook, whose work on Ornament we noticed some time ago, is a professor in the School of Applied Art at Karlsruhe, and is a competent authority on design in its technical aspects. As Mr. Starkie Gardner, in his introduction, says, the "work is written from the German standpoint"; the illustrations are devoted mainly to modern Teutonic production and design, and as such is amenable to English criticism. When we consider, however, what we owe to Germany in the art and crafts of the metal-worker, the student must feel thankful for a handbook dealing with German ironwork and the technical qualities of design. The 13th and 15th century strap-work and hinges, and ornamental work based on the vine and the thistle, open to the craftsman many suggestions; but it is the Renaissance work that is most fully illustrated in Prof. Meyer's work. The first chapters treat of the properties of iron in its various forms of cast iron, steel, wrought iron, malleable cast iron, and the kinds used by artistic ironfounders, like bar and sectioned iron, forged and rolled; the tools and workmanship in the manipulation of wrought iron—the latter part is amply illustrated by the tools used, anvils, vices, chisels, metal-saws, drills, &c., methods of joining ironwork, smith's details, like ornamental bars, scrolled volutes, spiral twists, flat ornaments, scrolled ends, embossed leaves, &c. The historical development of artistic smithing, the styles of the Antique, Mediæval, Renaissance, Baroque, Louis XVI., are profusely illustrated by typical examples of those styles. The other sections are devoted to the principal fields of art smithing. The wrought-iron grille and balustrade were among the earliest developments, and many of these are illustrated from the early Gothic grille and railing of the Middle Ages to the Renaissance. The examples are chiefly from real works, and show the leading characteristics of each period. They comprise doors and gates, some beautiful instances of hinges, doors, knockers, and mounts of the 13th to the 15th centuries from Liege Cathedral and Augsburg, window fastenings of the Middle Ages, locks and keys, chests, escutcheons, candelabra, brackets, and many modern designs. Of some of the latter we cannot say much; but they serve to show present-day German work. Professor Meyer's work is a useful historical manual on art-smithing, based on a scientific classification of the subject, that will be of service to all smiths, designers, and students of technical and art schools. The illustrations are well drawn and numerous.—The *Calendar of the East London Technical College*, People's Palace, for the Session 1896-97, has just been issued by Mr. J. L. S. HALTON, M.A., the director of studies. Considerable developments have been made, especially in extending and systematising the instruction in the day classes. The Building Construction Classes are under the management of Mr. A. Grenville and Mr. F. R. Taylor; while the art professors are Messrs. Arthur Legge and R. Ponsonby Staples.—The *Calendar of the Glasgow and West of Scotland Technical College*, just published, contains, we notice, several new features in the Department of Architecture and Building Construction. The day classes are to meet at 10 a.m. instead of 9.30 a.m. The work of the architectural studio will begin at 6.30 p.m. instead of 7 p.m., and a new class is to be formed for the study of modern

design. The architectural history lectures are now arranged in two courses instead of three. By this alteration the classes are more suitable for students studying for the intermediate and final R.I.B.A. examinations. The syllabuses in the three courses of building construction have been revised, and design in construction is now part of the training in each course. The honours stage syllabus has been recast.—*Disease and Defective House Sanitation*, by W. H. CORFIELD, M.A., M.D. (Oxon.), F.R.C.P., &c., Professor of Hygiene at University College, London (London: H. K. Lewis, Gower-street) is a reprint, with illustrations, of two lectures delivered before the Harveian Society, and will be found an instructive little book, explaining in a popular manner the principal defects of insanitary houses, and therefore well adapted to be placed in the hands of every householder. The author traces the connection with insanitary dwellings and fittings of a great many of the diseases, like sore throat, diphtheria, and enteric fever, which, at this time of the year especially, afflict the dwellers in our great towns as well as in the country.—*Appleby's Illustrated Handbook of Machinery*, Section I., "Prime Movers," by C. J. Appleby, M.Inst.C.E. (London: E. and F. N. Spon, Strand), will be found a serviceable handbook to all who require fixed, portable, and marine engines, boilers and fittings, water-heaters, gas, oil, and other engines, dynamos, &c. The work is copiously illustrated, and is compiled for handy reference, with prices, weights, measurements, and other data, including cost of working and work performed. Seven sections, which can be obtained separately, are published, comprising hoisting and pumping machinery, contractor's plant, &c. Each section is bound in cloth, and is published at 3s. 6d.—*Trustees in Bankruptcy*, by SIDNEY WRIGHT, M.A., of the Middle Temple, Barrister-at-Law (London: Frank P. Wilson, *Estates Gazette* Office, St. Bride-street), describes in a concise and clear manner the duties and responsibilities of a trustee in bankruptcy. Mr. Wright's little handbook is to explain what a trustee so appointed is under the Bankruptcy Act of 1888. Before that time we know that the position of trustee was irresponsible, and that he often managed to feather his own nest, instead of looking after the interests of the creditors who appoint him; but under the new law the creditors have a more direct control over him, and the assets of the debtor are more efficiently realised. The chapters on appointment of trustee, realisation of bankrupt's property, trustees' powers, control over trustee by the creditors, remuneration, release, &c., contain information on all the principal duties as required by the Act. Perhaps none of these duties is more vexatious than that of disclaiming onerous property. An unprofitable contract, for example, may entail trouble and expense on the estate, and the trustee has a right to disclaim such property for the good of the creditors. On this and other important points useful advice is given, and all those interested in these matters will find Mr. Wright's little book a reliable guide. A list of cases is given.—From the Art Institute (Messrs. Orell, Füssli, and Co., publishers), Zurich, we have received Parts 13, 34-5, 55-6, 82-3, 84-6, 87-8 of *Illustrated Europe*, respectively describing Lucerne (13), the Burgenstock (34-5), the Lake of Lucerne (55-6), the Furka Pass to Brieg (82-3), Zurich (84-6), Brieg and the Simplon (87-8), and Zermatt (89-92). These little paper-covered handbooks, each illustrated with from twenty to forty sketches by J. Weber, and written by Dr. A. Cubasch, J. Hardmeyer, O. Wolf, and others, are published at half a franc each, and are by far the most portable guides published to the Continent, while so far as we have tested them they are reliable and up-to-date. They give just the class of information needed by the average tourist, are penned in a lively style, and are in most cases excellently translated from the original German. Their chief defect is the absence, in nearly all cases, of a reliable map to scale—a drawback which could easily be remedied by the enterprising publishers.

A new Wesleyan chapel and Sunday-school, built to accommodate 200 worshippers and an equal number of scholars, at a cost of £1,400, were opened at Cawthorne on Thursday in last week.

The ruins of the *Cour des Comptes*, or Audit Office, on the Quai d'Orsay at Paris, are soon to be pulled down to make way for a more central terminus for the Orleans Railway.

Building Intelligence.

BRADFORD-ON-AVON.—New voluntary schools for girls and infants, erected near the old parish church, were opened by the Bishop of Salisbury on Wednesday week. The schools have been erected from the designs of Messrs. Adye and Adye, M.S.A., of Bradford-on-Avon, by Messrs. Hayward and Wooster, of Bath, at a total cost of £3,000. The buildings are of Bradford stone range work, with Winsley stone for dressings, and are roofed with Welsh blue and Sedan slates. The floors over the heating-chamber are fire and heat proof, and the remaining floors, with the exception of that in the lobbies, which is of cement, are of wooden blocks, to deaden the sound. The girls' school comprises one main room, 21ft. 6in. by 21ft. 6in., and 16ft. in height, and provides accommodation for 82 scholars. There are two classrooms—one 23ft. 6in. by 21ft. 6in., and 16ft. high, and capable of accommodating 50 scholars; and the other 22ft. by 15ft. 6in., and also 16ft. in height, in which provision has been made for 34 scholars. The infants' department consists of one main schoolroom, 37ft. 6in. by 21ft. 6in., and of the same height as the other portions of the building, in which 100 infants can be taught, and classroom 15ft. 6in. by 21ft. 6in., and again 16ft. high, in which accommodation has been provided for 41 children. There is also a babies' room, 21ft. 6in. by 21ft. 6in., and 16ft. high, and here 66 little ones can be educated. The sanitary appliances were supplied by Messrs. Adams and Co., and are automatically flushed. The buildings are supplied with gas, and heated by hot water.

HARROGATE.—The new baths at Harrogate are rapidly approaching completion. The building, which has cost £82,000, is being constructed from plans by Messrs. Baggallay and Bristowe, of London. It faces Montpelier-road, is Renaissance in style, and is faced with stone. It is placed in a hollow, and is therefore not seen to the best advantage; but it has a dome 100ft. high, and the two flanking towers each 85ft. high. The building consists of a central pump-room for the use of water-drinkers, a winter garden, suites of special and sulphur-baths, and dressing-rooms for ladies and gentlemen; a Turkish bath, and rooms for the inhalation of the waters, dry massage, and other treatments. In connection with the central hall are cooling, reading, and refreshment-rooms, besides the manager's offices. The winter garden is 220ft. by 42ft., is covered with a coloured glass roof, and ornamented with a fountain and flower-beds. The suites of special baths are on the north side of the building, and the Turkish bath and the other apartments, including the winter garden, are on the south. The baths and dressing-rooms will accommodate from 130 to 140 bathers at once, exclusive of water-drinkers and persons using the refreshment and recreation-rooms. The basement contains accommodation for the attendants, laundry, bottling machinery, pumps, boilers, and pipe subways. The walls of the Turkish hot-rooms are of variously-tinted glazed brickwork, with horseshoe arches to the doorways in similar material and colour. The plunge-bath in the Turkish department is 25ft. long by 7ft. broad, and is 4ft. 6in. deep. The dressing boxes are executed in pitch-pine; they provide accommodation for about 20 bathers, and the lavatory requirements, shampooing slabs, sponge-bowls, shelves, and screens, are all of Sicilian marble. The Crane and Wells baths, each holding 300 gallons of water, are specially formed of concrete, and lined with Wedgwood tiles, and the steps and curves are formed of white faience ware. The whole of the bath-room floors are laid with marble pavement. The floor of the large dressing-hall is laid with polished oak parquet; the exteriors of the dressing-boxes are in walnut wood. In all the bath-rooms there are radiators for warming the rooms.

HULL.—The Rev. Dr. Lacy, Bishop of Middlesbrough, opened and consecrated, at Hull, on Tuesday, a new Roman Catholic Church, dedicated to St. Wilfrid. The church has been designed and carried out under the superintendence of Messrs. Smith, Brodrick, and Lowther, architects, of Hull, and it consists of a nave 75ft. long by 22ft. wide, with north and south aisles, each 12ft. in width. The Boulevard front is built of thin red stock bricks, with stone dressings. In the front there are two main entrances, with long two-light tracery windows above each. The gable is coped with moulded

stone, and in the apex is a carved rood, with canopy. The angle buttresses terminate in turreted stono pinnacles. On the southern side of the main entrance is a bell turret. The church will seat over 500 people. The contract was let to Messrs. Colley and Levitt, builders, of Hull, at £2,895.

LANCASTER SCHOOL BOARD.—The second school built by the board was opened on Saturday last by the chairman. The school, when completed, will give accommodation for 1,000 children—300 infants in one department, and 700 boys and girls in a mixed school. The portion now erected comprises a large room, 60ft. by 24ft.; babies' room, 25ft. by 22ft.; and classroom, 25ft. by 22ft. These rooms are separated from the large room by glazed movable partitions. Good roomy cloakroom and entrances are provided, and the whole of the internal walls have a glazed brick dado 4ft. 6in. high, finished with a moulded ornamental string. The rest of the walls are finished in duresco. The external walls are built with the local stone in random courses, and pointed with cement, and freestone dressings. The roofs are covered with green Westwood slates, and the whole of the turners' work is of pitch pine. The whole has been carried out from the design, and under the superintendence of, Mr. Robert Walker, F.R.I.B.A., of Windermere and Lancaster, the architect to the board.

NEWCASTLE-ON-TYNE.—The new baths and washhouses erected in Gallowgate by the Newcastle Corporation were recently opened. The building has been erected from plans furnished by Mr. Gibson Kyle, of that city, selected in competition, a Late Tudor treatment being adopted. The frontage to Gallowgate is 78ft., and there is a frontage in Strawberry-lane of 213ft. Ruabon pressed red bricks and stone have been used for facings. The baths are entered from Gallowgate, the men's first-class bath hall being provided with eight fireclay baths and two shower-baths. The second-class hall has eight baths, and room is reserved for more if required. There are also women's first and second-class baths. In the washhouses, which are entered from Strawberry-lane, there are 36 compartments. The opening of the new edifice will be followed by the destruction of the old baths and washhouses at the corner of Newgate-street, as they are to be pulled down in order that Gallowgate at that part may be widened. Mr. C. W. King, of Newcastle, was the builder.

WEDNESBURY.—The new Science School in Holyhead-road was opened on the 12th inst. It is situate between the Post Office and the School Board offices, and thus, with the municipal building and the art gallery, five of the public buildings of the town are in a line. The materials used are red brick, with terracotta facings. The ground floor is occupied with the entrance vestibule; an exhibition-room, in which it is proposed to exhibit specimens of the manufactures of the town, and a metallurgical laboratory, with furnace-room attached, and having appended to it a balance-room, stores, lavatories, &c. The rapid fall in the direction of Albert-street at the back has been utilised for workshops, stores, and a second entrance, under the ground floor. Above the exhibition-room and metallurgical laboratory are placed the chemical laboratory, a lecture-hall, classroom, balance-room, stores, and a teachers' preparation classroom. Four of the windows are filled with stained glass. Two of these are in the exhibition-room—one representing a laboratory, and having the portraits of Lord Kelvin, Faraday, Davy, and Roger Bacon in medallions, and the other representing a blacksmith at work, and having in the margins portraits of Stephenson, Bessemer, Watt, and Siemens, in medallions corresponding with those in the other window. The two others are in the lecture-hall on the upper floor. One represents a working colliery (the Sandwell), and has in the margin designs emblematical of geography and astronomy. The other portrays the Willingsworth iron furnaces in the centre, with emblems of chemistry and mechanics in the top corners. The cost of the structure and furniture has been upwards of £2,000. Mr. C. W. D. Joynson, architect, Wednesbury and Darlaston, furnished the plans and superintended the work of erection, which was carried out by Mr. Thomas Tildesley, Willenhall.

The Dover Corporation have decided to indicate by marble tablets the sites upon which stood the ancient gates when Dover was a walled town.

Engineering Notes.

GLASGOW.—The bridge built to take the place of the old one over the Clyde between Glasgow and Rutherglen was recently opened for traffic. Messrs. Morrison and Mason, Limited, the contractors, commenced the removal of the old bridge in the beginning of 1893, and the memorial stone of the new structure was laid in June, 1895. Messrs. Crouch and Hogg were the designers of the bridge, which consists of three segmental arches, the centre one having a span of 100ft. The width between the parapets is 60ft., of which 36ft. is roadway and 12ft. on each side footpath. Granite, supplied from Aberdeen, Dalbeattie, and Cornwall, is the material of which the bridge is built; and the total estimated cost, including approaches and the removal of the old bridge, is £70,000, of which the county of Lanark contributes £12,000, Rutherglen £5,104, and Glasgow the remainder, £52,896. The old bridge was a narrow, steep-graded structure, erected in 1774-75, from designs by James Watt, of Birmingham.

CHIPS.

Memorial stones of a new Welsh Congregational chapel were laid at Llanrwst on Monday. The chapel will seat 400 persons, and is being built from plans by Mr. Hugh Owen, of Llandudno Junction, the contractor being Mr. D. E. Berth Jones, of Colwyn Bay.

At the annual meeting of the Malpam Infirmary, South Shields, held on Monday, plans and a report by Mr. Grieve were adopted for the addition of a wing to provide 48 extra beds for patients and accommodation for nurses, the estimated outlay being £6,000.

At Bilston, on Monday, Mr. Walter Hughes, who has been the sanitary inspector of that town for twenty years past, fell down dead in the High-street while speaking to a policeman. A verdict of death from natural causes was returned at the coroner's inquest held on the following day.

A memorial window, designed and executed by Messrs. Jones and Willis, and representing Dorcas engaged in "good works and alms-deeds," was unveiled on Sunday at St. James's parish church, Burnley.

The Marquis of Bute has promised to contribute £10,000 to the University of South Wales, to be applied for the purposes of technical education in Wales, the sum to be handed over to the authorities as soon as required. The Drapers' Company have also promised £10,000 towards the fund for providing new buildings, and the Government have promised £20,000 on condition that an equal amount is raised by public subscription.

The foundation-stone of a new school attached to the convent, the Old Palace, Mayfield, was laid on the 15th inst. by the Right Rev. Dr. Butt, Bishop of Southwark, who was assisted at the stone by Mr. Peter Paul Pugin, K.S.S. The school is designed to harmonise with its surroundings, and will accommodate over one hundred boarders. It will be connected with the old building by picturesque bridges. The architects are Messrs. Pugin and Pugin, of London. The cost of the building will be about £12,000. Messrs. S. H. and R. Roberts, of Islington, are the contractors.

The foundation-stone of the public baths for Kensal Town, adjoining the Chelsea Parochial Offices in the Kensal Town-road, was laid on Wednesday. There will be two swimming-baths, 83ft. by 30ft., and 60ft. by 25ft. respectively, and 51 private baths. The architects, whose design was selected in competition as far back as March, 1893, are Messrs. Harnor and Pinches. The cost of the undertaking will be about £26,000.

Mr. Balfour will lay the memorial-stone of the new cottage homes and schools which are being erected near Wilmslow by the Chorlton Guardians at a cost of £60,000, on Monday week, the 31st inst.

It was reported to the city council of Sheffield at their last meeting that the sanction of the Local Government Board had been given for the borrowing of £17,318 for the court-house extensions, £5,000 for the furnishing of the court-house, and £1,018 for construction of a courtyard and wall at the town hall.

The Lord Lieutenant of Ireland, on Saturday, conferred knighthood on Mr. Vickers, Ulster King-of-Arms. Sir Arthur Vickers was appointed to the office of Ulster King-of-Arms in 1893, on the death of Sir Bernard Burke. He is a cousin of the well-known Captain Hedley Vickers. He was recently elected President of the Ex Libris Society, and is also a Fellow of the Society of Antiquaries, and one of the hon. secretaries and original promoters of the Kildare Archaeological Society.

COMPETITIONS.

NORTHAMPTON.—In a limited competition the plans of Mr. Herbert Norman have been accepted for the building of the Rose and Punchbowl Hotel. The competition was open only to three members of the profession. The original Rose and Punchbowl has been purchased by the corporation to make improvements—*viz.*, the widening of Marefair.

CHIPS.

The cable tramway at Douglas, Ilse of Man, constructed by Messrs. Dick, Kerr, and Co., was opened for public traffic on Saturday. The line has been inspected by Mr. Jas. Walker, C.E., on behalf of the Manx Government.

New National schools for boys, adjoining the church of St. Paul, at Truro, were dedicated last week by the bishop of the diocese. The building, which has cost £2,000, has been erected by Mr. Colliver, of Truro, and will accommodate about 270 children. The designer was Mr. Douglas, architect to the Newcastle Diocesan Board of Education, and Mr. Jenkin, the Truro diocesan inspector, superintended the erection.

A stained-glass window has been placed in the south side of Harvington Church, near Evesham, as a memorial of the late Canon A. H. Winnington Ingram, rector of the parish 1845-87. The left-hand light represents the Good Shepherd bearing a lamb in His bosom, and the right-hand light the Raising of Jairus' Daughter by Jesus Christ. Above are angels bearing scrolls.

The early 17th-century church of St. Mary at Staveley, near Cartmel-in-Furness, is about to be restored from plans by Messrs. Austin and Paley, of Lancaster. The scheme includes the removal of the old-fashioned square pews and the substitution of modern seating accommodation, and the re-roofing of the edifice. It is intended to construct open roofs over the nave and over the side aisle, with an arcade between, and to replace the rubble pillars by oak ones. The cost of the work is estimated at about £1,000.

The employés of Messrs. Homan and Rodgers, of Gracechurch-street, E.C., went to Clacton-on-Sea, on Saturday, for their annual outing. Seven of the party had gone out for a row, and were returning to the pier, when, as they were changing seats, the boat capsized. The men were thrown into the water, but a yacht was close at hand, and rescued all the party. Two of the men, however—William Bridges, of Old Kent-road (married), and William Bettridge, of Crampton-street, Newington-butts—died soon afterwards. The other five men, after being taken to a hotel and provided with a change of clothing, returned to London in the evening.

A new auction mart and concert hall has just been built at Kirkley for Messrs. Titcombe and Fen, auctioneers, of Lowestoft. The front elevation to London-road is of red brickwork, relieved with white brickwork and terracotta. The hall is 47ft. by 39ft., has an open timber roof of pitchpine, and has at one end a stage 18ft. deep with circular front. Accommodation is provided for 500 people on area and in side staircase. The architect is Mr. Charles Crosier, M.S.A., of Lowestoft, the builder being Mr. John Ashby, of the same town.

Revised plans of the police section of the proposed municipal buildings for Coventry have been completed by the architect, Mr. H. Quick, and the quantities are being taken out preparatory to tenders being invited. They are less ambitious than the abandoned earlier designs, and the building throughout will be of a less ornate character than was at first intended. The front elevation will be of stone to harmonise with the older buildings, which will not be interfered with. The new police premises will be located at the Bailey-lane end of St. Mary's-street.

A project of great importance to the Thames has been formed by the Peninsular and Oriental Company. The directors have acquired an extensive frontage on the river, in the neighbourhood of Tilbury Docks, with the view of constructing their own wharves and warehouses, thus making themselves independent of dock committees, with their burdensome charges and constant disputes. In other words, they are to become their own dockmasters, and provide every accommodation on the river for their own fleet of vessels. This is an outcome of the new charges by the London Dock Co. for unloading in mid-stream which come into force on October 1st.

The cathedral of St. Vladimir and the monument erected in St. Petersburg to Nicholas I. will be dedicated towards the end of this month, amid great festivities.

A Roman Catholic church is about to be built in Arthurstone-terrace, Dundee, from plans by Mr. T. M. Cappon, of that town. Accommodation will be provided for 800 persons at an estimated cost of £8,000, including presbytery buildings.

TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. All communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondents.]

It is particularly requested that all drawings and all communications respecting illustrations or literary matter should be addressed to the EDITOR of the BUILDING NEWS, 332, Strand, W.C., and not to members of the staff by name. Delay is not unfrequently otherwise caused. All drawings and other communications are sent at contributors' risks, and the Editor will not undertake to pay for, or be liable for, unsought contributions.

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ADVERTISEMENT CHARGES.

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Advertisements for the current week must reach the office not later than 3 p.m. on Thursday. Front-page Advertisements and alterations in serial advertisements must reach the office by Tuesday morning to secure insertion.

SITUATIONS.

The charge for advertisements for "Situations Vacant" or "Situations Wanted" is ONE SHILLING FOR TWENTY-FOUR WORDS, and Sixpence for every eight words after. All Situation Advertisements must be prepaid.

NOTICE.

Bound copies of Vol. LXIX. are now ready, and should be ordered early (price Twelve Shillings each), as only a limited number are done up. A few bound volumes of Vols. XXXIX., XL., XLI., XLVI., XLIX., LI., LIII., LIV., LVIII., LIX., LX., LXI., LXII., LXIII., LXIV., LXV., LXVI., LXVII., LXVIII. may still be had, price Twelve Shillings; all the other bound volumes are out of print. Most of the back numbers of former volumes are, however, to be had singly. Subscribers requiring any back numbers to complete volume just ended should order at once, as many of them soon run out of print.

RECEIVED.—E. J. and B. C. Co.—G. G.—Legislator.—W. M. Fothergill.—C. E. J. (Durham).—F. H. and Co.

Correspondence.

BEHAVIOUR OF CAST IRON UNDER INTENSE HEAT.

To the Editor of the BUILDING NEWS.

SIR,—I have just made a short visit to Ilfracombe, for the purpose of observing the extent of the damage done by the great fire which occurred there on the night of July 29th, in which 35 business premises and houses were burnt completely out. One fact which interested me may be also of some interest to your readers. It is the remarkable freedom from injury presented by cast-iron columns after being subjected to the most intense heat during about four hours; and not only to heat, but to the chilling effects of water also. The shop-front of the premises in which the fire broke out was supported by ornamental cast-iron columns, ranging from about 4in. to 2½in. diameter, and wrought-iron girders of I section. Some of the columns had fallen and been broken by the debris; but I counted 14 still *in situ*, and uninjured. The light cast-iron cantilever brackets attached to these were also, with one or two exceptions, unbroken. Most of the wrought-iron girders had suffered severely. Many were bent, twisted, contorted into serpentine forms, testifying to the intensity of the white heat, which left so many of the cast-iron columns unharmed. The object lesson is worth remembering.—I am, &c., J. HORNER.

THE "BUILDER" ON THE WAR-PATH.

SIR,—I regret to notice that my kindly remarks upon the misprints (for which the *Builder* is now rapidly becoming famous), instead of having been taken in that spirit of Christian forbearance I expected, have caused the editor of that journal to

execute a most characteristic war-dance, heedless whether his tomahawk injures his friends or his foes. The printer's manager, the reader, and the luckless printer's devil all have their scalps taken to save the reputation of the editor, who, I maintain is, after all, the person ultimately responsible for the mistakes which occur in the journal he conducts.

A certain number of errors are unavoidable; but when they crop up week after week it looks as if someone was a trifle careless, to say the least of it. Since my last letter on the subject appeared in the BUILDING NEWS, the architect of the house No. 20, James-street, Buckingham Gate, is facetiously referred to in the *Builder* of Aug. 8, p. 116, as Mr. Reginald Blanford (*sic*).

With regard to the editor of the *Builder's* pleasant little gibes about me personally, I need hardly say that my observations as to the alterations in the size of the type of the leading articles and the reports referred to changes made quite recently, and certainly since I had the pleasure of sending any contributions to the *Builder*.

This is my last word on a matter which, after all, cannot be of much interest to anyone; but never again will I attempt the thankless task of correcting anyone's spelling, or telling an editor how he ought to run his paper.—I am, &c., J. ROMILLY ALLEN.

28, Great Ormond-street, W.C., Aug. 17.

COOL—TO SAY THE LEAST!

SIR,—The following appears in the columns of a contemporary:—

COMPETITION.—DRINKING FOUNTAIN FOR PEOPLE, CATTLE, AND DOGS.—Premium of ten guineas is offered for the best Design for a Drinking Fountain for the centre of a triangular open space, cost not to exceed £120. Designs to be sent under a motto, before August 31st, to Box 220, Office of —.

In response, I applied to the address given for further particulars, and received, in reply, the following (written in a female hand upon half a sheet of waste notepaper):—

1. Drinking fountain will be seen all round. 2. Designer left free as to material. 3. Centre of a triangular plot of ground where four streets meet, just below a cathedral. One tap for people, one trough for cattle and one for dogs, is all that is required. Diameter of base about 9ft.

Accepted design will be property of premium giver, and will not necessarily entail any further fees. Unaccepted ones returned to designer.

No name or letter of any kind accompanied this curt intimation. The communication bore the postmark of "Ripon, An. 12, '96."

Will anyone be foolish enough to respond to this cool, anonymous advertisement? If they do, they deserve the fate that is probably in store for them. Their chance of seeing the proffered ten guineas is *very* remote!—I am, &c., ONE IN THE COUNTRY.

The Shardlow Board of Guardians have decided to offer £2,000 for The Grove, with eleven acres of land thereto. This land adjoins the workhouse, and it is thought the Local Government Board will sanction the purchase. In that case it is estimated £3,600 would be required for an infirmary, £1,000 for drainage improvement, £500 for water supply, £1,000 for alterations, and £2,000 for tramps' wards. In all, with the £2,000 for the additional land, an outlay of £10,100 would be involved, as against the probable expenditure of £35,000 that would be necessitated in providing a new workhouse.

The foundation-stone of the new church of St. Peter at Bocking was recently laid by Mrs. Southcott, of Gordon House, who, continuing the interest taken in the movement by her late husband, purchased and presented the site adjoining the west corner of the Brintree and Bocking public gardens. Thus was secured the building of the church, for which the late Miss Frances Wakeham, of Marshalls, had left nearly £10,000.

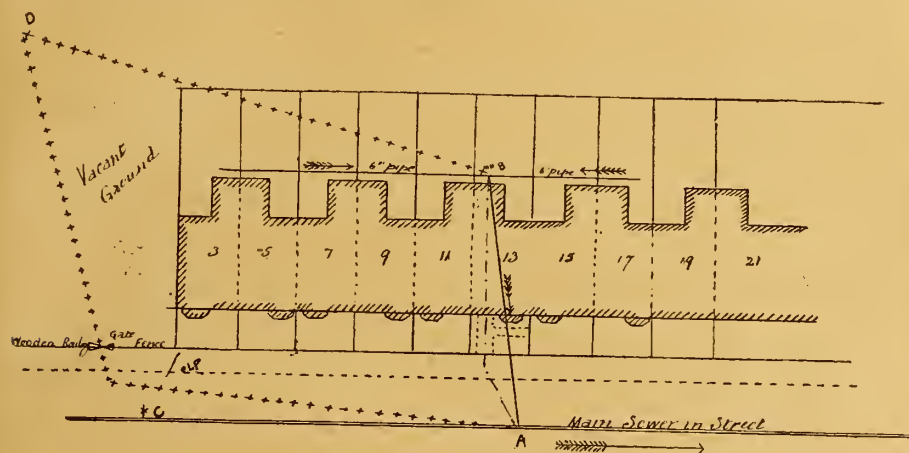
On Wednesday week the new porch of Chadwell Heath church, Essex, was dedicated by the Rural Dean of Chafford. The porch has been built in accordance with the designs of Mr. Fred Chancellor, of London and Chelmsford (diocesan architect), and is another step towards the completion of the church. Only the tower now remains to be built. The total cost (£130) was defrayed by Colonel T. H. Sale, who has been a magnificent contributor to the church. A vicarage-house is now being built, which will be finished by Easter.

A section of Govan ratepayers having protested against the proposal of the burgh commissioners to erect a town hall and police buildings, a plebiscite was taken on Friday, when, by a vote of two to one, the townspeople endorsed the scheme for the erection of the new buildings, which are estimated to cost from £9,000 to £12,000.

Intercommunication.

QUESTIONS.

[11540].—**Levels.**—I beg to place before your readers the accompanying sketch and questions as to the method and correctness of taking levels between the points A and B marked on sketch, also as to the re-checking of same. Briefly, the facts are as follows:—Between the points A and B the question of level or fall of drain is in dispute. Levels have been taken as follows:—On the first occasion, dumpy level was set up immediately opposite the entrance door of No. 13 (as shown in sketch thus *); levelling staff was thereupon placed upon sill of sewer at point A in main road, with junction of drain through No. 13. Reading taken at this point. Staffholder sent to rear of No. 13 at M.H., point B; staff reading taken from sill of sewer at said M.H., through glass window of back scullery; levels closed with this reading. My contention is that the manner in which the aforesaid levels were taken was irregular, incorrect, and contrary to the proper and recognised rules of levelling. Is my contention right or wrong? A re-checking by the same engineer took place, on my refusing to accept his levels as correct. On the second occasion, level was erected at point marked C; reading taken to sill of sewer at point marked A; change-sight reading taken at point marked D on vacant ground; level removed and erected at point E in garden ground at rear of No. 13. After reading of rear sight at point marked D, level of sill of sewer at M.H., point B, taken. From the point marked E the same procedure was adopted in a reverse manner to



point A. I am asked to accept the second readings as a rechecking of the first, and I refuse to do so for the following reasons:—1. No bench mark, either O.B.M. or fixed temporarily, was requisitioned as a basis to start and finish levels thereon. I contend that before levels can be accepted as correct, they must be started from, and checked back to, an Ordinance or other bench-mark? Am I right or wrong? 2. Can the readings taken from a level-staff through the glass of a window be accepted as correct? 3. Can the second set of readings, the line of which is shown on sketch thus + + +, be accepted as a rechecking of the readings taken firstly, and shown thus ----?—GEORGE R. JOHNSON.

[11541].—**Sound-Proof.**—In a house which has been lately built it was omitted to put any deafening under the upper floor, the ceiling below being of wood-lining. Would any reader kindly suggest to make the ceiling sound-proof without lifting the floor? Suggestions will greatly oblige.—DEAFENING.

[11542].—**Radiator.**—A radiator is required in a house already fitted with a hot-water service, the pipes of which are galvanised, to prevent rusting. The radiator must also be protected from rusting in some way; but all makers to whom application has been made say galvanised radiators are not kept in stock, but could be supplied at double the usual price. Can any reader give or suggest an alternative?—J. L.

[11543].—**Examination.**—If some reader who has passed the Municipal and County Engineer's Voluntary Exam. will answer the following queries inserted, in the "B.N." for July 10th, I shall feel greatly obliged:—1. What method of study would you recommend to qualify for the above exam.? 2. Is a coach necessary, and if so, would the expenses be very heavy?—STUDENT.

A stained-glass window was unveiled on Friday in St. Catharine's Church, Ventnor, as a memorial to Mr. Kenneth Sinclair Coghill, who was killed at Krugersdorp in January last in the unfortunate expedition under Dr. Jameson. The leading feature of the window is a representation of St. Andrew, the patron saint of Scotland.

The Local Government Board have given their sanction, subject to a satisfactory apportionment of the cost between the three parishes concerned, to an application from the rural district council of South Stoneham for sanction to borrow £37,000 for the execution of a scheme of sewerage and sewage disposal for the parishes of St. Mary Extra, Sholing, and Bitterne, in accordance with plans and a scheme prepared by Mr. Wentworth Shields, C.B. The rural district council has accordingly directed Mr. Shields to prepare estimates and invite tenders for the works.

Legal.

A COMPENSATION CASE.

THE question whether a railway company can take the part they need of certain property without being compelled to take the whole is one of much interest and importance. In a recent case arising out of the extension of the Manchester, Sheffield, and Lincolnshire Railway Company to London (*Times*, Aug. 5), the point was raised under their special Act of 1893, and its effect upon the Lands Clauses Act, 1845. The company wished to take a portion of some dye-works at Leicester, which included the land over which there was access from the highway to the factory. It was argued for the owner that if this was taken there would be no way into his works, and therefore the company must buy the whole. On the other hand, as the railway only wished to use this land for the purpose of building a viaduct, they stated that the owner could have a perpetual right of way granted to him through one of these arches, and so he would be able to use the rest of his premises as well as ever. The question was whether the

arbitrator could take this matter of granting a right of way into account in assessing the damages. A Divisional Court had held that he could not do so, because the company had no legal power to grant the easement of access as they proposed, from which the railway now appealed.

The Master of the Rolls said that the company's private Act had been passed for the very purpose of getting rid of the grievance under which the companies lay of having to take the whole of a house or factory if the owner so elected, although they only wanted a portion. Under this special Act it was provided that it was for the jury or the arbitrator to say, where part of a house was being taken, whether it was so taken as to cause a "material detriment" to the remainder. In this case the point was in regard to access to the high road. Of course if this were cut off the rest of the place would be useless; but if an equally good access under the railway arches could be afforded, then the arbitrator was prepared to hold there would be no material detriment. The Court of Appeal then held, upon the authorities and also upon section 68 of the Lands Clauses Act, 1845, that the company could legally give this easement and right of way, and that ought to be reckoned in the award, and so the company were successful.

FRED. WETHERFIELD, Solicitor.
1, Gresham Buildings, Guildhall, E.C.

NOTE.—All questions for reply in this column must be headed "BUILDING NEWS," and must reach my offices, as above, by *Tuesday* morning to insure answer same week.

PERPLEXED.—LEASE.—DRAINS.—LIABILITY.—Probably as between you and the lessee he is liable upon the covenant to do this work. But as regards the sanitary authorities both parties are responsible, so that they can, if they choose, make you do, or pay for, the work, and leave you to sue the lessee yourself.

At the Magistrates' Room, Pocklington, Mr. G. W. Wilcox, C.E., conducted a Local Government Board inquiry on Tuesday, relative to an application by the urban council for sanction to borrow £5,000 for the carrying out of a sewage disposal scheme, formulated by Mr. David Balfour.

LEGAL INTELLIGENCE.

LINE OF FRONTAGE CASE.—At the West London Police Court on the 11th inst., Mr. Wm. Bramley, livery stable keeper, South Kensington, appeared to a summons taken out by the Loudon County Council for having erected a structure beyond the general line of buildings in Clareville-grove, Kensington, without the consent of the Council. Mr. Thomas A. D. Chilvers, from the solicitor's department, supported the summons, and Mr. Rufus Isaacs, barrister, defended. In opening the case, Mr. Chilvers stated defendant was the lessee of No. 14, Clareville-grove, Kensington, and that he had converted the garden in front of the house into a yard and covered it in with an iron and glass roof, which he had brought out to the general line of buildings; in front of the roof and 2ft. beyond the general line of buildings defendant had an ornamental brick wall 20ft. long and 17ft. high, which he (Mr. Chilvers) contended was a structure within the meaning of section 22 of the London Building Act, 1894, and could not be erected without the consent of the Council, which they had declined to grant. Evidence in support of the opening statement was called, and the certificate defining the general line of buildings produced. For the defence, Mr. Rufus Isaacs stated that he did not dispute the facts, but he contended that the wall in question, which was erected by direction of the ground landlord to screen defendant's yard from the view of the occupiers of the opposite houses, was not a structure within the meaning of section 22 of the London Building Act, 1894, and as the matter was one of fact for the magistrate to decide, he asked him to dismiss the summons. The magistrate, Mr. Rose, in giving his decision, said, having regard to the judgments of the High Court in the case of "Ellis v. the Plumstead District Board" and "Lacy v. the London County Council," he could not agree with the contention of the learned counsel for the defence; but he was of opinion that the wall was a structure within the meaning of section 22 of the Act, and he fined the defendant 10s., and also ordered him to pay £1 3s. for costs.

CENTRAL RAILWAY CO. STATION FOR BAYSWATER.—The case of "Clark v. the Central London Railway" came on for the assessment of damages on Friday, at the London Sheriff's Court, Red Lion-square, before Mr. Under-Sheriff Burchell and a special jury. It was an action in which the plaintiff, Mr. Robert William Clarke, an ironmonger at Bayswater, sought to recover from the defendants the sum of £12,500 as compensation for the compulsory acquiring of his premises, situate at No. 1, Coburg-road, and No. 1, Queen's-road, Bayswater, for the purposes of a station in the construction of their new line from Shepherd's Bush to Liverpool-street. On the jury being sworn, a consultation between counsel ensued, with the result that it was agreed to enter a verdict for the claimant for £6,500.

LEEDS.—A few weeks ago arbitrations were held at the Town-hall, Leeds, in respect of property belonging to Mr. William Willey, in North-street, at the top of Trafalgar-street; property belonging to the Rev. C. J. Senior, in Park-lane, at the corner of Princess-street and Caroline-street; and Mr. J. E. Farnill's property at the corner of Grace-street, in Park-lane. The umpire in each case was Mr. Richard Horsfall, architect, of Halifax. In Mr. Willey's case Mr. Thomas Fenwick, C.E., of Leeds, was the arbitrator for the claimant, and Mr. J. M. Fawcett, surveyor, of Leeds, was the arbitrator for the corporation. The claimant's valuation was £4,935, and the corporation's £2,750. The umpire has awarded £3,765. For the Rev. C. J. Senior, Mr. Thomas Wiun, architect, of Leeds, was the arbitrator, and Mr. J. M. Fawcett, surveyor, of Leeds, for the corporation. The claimant's valuation was £3,944, and the corporation's £2,955. The umpire has awarded £3,485. In the third case, that of Mr. Farnill, Mr. Joseph Smith, surveyor, of Bradford, was arbitrator for the claimant, and Mr. J. M. Fawcett, surveyor, of Leeds, for the corporation. The claimant's valuation was £5,113, and the corporation's was £3,378 7s. 6d. to £3,539 5s. The umpire has awarded £4,685.

IN RE J. H. MOORE, OF BOURNEMOUTH.—The bankrupt, an architect and civil engineer, of Bournemouth, came up for public examination at the Poole Bankruptcy Court on Wednesday week. The statement of affairs, as filed by the debtor, showed gross liabilities amounting to £29,809 6s. 9d. The bulk of this is, however, covered by mortgages, &c., the amount estimated to rank for dividend being £5,038 0s. 11d. The assets are put down as of the net value of £3,589 3s. 4d., showing a deficiency of £1,448 17s. 7d. The Official Receiver said he did not appear to have any account from Messrs. Cox and Youngman, who were the petitioning creditors, and whose claim amounted to £4,827 1s. 1d. Debtor said he had been in practice as an architect and civil engineer for the last 30 years, the last 18 of which had been spent in Bournemouth. His average earnings in connection with his business for the last three years had been about £150 a year, not more; last year it was only £75. That represented his gross receipts—not his

profits. Besides that he had £100 a year as secretary to the Town Hall-avenue. That was all he had had. His expenditure in connection with his business during the last three years had exceeded his receipts. His household and personal expenses during that time had been from £500 to £600 a year, not including outgoings on property, interest on mortgages, or rent and office expenses. He was still occupying the premises in Christchurch-road, using part as offices and part as a lodging-house. The hearing was adjourned till October 21.

CLAIM AGAINST A NEWPORT ARCHITECT.—At Newport (Mon.) County Court, on Thursday in last week, before his Honour Judge Owen, Mr. W. Justin Hutchins, architect, brought a claim of £43 14s. 8d. against Mr. Bevan, formerly the keeper of a restaurant in Commercial-street, for goods supplied. The only item disputed was a sum of £1 3s. for certain blinds, and his Honour gave judgment for £42 11s. 8d. There was a counter-claim against Mr. Hutchins for £100 as damages. Plaintiff's case was that in June, 1895, Mr. Bevan thought of purchasing two houses in Caerau-road for £1,250. He consulted Mr. Hutchins, who advised him not to make the purchase, and said that he would erect him two better houses in Clytha-park for the same amount of money, or even less. Upon this an agreement was entered into by which two houses were to be erected in Clytha-park, and, although no price was mentioned, it was mutually agreed between them that the houses were not to cost a penny more than £1,200. Mr. Hutchins was to be paid 4 per cent. on £1,000. At Mr. Hutchins's suggestion, Mr. Bevan also agreed not to advertise in the usual way for tenders; but Mr. Hutchins promised to buy the materials at a cheaper rate than they could be obtained by tender. The net result had been that the houses, instead of costing £1,200, had already cost more than £1,600, and would cost another £100, and, instead of being built in a reasonable time, were not yet completed. Mr. Bevan now alleged that Mr. Hutchins was negligent in the estimate he had made, and negligent in the supervision of the buildings in allowing the houses to cost too much. He also alleged that from time to time Mr. Bevan certified to the contractors much more money than was due to them under the contract; hence his claim. Mr. Bevan gave evidence, and went into details. Among other things, he had had to pay a man £10 to put in certain ranges, work which was specified in the agreement. Then a painter contracted to paint the houses for £16; but he did not fulfil the contract, and it had cost him (witness) an extra £10 to have the work completed. Mr. Charles Miles, architect, gave evidence that certain work was badly done, and ought not to have been passed by the architect. In one case an outbuilding, 30ft. high, had not been tied to the house, and two boilers had no flues to them. He estimated that the defects would cost £25 to put right. Mr. Benjamin Lawrence, architect, corroborated, and said that in two places in the house one could see daylight through the walls. For the defence, Mr. Hutchins said that Mr. Bevan was cognisant of what was going on, and interfered with the arrangements. Plaintiff did not make any complaints until witness pressed him for payment of the accounts. With regard to the total cost, witness contended that the increase was due to extensive alterations upon the original plans; he called his wife, who said that Mr. Bevan told her he was satisfied with the buildings. His Honour said that the case was a very unfortunate thing both for Mr. Bevan, who was called upon to pay £500 more than he anticipated, and for Mr. Hutchins, who might suffer professionally. It was an architect's duty to protect the building owner, and he was, therefore, bound to give judgment for £75 14s. 11d., the costs in each case to follow the event.

A new iron bridge has been thrown across the Wye at Bridge Sollars, some half-a-dozen miles from Hereford. It is 188ft. in length between the abutments, the central span being 64ft. and the two side openings 61ft. across, and the width of roadway is 15ft. It has been built at a cost of £3,000 by Mr. John Preece, of Marden, the joint-engineers being Mr. Stephen Williams, of Radnor, and Mr. R. L. Bamford, of Hereford.

At Bootle Town Council, on Friday, Alderman Johnson, on behalf of the Free Library and Museum Committee, explained that the £15,000 voted for a new technical school would not provide the accommodation required, and the committee had written to the Science and Art Department for advice. As to the maintenance of the new school, it would probably be necessary to take the £400 now granted to the library and museum, and replace it by a 3d. museum rate, as was done in other towns. A suggestion was made that it might be advisable and economical, in order to provide additional accommodation for the municipal officials, to throw the existing library and museum premises into the town hall, and to build a new library and museum with a technical school in one block.

Our Office Table.

It is to be hoped the people of Islington will see their way to accept Mr. Passmore Edwards' offer of £10,000 to build three Free Libraries in their parish, which at present labours under the stigma of being the one great London parish inimical to the Free Library movement. We may be permitted, perhaps, to wish it also, because it will mean more work for architects, builders, and vendors and makers of building materials and appliances. It is worth remembering that the many thousands of pounds contributed by Mr. Passmore Edwards to philanthropic objects have been entirely spent among the building trades, and it probably rests with the readers and advertisers of this journal, by their combined and, if possible, extended support thereof, to increase future probabilities of the legitimately profitable consequences thereof to themselves.

Two new pictures have just been hung at the National Gallery, each being the work of an artist previously unrepresented in the collection. No. 1476, which hangs on a screen at the western end of Room VII., is a representation of "Jupiter and Semele" by Andrea Schiavone, better known as La Medula, a pupil of Titian and a well-known historical artist of the Venetian School (1522-82). It is a highly-stippled work, measuring 25in. in width by 9in. in height, and represents Jove clad in a purple robe descending in clouds to visit the future mother of Bacchus, who reclines on a couch in a tent of crimson velvet; the goddess, who is absolutely nude, rests on her left arm, her head coquettishly turned from the God of Thunder. To the left the background is occupied by mountainous scenery. No. 1477 is a brightly-painted landscape by J. W. Inchbold (1830-88), and is entitled "The Moorland: The Dewar Stone." It has been bequeathed to the Gallery by Sir John Russell Reynolds, Bart., the late physician to H.M. Household. It is 20in. high by 14in. wide, and hangs at the west corner of Room XX., almost opposite to Frith's ever-popular "Derby Day." Under a glorious sunset sky, up which horizontal lines of purple cloud are creeping, is seen from a considerable height a broad expanse of hillside and craig, the rocks of limestone and millstone grit, coated with vivid turf. Far away below a mountain brook forces its way over the loose stones and disappears to the right at the foot of a ravine, whose opposite bank is a steep scarp. To the left an immense boulder, poised near the slippery edge of the grass, gives the secondary name to the picture, and not from it a raven—poorly limned by the way—contributes the only feature of life to the scene. The picture is signed and dated in the right-hand corner.

ONE of the appendices to the annual report of the Science and Art Department gives an abstract of the total cost of objects purchased for the art collections of the South Kensington Museum up to the end of 1895. The aggregate sum is stated at £114,919. Of this the amount paid for woodwork, furniture, &c., is the largest, the total being £58,971; and among the other more costly outlays have been £37,512 for metal-work, £34,581 for enamels on metal, £34,243 for sculpture in marble, stone, &c., and £37,716 for textile fabrics and embroidery. Not far behind come the purchases of jewelry and goldsmiths' work, which are put down at £25,554 and £24,593 respectively. There has also been considerable expenditure for carvings in ivory, bone, tortoise-shell, and other materials. For porcelain a sum of £16,231 has been paid, but with the exception of paintings these are the only objects of which collections have been made at a greater expenditure than £10,000. The collection of oil paintings at South Kensington has cost £10,791; that of water-colour and other drawings £25,121. The aggregate value of the objects acquired last year is £13,613, of which £8,286, or considerably more than one-half of the whole, is for woodwork, furniture, &c.; the only other amounts above £1,000 were paintings £1,395, metal-work £1,305, and enamels on metal £1,265.

DURING the past week the excavations of the foundations of the west front of Peterborough Cathedral, under Mr. Irvine's superintendence, have revealed several further pieces of the huge circle in Alwanton marble which is now identified as the monastic fountain built by Abbot Lindsay and afterwards destroyed. About a third of the circle, containing an inner row of basins, can now be pieced together, and will be added to the collection of cathedral curios and curiosities, so large a

number of which have been brought to light during the internal operations of the past ten years, and which are now lodged in the triforium. Robert de Lindsay governed the monastery from 1214 to 1222, and raised the number of monks from 72 to 80. He made many improvements, according to Swapham, in the domestic buildings, "covered the Abbot's hall with lead next the cloister, erected lavatories, &c., of marble, and gave part of his vinery to enlarge the burial ground." One hundred years later the Norman cloisters (with their Norman works), including the marble lavatories and fountains, appear to have been replaced (and in some cases faced) with others nearly contemporary with the style of the west front.

THE hall at Shrewsbury, which is being specially built in the beautiful public gardens beside the Severn, known as the Quarry, for the Church Congress, is now completed, with the exception of the internal fittings, which will be proceeded with next week. The Congress-hall, which has been built from designs by Mr. A. E. Lloyd Oswell, architect, of Shrewsbury, will accommodate 2,500 persons, the central area being furnished with chairs, and the sides are raised as galleries and benched. Under the speakers' gallery are committee and reception rooms. The sectional meetings will be held in the music-hall, a short distance from the Congress-hall, and women's meetings in the working-men's hall. The Ecclesiastical and Educational Art Exhibition will be held in a large building now being specially constructed. It will be in the Quarry adjoining the Congress-hall, and both buildings will be lighted each evening by electricity. The loan collection is being organised under the auspices of the Shropshire Archaeological Society and the Powysland Club.

THE annual conference of the National Association of Master House Painters for England and Wales will be held in Birmingham on Tuesday, Wednesday, and Thursday, October 13, 14, and 15. The large room at the Municipal School of Art and the examination hall of the Municipal Technical School have been placed at the disposal of the association for the conference meetings. Papers will be read by Mr. E. Breakpear, president of the Birmingham House Painters' Association, Mr. Lewis Crosskey, director of the Glasgow Technical College, and others; while the lighter engagements of the conference include an excursion to Stratford and Warwick.

THE World's Fair (Chicago) medals are all of bronze. They measure 3in. in diameter, and weigh 6oz. 10dw. (troy weight), against 3in. diameter, 8oz. 10dw., the (troy) weight of the Centennial Exhibition medals of 1876 issued at Philadelphia. The one innovation in the new medal is that the names of the respective recipients occur in raised letters upon the face of the actual medal itself. In all former international medals the names have always been simply engraved—generally upon the edges. We have received photographs of the obverse and reverse sides of the Chicago medal, which is certainly by no manner of means a good example of numismatic art, from Messrs. Harry Hems and Sons, of Exeter. The stately attitude of Columbus himself on the obverse face—who appears to be throwing himself in despair from a rock into the sea—is ludicrous in the extreme. Messrs. Hems and Sons were also awarded the Philadelphia medal exactly twenty years ago, and it is worthy of record that both the grandfathers of the senior member of this family of well-known art-workers received medals at the Great Exhibition at Hyde Park in 1851.

THE Boston and Albany, the Boston and Providence, the Old Colony and the New England Railroads are about to follow the lead of the Northern lines, and, under an Act passed by the last legislature, build a new union passenger station on the south side of Boston. The new station will front on the extension of Summer-street, Federal-street, the main lines of communication between Boston and South Boston being closed. The preliminary plans for the station are as follows:—The façade on Summer-street will be four stories in height for a portion of the width, and there will be a tower 120ft. high. The general waiting-room will be 300ft. long, 76ft. wide, and 30ft. high. The train shed will be 825ft. long, 610ft. wide, and will contain 33 tracks. The station and terminal will cover about 23 acres. The estimated cost of the undertaking is about one and a quarter millions sterling.

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DISCREPANCIES.

THE most rigid observance of rules will often fail in their purpose—a truism which is found in many occupations and duties of life. Of all men the artist knows this the best. He repeatedly discovers that his laboured and neatly-executed work is often ineffective and disappointing. The accurately drawn elevation, in which the canons of correct art have been most zealously cared for, turns out a failure—there is something feeble or cold in it; while a rough sketch drawn on the spur of the moment has given pleasure. The lesson is forcibly brought home to the architect when he has trusted too much to the literal rendering of his drawings and specifications, and he soon begins to find out that if he wishes to avoid the pitfalls which so often beset his path, he must devote a larger portion of his time to the supervision of his buildings. Who does not know of those irritating discrepancies between plans and specifications? The arbitrary distinction that exists between the present division of professional duties and the delegation of them to separate individuals has much to answer for in the constant friction that takes place in the execution of contract works. Properly, there is no distinction. The agencies of designing, writing specifications, and overlooking works ought to flow smoothly from one to the other. They should run, so to say, in parallel lines, and the two first at least should be taken up simultaneously, instead of made distinct duties as they are now, performed sometimes by different persons. Many an architect thinks that after the design and drawings are completed, the specification can be left to a managing clerk, or to the surveyor, while it is the clerk of works' duty to relieve him of all superintendence.

Drawings, specifications, and superintendence comprise the three instrumental agencies by which the architect's intentions are carried into effect. Experience has proved that the omission of any one of these three is detrimental; it is, therefore, well that the profession should guard jealously any interference with a procedure which has so long been regarded with respect. At different times attempts have been made to dispense with one or two of these requirements, but the result has generally proved disastrous for the building. We all know, for instance, how many "peuny - wise - and - pound - foolish" people have ventured to build their houses from drawings—perhaps only a plan and elevation, without any specification of materials and workmanship, and without any professional supervision. Our experience of such buildings is anything but encouraging. While a crude approximation to the plan and elevation is attained, the materials are thrown together, the bricks and brickwork are inferior or scamped, the timber is unseasoned and of poor quality, the scantlings are inadequate, and there is a general want of skilful construction and of method in the work. As far as the elevation goes, there is just a faint likeness discernible in the executed building. All projecting features are kept flat; what was intended for a brick or stone cornice is executed in a meagre builder's style—a few dentil bricks or fascia board on which a common half-round gutter is screwed; any dressings to the windows in brick or stone are dwindled down to slight projections; if there are mullioned windows, the mullions are made in the frame of wood, and there is a general poverty and

meagreness in the details of doorway, and of all mouldings and decorative features. Just the difference, indeed, between a builder's perfunctory rendering and the architect's care in making working details for each of these features, and in seeing that they have been carried into effect. The "building per drawing" is always an imperfect realisation, because it lacks the thought and personal care of the designer, which are only secured by his specification and superintendence. These, as it were, fill up the outline—the gaps between conception and realisation. Or, again, sometimes we hear of a building being carried out to a specification. The design is simply a copy—it may be a house in a row; but then the owner has at least the satisfaction of knowing that his bricks and mortar will not blow to pieces or perish at the first frost, that his windows and doors will be made to fit their frames and exclude rain and wind, that his floors are sound and his roof weathertight. But it may be all this, and yet there is something wanting. The best of everything from stone and timber down to ironmongery may be included; the structure may be a storehouse of the latest inventions and fittings, but it may be an instrument out of tune. There is a broken harmony, a lack of union between the parts; the details come together awkwardly: we perceive that a directing mind has been absent, and that the building is a fortuitous jumble of trades. One feature looks heavy, another meagre; mouldings and details of different styles have been mixed up; there is a jarring discord between the door and window "trimmings"; the wall-papers shock one's sense of colour-harmony and gradation, and it is plain that the "specification-ideal" is quite as far from success as the "drawing-ideal" was.

We have lastly to consider the building erected under superintendence. As in the last case, we may imagine it a replica, but that the specification is wanting—by no means an uncommon circumstance. The architect or builder who has a number of houses in a street to build often adopts this course; he does not require plans nor a specification, he has these at his fingers' ends—or let us imagine an architect is engaged to carry out his own design. He checks the materials as they are brought on the site, he fixes the dimensions and scantlings, and personally looks after the construction of every part; he takes a particular interest in the work as it proceeds. If any discrepancy arises, he is there to alter or modify this or that, to avail himself of every improvement that suggests itself to him, or which his client suggests—to smooth over any contradiction between one thing and another. We do not say the ordinary architect's superintendence amounts to this—it often falls short of it; but nothing less than this is expected. The personal supervision of the architect may, indeed, supersede both the other requirements. He can design as he proceeds, modify this or that detail, determine the proportions of his work, and see that the right material is used. More than this;—superintendence is the personal factor, and the only one of the three which seems to come near to the old master-builders' conception. It is the only one which enables the designer to be in touch with the work itself. Drawings and specifications can, perchance, be prepared by anyone. They are the work of draughtsmen and surveyors outside the actual operations of the builder. But design and superintendence are affiliated duties, and cannot well be separated. It is advocated by many quantity surveyors that they are the proper individuals to write the specification; others go so far as to think that the architect's proper function is to prepare the design, leaving the practical details of the work in the hands of the surveyor—a principle which would entirely sever the architect from the building, and one which the profession could never think

of seriously following. The true integrity of the architect's work is, as we have seen, in combining all three, in showing himself a designer as well as a carrier out of his ideas. The splitting up of the profession into two ranks, the designer and surveyor, has unquestionably favoured the specific performance of each of these divisions. Out of it has arisen a feeling of independence, if not of hostility. The set of drawings which the architect makes to please his client are prepared without the slightest reference to cost or the quantity surveyor. How many cubic feet of stone this column or that cornice will take, or what the extra cost will be of introducing pilasters or stone dressings, are questions which never trouble the architect who is designing a competition elevation, or is about to captivate his client. These things may be "cut down" or omitted afterwards; but not till the contractor has been asked to submit a tender. So that what the builder contracts for and what has been designed and passed are very different buildings or versions: the one is the architect's, the other the contractor's. Sometimes the drawings are modified and made to agree with the quantities, but not always. The surveyor makes his own reductions, prunes this feature and the other down, substitutes brick for stone, zinc for lead, inferior for the best timber; puts down a lower prime cost for fittings, and no one is any the wiser for the alteration. It is what can be erected at a given cost, not the architect's design, that is carried into execution. They are separate things: one is paid for as art, the other is a bargain for doing so much work.

The discrepancies which arise from this division of duties are well known to most practitioners. We have those, for instance, which crop up between the drawings and specification. The first hitch is likely to occur about the foundations: the drawings and specification show one depth, the actual requirements call for another. By making, for instance, the specification statement an echo of the sections a difficulty is likely to arise. We see, for instance, a clause to the effect that the soil is to be excavated to the levels shown on the sections; but perhaps one portion of the site is soft ground and requires a greater depth, and an extra is the result. It would be safer to insert a clause providing a sum for trial borings at parts of the site as the architect may direct, for then the architect would have a freer hand in ordering extra depth. A usual clause is: "Do all the excavation shown or implied in the drawings for cellars and trenches, &c., required in obtaining a good foundation, &c."—no doubt, a better form than fixing a certain depth or area. The word "implied" is a good one to use, though it may often be taken to mean the same as that of "shown," and it would save much disagreement if the clause ran: "Do all the excavation shown and implied for cellars and trenches; those figured or shown in the plans and sections are not necessarily to be taken as being the right ones." In other words, the specification would be better if it supplied something that the drawings did not give, and be explanatory rather than definitive in cases like these. The ordinary specification errs either in merely repeating what the drawings show, or in making definite statements which are discovered to be wrong. It would be easy to mention many instances where general terms are preferable to exact provisions. In the same trade of Excavator, the digging of sand and gravel from the site may be left to the option of the architect, who is to decide whether such may be used or not in the contract work; or, again, it is safer to specify that the drains are to be laid at depths and at falls at the architect's discretion according to the plans, than that their depths and gradients should be fixed. Exact statements are necessary in other cases, as in the description of concrete, its aggregate and mixing, the

cement to be used, which things may be specifically stated without any risk of being altered by circumstances; and the same exact statements can be made of the brick, stone, and timber, and other materials. While, therefore, it appears necessary for an architect to be precise and exact in specifying the materials and fixtures in relation to the workmanship or methods to be adopted, it seems desirable to specify what has to be done in general terms and rather supplement the information given in the drawings than repeat it. Discrepancies arise also by contradictory statements. A drawing may show a thickness of wall or size of timber that does not agree with the specification. Thus a stone pier may be shown to rest on an ordinary brick footing; but the specification may provide that it rest on 6in. tooled York landings of a certain size with brick-in-cement pier below, with double courses, or a mass of concrete of certain dimensions. Which is the builder to follow? Of course, he prefers to take the simpler plan shown on the section. In stonework and joiner's work divergences often occur, and in these doubts the architect is compelled to resort to the clause in the Conditions of Contract, which provides that he is to decide which is to be followed in case of any discrepancy between the drawings and specification, and that the "true intent and meaning" of both taken together is to be followed. Practically these differences are arranged, or they are submitted to arbitration under the usual clause. It is in adjusting and smoothing over these differences that efficient superintendence is so desirable, as it enables the architect to accomplish so much by a mutual understanding, and the application of the "give-and-take" principle. It is in trying to enforce the letter of the drawings or of the specification that disputes so often arise. Periodical inspection enables the practitioner to see what is absolutely the actual want, and how it can be carried out with the least expenditure of labour; it enables him to read the specification on the light of the actual building;—here to mitigate the vigour of a clause, there to modify the written description, and to obtain by the easiest means the required result. Superintendence is the best interpreter of the architect's drawings and specification, which, to some extent, must always be tentative and speculative in their character. If the architect really knows what he wants, he can on the works decide at once, for the most implicit following of every drawing or specification clause will sometimes fall short of the intention he has conceived in his mind, and which only his personal inspection can properly realise.

OUR GROWING SUBURBS.

ONLY a few years ago it was possible to distinguish the invasions of the speculator-builder by the number of private estates which were dotted over the landscape. Between them were acres of woodland or meadow or old residences of a past generation with their acres of land. But this partial invasion of the landscape may no longer be seen; the building estates have coalesced or joined, and what before was a varied mixture of old and new have now become a mass of dwellings. Even the hilly slopes of the "Northern Heights," and the hills stretching from Brixton to the Sydenham ridge are more or less covered, as if those natural barriers were unable any longer to arrest the tide of human habitation. Every suburb, in fact, is being "spoiled" by the hand of the jerry-builder and the greed of landowners. Instead of swelling hills and green pastures, we see serrated lines of house-tops or slated roofs.

This vast waste of bricks and mortar grows without any visible manifestation of the architect. It is true architectural "properties," like the bay-window, gable, "half-

timber," "ingle-nooks," are to be found, often plagiarised and introduced without any motive; but the great majority are of the ordinary builder's type, and are produced with little variation. Multiplication of the same pattern is to the builder of suburban houses what it is to the manufacturer. They can be built cheaper and quicker if the same plans and templates, window-frames and sashes, the same stone dressings, the same fastenings and ironmongery are used, than if each of these things undergoes modification to suit individual taste. We have evidences of this multiplication of parts in the details and elevations of the houses. Take the brickwork: one template is worked to in the setting out of all the bay-windows or porches; the doorways and window openings are spaced alike in all. The builder knows exactly the width and number of bricks and closers required for each pier; he can tell the number of bricks required for each house; he can order ornamental stringcourses and cornices wholesale, as he can his iron guttering and his railing. For the stone dressings the same amount of labour and materials can be used in each; the stone shafts which adorn the front entrance, the moulded bases, window mullions, are turned out in duplicate. Thus the same stone shaft, sawn in halves down the centre, does for each side of the entrance. The cornices and stone sills are turned out by the hundreds of feet super., and can be sawn, worked, and cut to the required lengths with accuracy. The carpenter and joiners' work can be machine-made with even greater rapidity. The joists and rafters, cut to the same scantlings, are capable of being numbered to each room, while the joinery of each house is repeated with undeviating monotony. All this multiplication of the same details and fittings enables a considerable reduction to be made in the cost of erecting a few hundreds of houses. No one doubts this. On the other hand, the same number of men and women of diverse tastes and habits are compelled to dwell in them. Many hundreds, nay thousands, of individuals of different habits and requirements are forced into the same number of houses erected on the same plan, and with the same accessories. Here the great evil is felt. We have one man who has a large family compelled to dwell in a house with only two or three decent bedrooms, having a small sitting-room; another family of only two or three obliged to take a house in which there are a number of good-sized bedrooms. One tenant likes a cosy set of apartments retired from the street and the inquisitive eyes of every tradesman's boy; but he has to be contented to live in a house having a number of windows facing the entrance; another likes dark apartments, but has to dwell in rooms of excessive light. Then the same narrow and contracted entrance and hall have to serve for a variety of persons of different degrees of corpulency and habits. These and other inconsistencies are the result of the Procrustean rule of building in vogue in our towns, and continue unchecked through legislative inaction. They will continue in operation as long as people are contented to sink their individuality in the matter of house-building, or so long as they are forced to put up with accommodation provided for them by the speculative builder. No doubt a certain amount of uniformity is necessary in our suburban roads; but there is no absolute reason why precisely the same plan should be followed throughout. Great benefit would accrue if builders varied the accommodation, the size of the rooms, and other fittings, while some variety of elevation would be the result. But, as we have said, profit is the only consideration, and the public must put up with what they cannot avoid, or will not go out of their way to alter. It is this unaccountable indifference to their interests, and apathy for their own advantages that has made the

"jerry" so successful. The public will not take the trouble to inquire or think for themselves in these matters. It is enough that someone caters for them, and if one is satisfied the others follow. Our suburban estates reflect the "jerry" guidance in architecture, the one mint for many, and there is little hope of improvement till the average householder looks at a dwelling in a rather different sense than he does now. Estate promoters and building syndicates are still in this initial stage, and they do not seem to get beyond the "jerry"-builder's view. One large building speculation of this kind in the south of London have built some hundreds of middle-class dwellings on what was once a very beautifully-wooded estate facing the Streatham main road. Having ruthlessly cut down all the trees, they formed two or three roads at extremely narrow intervals through the ground, and erected a number of well-built red-brick houses. These are small and contracted in the rooms and passages. The frontage towards the main thoroughfare facing and adjoining residential houses of a superior kind, has been utilised for shops, with three or four stories above, which undoubtedly detract from the scheme, and must be prejudicial to the neighbourhood.

To mix up middle-class dwellings with workmen's blocks is another experiment of doubtful expediency, though it has been attempted in several localities, with the idea that they will attract the working classes. But the system of flat dwellings in the suburbs has been doomed to failure. The working classes do not care for them. If they migrate to the suburbs, they expect to obtain cottages at a reasonable rental. We find this to be the case in South Lancashire. New workmen's dwellings have been lately contemplated at Miles Platting, and plans have been sanctioned by the Local Government Board. Out of two alternatives, the cottage dwelling and the high tenement block system, the corporation have chosen the former, as they find that the Lancashire working man prefers the cottage to the flat tenement. The corporation buildings in Ancoats, though a great improvement on the insanitary hovels they replaced, are, it is said, unpopular, and are called the "barracks" by the tenants themselves. However well constructed, the tenement block has not been appreciated—one main reason being the want of an independent street entrance, and the separate playground. Sentiment also has something to do with the dislike to the huge block. Every family is merely a fraction of a great whole, and is under a kind of control which is uncongenial to the working man's independence of action. When the ground value of land is not prohibitive, there is a stronger reason why the working classes should prefer the separate dwelling. Notwithstanding these obvious causes of failure, the suburban builder and promoter still repeat their mistakes, to the irretrievable injury of every suburb.

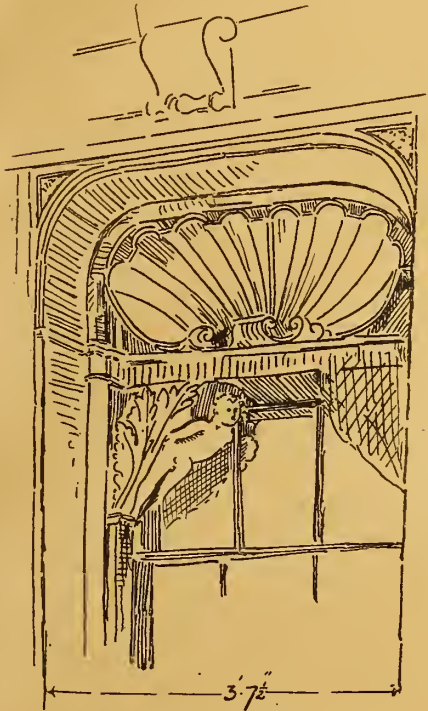
SOME MINOR EXAMPLES OF THE FRENCH RENAISSANCE.*—VI.

By G. A. T. MIDDLETON.

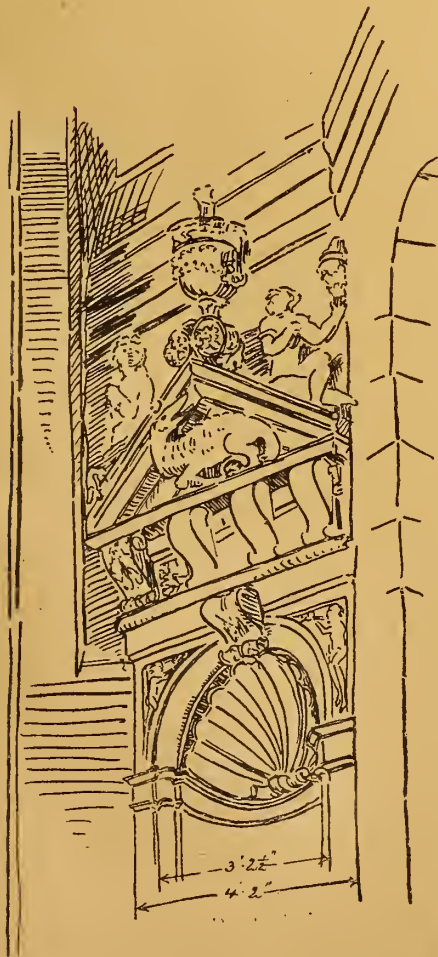
THE CHATEAU AT VILLERS-COTTERETS.

AT one time this would not have been considered a minor, but a great, example of the French Renaissance, for Villers-Cotterets was the favourite hunting seat of François I., and was almost more lavish in its ornamentation than most of the buildings even of his time. It fell upon evil days, however, during the English occupation which followed the battle of Waterloo, and now there remain but two staircases, the throne-room, and a small portion of the façade to attest its former glory. These, however, are taken great care of, and the throne-room has recently been well restored.

The wealth of detail everywhere can be but suggested in the accompanying drawings, for refinements which go far to create the impression of extreme beauty are only to be discovered on close examination, consisting, as they do, in slight differences such as those between the ogee



Windows in Throne Room, Chateau Villers-Cotterets.



Niche over Entrance, Chateau Villers-Cotterets.

mouldings in the upper part of section A and the lower part of section B, which, to the small scale of the general drawing of end of throne-room, look to be alike and continuous. The con-

siderable employment of slightly projecting facets in the mouldings is also noticeable, as is the fact that the Doric columns are fluted as if they were

in every case; while its employment in the window-head is exceptional both as to position and form, as also is the introduction of the cupids within and without the glass.

The Salamander, the symbol of François I., is, of course, found carved everywhere, as in all the royal buildings of his reign, and an example is shown in the tympanum over the niche.

ADAPTABLE SPECIFICATIONS.—VI.*

MASONRY: FACTS AND MEMORANDA (continued).

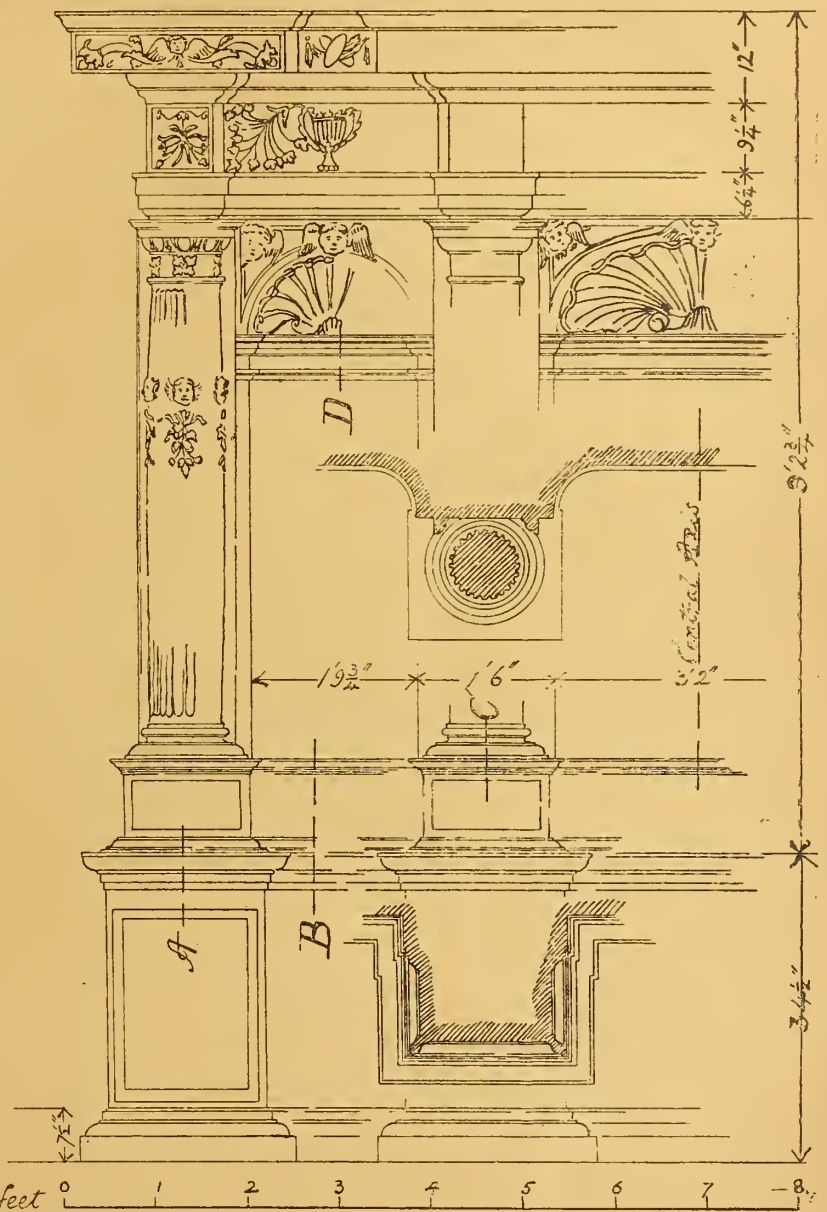
COLOURS OF STONE—1. *White*.—Portland stone, Caen stone, Tredington stone (Worcestershire). This last is a beautiful compact white lias, excellent for carving and delicate detail, and said to be durable when exposed, at least, in its own locality.

2. *Cream Colour*.—Bath stone (from all the quarries), Ancaster stone, Denwick (sandstone), from quarries near Alnwick, Northumberland. This has a faint greenish shade in it.

3. *Rich Cream Colour*.—Mansfield Woodhouse: a beautiful and permanent magnesian limestone, suitable for carving, which in the Chapter House at Southwell has stood well for about 600 years, with an unusual amount of undercutting. Ketton stone, Rutland, is of a rather darker shade. Casterton oolite (near Stamford) is also darker. Painswick (Gloucestershire) and Weldon (Northamptonshire) are both good oolitic limestones, of a warm cream colour.

4. *Yellow or Orange*.—Ham Hill (limestone) has a soft rich orange-brown tint, with brighter markings in it. Bourton-on-the-Hill stone

* All rights reserved.



LOWER PORTION, END OF THRONE ROOM, CHATEAU VILLERS-COTTERETS.



Mouldings, End of Throne Room, Chateau Villers-Cotterets.

Ionic, with twenty-four flutes, having fillets between.

The shell ornament is seen in each of the subjects illustrated herewith, and is beautiful in

(Gloucestershire) is a softly-toned yellow-brown oolite. Campden Hill (Gloucestershire) deep yellow ochre-coloured oolite.

5. *Brown*.—Brown Ancaster (oolite) is of a reddish brown, a good weather stone, and will take a polish. Doultling (oolite) is of a light brown. Darley Dale (sandstone) is light brown, with sometimes a faint tinge of green in it. Tisbury (near Salisbury) is a greenish and yellowish limestone, with shades of brown. Whitby is a light-brown sandstone, so are the Prouddham and Kenton stones (both in Northumberland). Hopton Wood (Derbyshire) is a warm brownish grey, and is often polished.

6. *Bluish*.—Blue Forest of Dean is a good compact limestone, of rather bright blue-grey, but with occasional drab or brownish patches in it. Blue Robin Hood is a blue-grey sandstone, shading into brown. Wilmcote lias (Warwickshire) is of a pleasant bluish colour, and fine-grained, chiefly used for steps, but suitable for columns, &c. Masons who are not used to it complain that it "plucks"—that is, small pieces fly out of the bed when it is being worked to a plain face. Hanham (near Bristol) is a bluish-grey sandstone. Purbeck (near Swanage) is of a dark bluish or greenish-grey, often polished. Pennant is a fine bluish sandstone. Horton (near Banbury) is a very noticeable parti-coloured stone, buff and blue mixed in veins and patches.

7. *Red and Purple*.—Red Mansfield: a magnesian limestone of pinkish-red colour, which fades to some extent when used externally. Corsehill red sandstone, of a full red colour, apparently permanent in London. Dumfries red sandstones, light and dark red, said to be durable and to keep their colour. Aspatria (Cumberland) is a good red sandstone. Codsall (near Wolverhampton) is a dark red sandstone, suitable for internal work. Idle (near Bradford) furnishes, at Messrs. Vint's quarries, a deep red, fine-grained, and compact sandstone. Grinshill (Shropshire) is a heavy brownish-red sandstone. Penkridge (Staffordshire), a pleasant light red, mottled with grey. Hazelstine (Stafford) is a dull purplish-red sandstone. Hartshill, of a full red colour, used by Mr. G. E. Street at the church of SS. Philip and James, Oxford.

WEIGHT OF VARIOUS STONES PER CUBE FOOT.—Ancaster, 139lb.; Bath, 140lb.; Bolsover or Church Anston, 151½lb.; Tisbury, 111lb.; Doultling, 140lb.; Ham Hill, 142lb.; Hopton Wood, 158lb.; Ketton, 128lb.; Portland, 135lb.; Weldon, 140lb.; Casterton, 149lb.; Darley Dale, 148lb.; Denwick, 160lb.; Hollington, 149lb.; White Mansfield, 149½lb.; Red Mansfield, 148½lb.; Whitby, 127lb.; Welsh slate, 175 to 185lb.; chalk (solid), 125lb.; Portland cement concrete, 132lb.; marble (average), 170lb.; Aberdeen granite, 166lb.; Cornish granite, 166lb.; Guernsey granite, 185lb.; Kentish ragstone, 166lb.; Caen stone, 125lb. Some authorities give the weight of Combe Down Bath stone as 116lb., and Box stone as 123lb. Others, again, put White Mansfield at 140lb., and Red Mansfield at 143lb. Different beds in the same quarry often vary as to weight, and the damper or drier state of the specimens weighed, too, may account for some of the discrepancies between published results.

PART V.—WALLING AND MASONRY.

V. 1. *MORTAR*.—Except where otherwise described, the mortar is to be composed of three parts of clean, sharp sand, free from loam, dirt, salt, and all other impurity, thoroughly mixed with one part of [ground Dorking stone lime], and used on the day on which it is made.

V. 2. *BEDDING AND GROUTING TO RUBBLE*.—All the rubble stone, where not already damp, is to be well sprinkled with water all over before being laid. It is to be thoroughly well bonded together and equally well bonded to the facing and the backing, where there are any. It is to have its cavities carefully filled with mortar and stone splinters, and to be brought to a level about every foot in height, and then well grouted with mortar thinned down with water till it is just capable of flowing freely when poured.

V. 3. *LAYING STONE ON ITS NATURAL BED*.—All stone of whatever kind [except granite, elvan, and trap rock] is to be laid on its natural quarry bed, and any not so laid will have to be cut out and made good with new stone at whatever stage in the execution of the contract it may be discovered.

V. 4. *MASONRY BEDS TO BE TRULY PLANE*.—All beds in masonry and ashlar, and, in particular, the beds of piers, columns, and shafts, are to be

very carefully and truly worked to a true plane, and on no account hollowed.

V. 5. *SETTING OF PIER-STONES*.—These are to be very carefully and truly set on an even bed of fine mortar ½in. thick. After the chief weight has come on the piers, and before the mortar has set very hard, these joints are to be neatly raked out ½in. back from the pier [and so left] [and pointed with a flat joint in putty].

V. 6. *WORKING MASONRY AT THE BUILDING*.—The whole of the masonry is to be worked at the building, and when finished, if not immediately set, is to be so stored as to give the architect all practicable facilities for examining it. None of it, unless specially directed by the architect, is to be daubed over with mortar before he has seen and approved it, or treated in any other way which may conceal the bed of the stone and possible defects in it.

V. 7. *DEFECTS AND BREAKAGES IN THE STONE*, when they occur, are not to be concealed from the architect by being stopped with shellac, stone-dust, and other compositions. If defective or broken stones cannot be re-worked so as to get rid of the defect without reducing the stone below a size approved by the architect, they must be removed from the works or from the building if laid, at whatever period the defect be discovered, unless the architect permits their retention.

V. 8. *RUBBLE WALLS*.—The rubble is to be laid in fairly horizontal courses, which may vary in depth, and which may step slightly up or down, as the size of the headers and other stones makes it convenient. All the walling is to be thoroughly flushed up with mortar and grouted, as before described. There are to be at least four through-stones [going through the whole thickness of the wall] [2ft. long, or as much less as the thickness of the wall allows] in every superficial yard of the facing. The rubble walling is to be finished outside with a very neat struck joint, weathered, in the same mortar which the wall is built with, and executed as the work proceeds, unless from imminent danger of frost some portions may have to be left for a time. These must afterwards be well raked out and pointed in the same way.

V. 9. *RUBBLE WALLS WITH BRICK LINING*.—The rubble and brickwork are to be carried up evenly together, and thoroughly well bonded to each other and grouted every foot in height; but the bonders of rubble stone must not go within 4½in. of the internal face of the brickwork.

V. 10. *RANDOM HAMMER-DRESSED WALLING*.—The walls are to be of walling stone of good quality, free from soft spots, iron spots, and clay beds, and of colour approved by the architect. It is to be from quarry at, or from other quarries which the architect, on application being made to him by the contractor, shall approve. The stones are to be roughly squared, and are to be hammer-dressed on the face and to be laid in random courses [the work being similar on the face to the average of the walling of the front of at]. The walling is to be thoroughly flushed up with mortar and well grouted every foot in height, and is to have four bonders at least 2ft. long, where the thickness of the wall allows of it, in every superficial yard. The walling is to be pointed outside as it proceeds with a very neat projecting V-joint in mortar. The quoins are to be of the same stone as the walls. They are to be of varying heights to suit the rubble courses; but are not to be more than 12in. high, and are to bond in and out, the stretchers projecting at least 4in. more than the headers.

V. 11. *PARPOINT FACING WITH BRICK LINING*.—The walls coloured [brown on elevations] are to be faced with Yorkshire parpoint of best quality from the quarries at [Durdurford Bridge], or from other quarries approved by the architect. The parpoint is to be free from loam layers, iron-spots, and all other defects. It is to be of a good and even light colour. It is to be in courses not less than 3in. nor more than 5in. high, the thicker courses being nearest the ground. The face will be left as it comes from the quarry, except that any portions projecting more than an inch from the general line of the wall-face must be removed by hammer-dressing, and that the vertical joints must not exceed ¾in. in thickness. The parpoint is to average 6in. in thickness, and, in addition to this average, it is to have in every superficial yard of the facing at least four long bonders, going from the outside of the parpoint right through the brickwork, where this is left rough inside or is to be plastered, and going within 4½in. of the internal face wherever

the brickwork is to appear inside and to be pointed. The parpoint is to be finished, as the work proceeds, with a very neat weathered joint in white mortar. At the corners of the work there will be no quoins, but the parpoint is to be carried up as evenly as possible, and it is to be tooled very neatly for an inch in width on each side of the arris, so as to leave a true vertical line at the angle. The work is to be well flushed up in mortar, bonded to the brickwork, and grouted at every foot in height.

V. 12. *ARCHES IN PARPOINT*.—These are to be worked in the same way as the parpoint facing, and a true arris is to be formed by tooling the stone for an inch in width on the face and soffit adjoining the angle between face and soffit.

V. 13. *ASHLAR AND BRICKWORK*.—The whole of the walls shown on the drawings as faced with stone are to have an outer facing of [Ancaster] stone averaging 6in. thick, carried up with and well bonded to the brickwork in courses, whose depth is equal to either two, three, or four brick courses, and having, in addition to the average thickness of 6in., at least four bonders in every superficial yard of facing, giving, wherever the thickness of the wall allows, at least 9in. into the brick backing. The [Ancaster] stone is to be from quarry. It is to be of the best quality and free from clay beds, soft spots, and all other defects. The courses are to show outside as headers and stretchers properly breaking joint. Each part of the work is to be cleaned down within a fortnight of the time at which it was set, and is on no account to have its surface dragged or otherwise disturbed afterwards. Before the scaffold is struck, all the external masonry and ashlar are to be carefully cleaned with brushes and water.

V. 14. *CEMENT TO BE KEPT BACK FROM THE FACE*.—Wherever ashlar or masonry is shown or directed to be set in cement, a bed of mortar, 1½in. wide, is first to be formed next the outer faces of the stone so as to keep the cement back 1½in. from the outer surface of the stone.

V. 15. *TESTING STONE*.—Provide the prime cost sum of [fifteen pounds] to be used by the architect in getting samples of the various stones tested, as far as he considers desirable, and provide all the specimens, worked to sizes and rubbed to true and even faces, which may be required for such testing, and provide packing and carriage to [London].

V. 16. *MASONRY JOINTS: DOWELS, JOGGLES, &c.*—Unless distinctly shown on the detail drawings, or specially directed by the architect, no masonry must be jointed so as to produce on either side of the joint an arris sharper than a right angle. The joints of gable copings, unless directed or distinctly shown on the details to be otherwise shaped, are to be rebated joints, arranged so as to prevent water from passing through the coping. The joints of all landings and horizontal copings are to be joggled in cement. All joints in shafts, mullions, tracery, and similar details are to be very carefully fitted together, and dowelled with ¾in. square sawn slate dowels in cement. All gable copings which are not bonded into the wall are to be cramped together on the under side at each joint with two strong galvanised wrought-iron cramps set in cement. Shafts, mullions, tracery, and finials, like the rest of the masonry, must be so worked that when they are fixed the natural or quarry bed of the stone shall be in a horizontal position.

V. 17. *BATH STONE, WITH PORTLAND COPINGS, &c.*—The whole of the external stonework in [dressings to windows, doorways, pilasters, piers, columns, capitals and bases, and], but not the stonework of copings, sills, stringcourses, steps, pavings, landings, or cornices, is to be in the best and most compact quality of [Monk's Park] Bath stone. The stringcourses, copings, cornices, and sills, and any other work tinted on the drawings are to be of "Whit-bed" Portland stone, specially selected, of a very close-grained and uniform quality, as free as possible from shells and other petrifications, and entirely free from cavities.

V. 18. *BATH STONE INTERNALLY*.—The internal stone dressings of the building, with the exception of steps, landings, hearthstones, mantelpieces, and pavings [and of], are to be of the best fine-grained white Corsham stone.

V. 19. *YORKSHIRE STONE*.—This is everywhere to be hard, fine-grained, and tough, and equal in quality to good Robin Hood stone. It is to be free from soft spots, coal specks, and all other

defects. Where not otherwise specified, the faces may be sawn.

V. 20. PORTLAND STONE.—The following details are to be in Portland stone: Namely, The Portland stone throughout the building is to be Whit-bed, and not "Base-bed," otherwise known as "Best-bed." It is to be of the close-grained and compact, and not the coarse and rough, variety of Whit-bed. It is to be free from cavities and fissures, and as free as practicable from shells and other fossils.

V. 21. ANCASTER STONE.—The following details are to be in Ancaster stone: Namely, [The plinths, strings, and sills, and also the copings are to be of the brown weather-bed, and to be specially selected for weathering qualities.] All the stone is to be from 's quarries, and is to be free from soft patches, clay-beds, and all other defects; and for tracery and other delicate work, it is to be of the hard white close-grained bed.

V. 22. STONE FOR COLUMNS, &c.—The stone for is to be [Kent] [Idle] [Denwick] [Robin Hood] of uniform texture, and of a colour approved by the architect. This stone must be able to bear, before crushing, a weight of at least [7,000lb.] to the square inch on the bed. It will have to be selected with special care, and all stone which proves when tested to be of a less strength than that here specified will be rejected.

V. 23. WORKING FACES AND CLEANING OFF.—The plain faces and circular faces of hard-stone piers and other details to be very finely and evenly tooled with a vertical stroke of about [8] bats to the inch. The mouldings in hard-stone to be rubbed. All the beds are to be very truly worked. All external details, whether in hard-stone or in limestones or oolites, are to be worked off and cleaned down as soon as practicable after they are set, and their surface is not to be again disturbed. There is, therefore, to be no dragging or tooling of them before the scaffolds are removed; but they are then to be washed down with clean water and a brush.

V. 24. PROTECTING MASONRY.—Properly cover up and protect from injury all exposed details during the progress of the work, and remove the boards, fillets, or other protection before the building is given up for occupation. Also protect against frost all stones requiring such protection, and especially large pier-stones, arch-stones, &c.

V. 25. YORK STONE STEPS, &c.—Those to the outer doors to be tooled, and of the sizes shown. Those to [the basement] to be solid sawn steps. Those to [the first floor] to be spandrel steps with moulded nosings, which are to be of [3½in.] girth, and are to be rubbed all round, both on treads, risers, and soffits. The horizontal bed-joints are to turn for a distance of about 1½in. on each step, so as to be at right angles to the soffit, thus avoiding a "feather-edged" or acute-angled joint. All landings not otherwise specified are to be of hard York, and sawn. All steps and landings which bed on a wall at each end are to go ½in. into it at each end. All those which only go into a wall at one end are to go in 9in. or more when so shown or described.

V. 22. YORK HEARTHES.—Put to all fireplaces not having tiled or marble hearths, rubbed York hearths and back hearths, 2½in. thick. These hearths, where not otherwise described, are to project 18in. in front of the chimney-breast, and are to be at least 6in. longer at each end than the fireplace opening.

V. 27. YORK TEMPLATES AND COVERS TO IRON JOISTS.—Put to the ends of all purlins, binders, bridges, and wooden girders hard York tooled templates, 14in. by 9in. by 3in. Put to the ends of all rolled iron joists and girders which bear on brick walls similar templates 14in. by 12in. by 4in., or larger in the case of large girders, increasing to the size of 18in. by 14in. by 6in. for girders weighing 120lb. or more per foot run. Put along all rolled joists or girders which carry walls, York cover-stones 3in. thick, and as wide as the thickness of the wall.

V. 28. YORK PAVINGS.—Put to sawn pavings of hard York stone 3in. thick, the stones neatly squared and fitted closely and evenly together, so as to break joint. All pavings, where no concrete is provided to bed them on, are to be laid on a 12in. bed of hard, clean, dry rubbish, well rammed and levelled.

V. 29. GRANITE SHAFTS, AND CAPS AND BASES.—These are to be of [blue Aberdeen] granite, similar to a sample which may be seen in the architect's office, free from black patches, holes, breakages, and other defects. They are to be

[finely polished] [half-polished like the sample], and are to be strongly dowelled to their caps and bases by copper dowels ½in. square set in cement. The caps and bases to be of [Blue Robin Hood] stone of special quality, selected to match the colour of the granite].

V. 30. SINKINGS FOR MATS.—At the points marked M on plans form in the various pavings proper sinkings for door-mats, of the sizes shown, and [1½in.] deep. In the stone pavings these are to be sunk into the stone, or cut through it and filled partially in with another stone. In tile and mosaic or marble pavings they are to be formed with a chamfered oak curb 1½in. thick all round the sinking and a floor of trowelled Portland cement on concrete.

V. 31. BONDING STONES INTO WALLS.—These in each case are to be bonded in to the average depth indicated on the detail drawing. Where no depth is mentioned, the stones are to bond in and out [9in. and 4½in.] alternately, except in the case of corbels and stones carrying weights on their projecting part. These are to tail into the wall as far as practicable. No stones must go into the walls less than 4½in., and no sham quoins or sham jamb-stones, cut off diagonally at the back, will be allowed.

V. 32. CARVING.—Provide the sum of pounds for carving, which is the net sum that the contractor is to pay to the carver, without deducting or receiving back any part of it as discount, allowance, or commission. Provide and maintain proper scaffolds for the carver, and shift them as he requires. Do, under his personal direction, but on no account without it, any rough shaping or reduction which he may require in the stones left for carving, and work off up to the carving, any parts of mouldings which stop against the carving or run between or amongst it.

V. 33. CHIMNEY-PIECES.—Provide the prime-cost sum of pounds for chimney-pieces [to drawing] [to be selected by the architect] and fix No. chimney-pieces complete.

V. 34. SUNDRIES.—Cut all mortises, grooves, and weatherings, and provide all necessary tackling, ladders, tools, moulds, and other requisites of every kind, necessary to complete the work to the architect's satisfaction. Run iron balustrades to stone stairs with lead, caulking them and leaving them firm.

NOTES.

V. 5 Stones which have a great weight on them should not be bedded on lead (see the granite piers so bedded under the Holborn Viaduct). It is safer to provide a fairly thick bed of fine mortar, and to let the weight, as it is gradually added, squeeze part of this mortar out at the edges of the joint.

V. 6 and V. 7 are clauses meant to prevent the occurrence of errors in working, and of injuries in the carriage of worked stone, and also to discourage the concealment of such injuries and of improper bedding.

SANITARY INSPECTORS' CONFERENCE.

THE annual provincial meeting of the Sanitary Inspectors' Association was held at Leeds on Thursday and Friday in last week. The members were welcomed to the city on the Thursday by the mayor, the Right Hon. W. L. Jackson, M.P., who said that the association had visited Leeds at a time when, unfortunately, there was an outbreak of typhus fever. Of recent years, under the administration of the medical officer of health, Dr. Cameron, a great deal had been done for Leeds in various directions, especially with regard to the education of the public on general sanitary matters. Mr. H. Thomas, Bermondsey, said that typhus was caused almost entirely by tramps. They should keep a sharp look-out on this class, see that their temporary homes were well ventilated and kept clean, and they would soon stamp the disease out.

WANTED A MINISTER OF HEALTH.

At the second day's meeting, held at the Leeds Town Hall, Mr. T. Pridgin Teale, occupied the chair, and read, in his absence through illness, the address of the president (Sir B. W. Richardson), who urged that the time had arrived when the question of the appointment of a Minister of Health should be agitated. The basis for such a Minister had already been laid, and with the full development of such a Government Department no country in the world would then possess so perfect a sanitary organisation as ours. The Minister of Health should be a Minister of State,

but it would not be to the best interests of the country that he should vacate his office with every change of Government. He would, from the nature of his position, be different from all other Ministers in almost every respect. He should not be troubled with active Parliamentary duties, nor should he be an administrator so much as an observer.

Dr. Spottiswood Cameron, the medical officer of health for Leeds, subsequently read a paper on "The Working Cost in Leeds of Destroying Refuse by Heat," and the "Codification of the Public Health Law" was dealt with by Mr. R. W. Evans, of Halifax, who said that only one word, "chaos," described the present state of the law relating to public health. "Tenure of Office and Superannuation" was the subject treated by Mr. W. H. Grigg, of Fulham, and a public meeting in connection with the conference was held in the evening in the Philosophical Hall, presided over by Councillor Womersley (chairman of the Leeds Sanitary Committee), who mentioned that the death-rate in Leeds had decreased from 28 per 1,000 in 1874 to 21 per 1,000 in 1894.

HOW TO CULTIVATE HOUSE-PROUDNESS.

Mr. Pridgin Teale (president of the Yorkshire branch of the Sanitary Inspectors' Association) delivered an address. He said that he discovered, many years ago, that very few houses were safe to live in. Were they now able to reverse their opinion, and say that very few houses were unsafe to live in? To some extent he hoped they could, at any rate, as regarded the well-to-do people, and, perhaps, as to the cottages of the very poor, and less so for the rest of the small back-to-back houses built a few years ago. There still remained much to be done in the way of systematic house-to-house testing. Seeing that the tenants of the small houses had very little power in themselves, either of finding out what was wrong or getting things put right, the remedy must come from the public sanitary authority, working through the sanitary inspectors, who acted under the guidance of the medical officer of health. Despite all that had been done by those inspectors, the fact remained that there were hundreds, perhaps thousands, of houses in Leeds which had never been thoroughly inspected, and they knew from experience gained in inspecting that a very large proportion of those were likely to have grave sanitary defects. Could the work of the city authority be supplemented by private effort? There had been in Leeds for several years a voluntary society with the sensible title of the Sanitary Aid Society, which aimed at helping those who were willing to help themselves. If it could instruct and inspire with sanitary enthusiasm the occupants of small houses, so that every householder should feel it his duty to find out whether his house was healthy or not, free from sanitary defects, sanitary cleanliness, personal cleanliness, and "houseproudness" would grow up together, and they would in time see a higher standard of life and character gradually asserting itself amongst even the poorest of the people.

Addresses were delivered by the Rev. Canon Ivens, vicar of Sowerby Bridge, and by Mr. W. W. West, of Walthamstow, and the proceedings were brought to a close.

Mr. W. Holmes, county sanitary inspector, of Wakefield, read a paper on "Sanitary Administration in the West Riding," in the course of which he mentioned that there were 435 administrative authorities in the Riding, and the number of sanitary inspectors was 250, with salaries varying from £5 to £250 per annum.

DRAINAGE OF BUILDINGS.

The "Drainage of Buildings" was the subject of a paper by Mr. R. W. Cass, sanitary inspector, Pudsey. The writer dealt with the relative importance of underground drainage and plumbing work; improvements in the fixing of closets and soil-pipes; improvements in, and relating to, the discharge of liquid filth from sinks, baths, lavatories, and fall-spouts; gully and other traps, having regard to the influence they exercise on the drains and sewers, also on the nature and treatment of sewage; and the importance of neat excavations for drainage work, with careful filling and special use of concrete.

WHY DWELLING-HOUSES ARE SOMETIMES UNHEALTHY.

This question was considered in a paper by Mr. J. Lindley, chief sanitary inspector, Batley. He remarked that the healthiness of a dwelling-house depended upon six essential points:—

(1) pure air, (2) pure water, (3) efficient drainage, (4) ventilation, (5) cleanliness, (6) light. Without these no dwelling-house could be healthy. And it would be unhealthy just in proportion as its deficiency existed in these various points. To have pure air, the dwelling-house must be so constructed that the atmospheric air shall penetrate every corner. Back-to-back houses were a grave departure from this rule, also one-roomed houses, but worst of all cellar dwellings. The air we breathed was more essential to life than either water or food, and yet we found dwelling-houses so constructed that the architect and builder might have been most careful to ignore its necessity. Next in importance to pure air was pure water. Good water should be clear, colourless, tasteless,

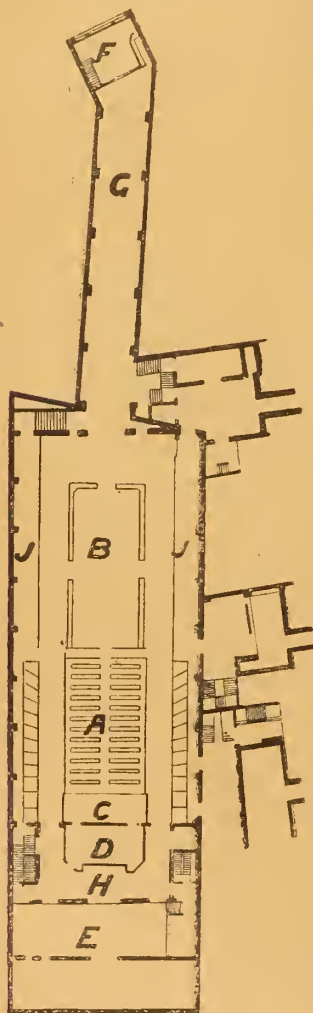


Fig. 1.—A, grand hall; B, fêtes hall; C, orchestra; D, stage; E, machine-room; F, entrance; G, grand vestibule; H, promenade; J, raised promenade.

without any odour or dirty deposit, and free from floating filaments or particles. Any water which tasted bad, or had a disagreeable odour, or became muddy after rain, was a suspicious water, and should always be boiled before being used, if at all. The use of cisterns for dietetic purposes was open to very grave objections, not only because they were liable to become fouled if not properly protected against the entrance of aerial impurities, but they might in so many ways become polluted and therefore dangerous to health. No dwelling-house with an untrapped drain having a connection with the main sewer or cesspool, whether it be from a sink, waste-pipe, water-closet, or for draining the basement, could ever be healthy. Not only was it necessary that the drains should be correct, but the main sewer must be properly constructed and kept in good working order so as not to be a nuisance. Ventilation, or rather the want of it, might render a dwelling-house unhealthy. Once insure that the air in a dwelling-house was stagnant, and sickness was certain to follow. Cleanliness was absolutely necessary for the preservation of health. Every dwelling-house, in his opinion, should be provided with a bath. "Wash and be clean," was the command in the days of old, and now in the

19th century it was just as necessary, and ever would be, for it was the starting point of sanitation. A dwelling-house might be unhealthy by its walls being papered with coloured paper containing arsenical poison used in the colouring of the same. Flock paper upon walls were a source of mischief in affording means for harbouring dust, therefore should be discouraged. Papering of walls should be avoided as much as possible, and colouring or an equivalent adopted. Light was as important to health almost as air, and it might be said without fear of contradiction that the dwelling-house was the healthiest which was the lightest and most airy; therefore a dwelling-house could not have too much natural light. The lack of light was most detrimental to health, and a dark house was always an unhealthy house, a badly aired house, and a dirty house.

CONCERT-HALLS AND ASSEMBLY-ROOMS.—XXVII.

By ERNEST A. E. WOODROW, A.R.I.B.A.

THE Olympia, in the Boulevard des Capucines at Paris, is a music-hall of the smaller type, also essentially French in character, erected from the designs of the architect, M. Léon Carle. It is a hall built on a very long piece of back land, with a narrow frontage to the public thoroughfare, with just sufficient width to contain the flaming posters and advertisements peculiar to this class of building. The entrance from the street is by a long passage-way, between five and six metres in width. The ground floor, or area level, is divided into two distinct parts, the fêtes-hall marked B, and the stalls of the grand hall marked A on the diagram. The floor of the first portion is level; but the floor in the front part, where the seats are placed, slopes downwards the stage. The fêtes-hall is quite in the character of a French music-hall, affording as it does large space for promenading purposes. The portion marked C on the plan is an orchestra in front of

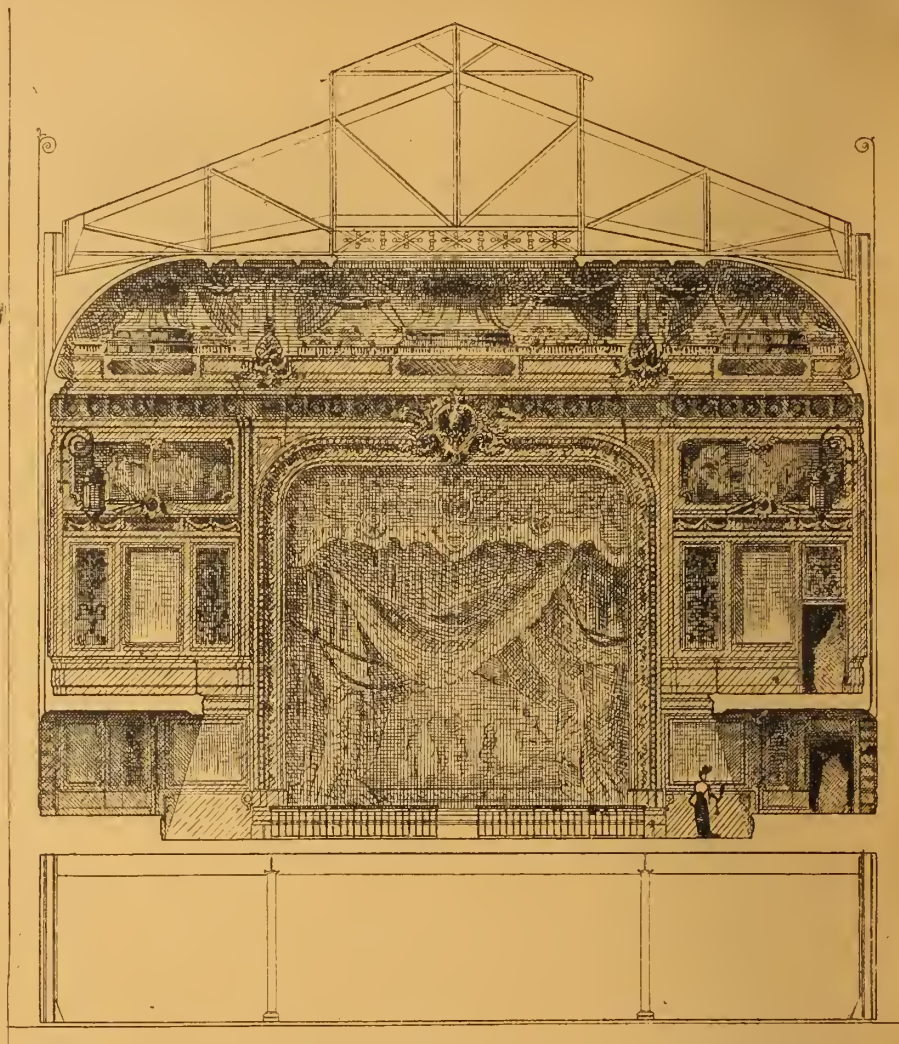


Fig. 2.

the platform which does duty for a stage. The promenade extends along each side of the hall and round behind the stage, and beyond this is placed the machinery-room.

In the fêtes-hall there are raised platforms either side, four steps above the level of the floor, forming a promenade, from which the stage can easily be seen.

The first floor consists of a gallery, four and a half metres wide, running the full length on both sides of the hall as well as across the back. This gallery is not stepped up for seats, but is arranged for a promenade and used only for that purpose. There is, however, at a higher level, a second gallery of six rows of seats at the back of the hall.

Fig. 2 illustrates the longitudinal section. It is interesting to note how totally different this plan is from the music-halls of this country, and how it could never, under the present regulations, be erected in London, quite apart from its unsatisfactory arrangement in being built so far away from the street.

Figs. 3 and 4 are plans of the hall known as the Concert de la Scala in the Boulevard de Strasbourg, Paris. This building was erected from the designs of M. F. De La Rue, the architect, and it will be seen it is more like the English music-hall in arrangement than the preceding example. The area consists of a flat floor seated with benches, from which one would imagine it would be difficult for one seated at the back to see the performance. As in the Olympia, there are raised platforms at the sides of the area with one row of seats running the length of the hall.

There are three tiers of galleries above the ground floor planned in a horseshoe form, with elongated sides, following a line not particularly good for sighting purposes, especially from the back seats at the sides.

The auditorium is surmounted with a sliding roof, and Fig. 5 gives a detail of the construction and gearing of the movable portion over the centre of the auditorium ceiling, from which it will be seen that by working a windlass over the

proscenium wall, the sliding dome can be moved sideways to the right or the left. This dome is mounted upon strong metal wheels, which run upon rails bolted to the top of the main iron girder of the roof. A plan, elevation, and section of this method of construction is shown upon

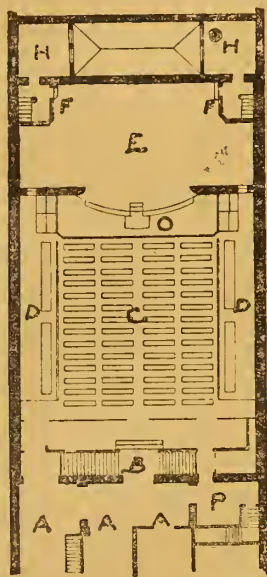


FIG. 3.—A, entrance and exits; B, gallery stairs; C, stalls; D, side stalls and promenade; E, stage; FF, dressing-room staircases; HH, dressing-rooms; O, orchestra; P, buffet.

Fig. 5 to an enlarged scale. The English manner of working the sliding roof from the stage-level is far better than having to mount up to the roof-level before the sliding portion can be removed. Should a sudden shower come on during the time taken in reaching the windlass, the audience in

not extend below the boards. With regard to the entrances and exits, it will be seen from the plans that there are double staircases leading from the vestibule to the three tiers of galleries above. These staircases are in common to all the galleries, and eventually discharge at one point,

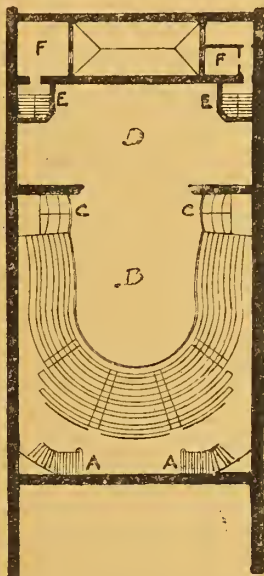


FIG. 4.—AA, staircases to galleries; B, auditorium; C C, private boxes; D, upper part of stage; E E, dressing-room staircases; F F, dressing-rooms.

where a stream of people from the back of the stalls also joins them—a most dangerous and unsatisfactory state of affairs. The staircases, too, in themselves, are also unsatisfactory, and they are formed in their upper parts with numerous winders, as they curve round and dis-

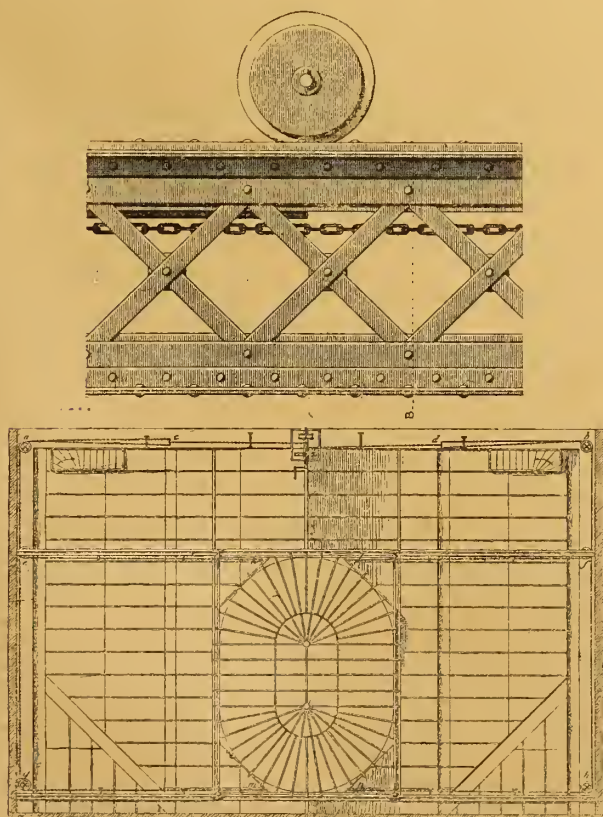


FIG. 5.

the stalls would be materially damped by the falling rain. I have already explained the way of working adopted in London music-halls where sliding roofs are provided.

From the section, Fig. 7, it will be seen that the stage is provided with a certain amount of machinery above the stage floor, but that it does

charge at the side of the tiers. Altogether the planning is not what would be expected in a building of this size and character.

The timber-yard and saw-mills of Messrs. Harrison and Dybell, of Norwich, were destroyed by fire on Thursday in last week.

ON CANTILEVER BRIDGES.*

By Professor EDGAR MARRBURG.

(Continued from page 262.)

BENDING MOMENTS (LIVE LOAD).—The bending moments will be maximum throughout with the load extending over the entire span (Fig. 6). Their values are represented by the vertical intercepts in Fig. 6a. The curves in this figure are parabolic, and the ordinates to the inclined lines *bc* and *ef* denote the bending moments in the cantilever arms from the load on the suspended span. For convenience, these moments, though negative, are laid off above the horizontal datum line. The average bending moment becomes a minimum for that relation of x_1 and x_2 which reduces the area (ΣM) of the shaded figure to a minimum. With the notation indicated,

$$\Sigma M = \frac{1}{12} w x_1^3 + \frac{1}{2} w x_1^2 x_2 + \frac{1}{3} w x_2^3.$$

$$\text{Placing } x_1 = \frac{1}{2} (l - x_2),$$

$$\Sigma M = \frac{1}{24} w (l^3 - 3 l x_2^2 + 4 x_2^3) \dots \dots (1)$$

Equating the first derivative to zero, and solving for x_2 , there results—

$$x_2 = 0, \text{ or } \frac{1}{2} l,$$

the former indicating a maximum and the latter a minimum value of ΣM . In general these may be written $x_2 = z l$, the value of z ranging from 0 to 1. Eq. (1) then becomes—

$$\Sigma M = \frac{1}{24} w l^3 (1 - 3 z^2 + 4 z^3) \dots \dots (2)$$

ΣM attains its absolute maximum value when $z = 1$, corresponding to the condition of a simple truss of span l . The average bending moment for any value of the length-ratio z is found by dividing the resulting value of ΣM from Eq. (2) by the span l . These values for the conditions of maximum and minimum may be tabulated as follows:—

Conditions.	z	Average Bending Moment, $\frac{\Sigma M}{l}$	Ratios.
Simple truss.....	1	$\frac{1}{12} w l^2$ (max.)	$\frac{2}{3}$
Suspended truss = $\frac{2}{3}$ total span	$\frac{1}{2}$	$\frac{1}{32} w l^2$ (min.)	1
Pure cantilever.....	0	$\frac{1}{24} w l^2$ (max.)	$\frac{1}{3}$

Shears (live load).—The diagram for maximum shears from a uniform live load is shown in Fig. 7. For the suspended truss the load must be considered as advancing from either end. The general value of the maximum shear (s_2) in this truss, at any distance x from either end, is expressed by the equation—

$$s_2 = \frac{w x^2}{2 x_2},$$

which is the equation of a parabola (Fig. 7) with vertex at *b* or *d*. Denoting the combined areas of the figures *b c h g* and *e d k i* by Σs_2 —

$$\Sigma s_2 = 2 \int_{\frac{1}{2} x_2}^{x_2} \frac{w x^2}{2 x_2} dx = \frac{1}{4} w x_2^2 \dots \dots (3)$$

If the combined areas of the trapezoids *a b g f* and *d e l k* are represented by Σs_1 —

$$\Sigma s_1 = \frac{w x_1}{2} (l + x_2) \dots \dots (4)$$

From the summation of Eqs. (3) and (4), the total area (ΣS) of the shaded portions of Fig. 7 may be written by placing $x_2 = z l$ as before—

$$\Sigma S = \frac{w l^2}{24} (z^2 + 6) \dots \dots (5)$$

It is apparent from this equation that S will be a minimum for $z = 0$ and a maximum for $z = 1$, as is indeed evident from independent considerations. The values of the average shears for the cases previously considered, may be determined by the aid of Eq. (5) and tabulated as follows:—

Conditions.	z	Average shear, $\frac{\Sigma S}{l}$	Ratios.
Simple truss.....	1	$\frac{7}{24} w l$ (max.)	1.12
Suspended truss = $\frac{2}{3}$ total span	$\frac{1}{2}$	$\frac{5}{96} w l$	1.00
Pure cantilever.....	0	$\frac{1}{4} w l$ (min.)	0.96

In the foregoing no account has been taken of the counter-shears, represented in Fig. 7 by ordinates to the curves *b i* and *h d*. Inasmuch as these counter-shears are relatively small and are neutralised to a considerable though unknown extent—depending

* From the *Proceedings* of the Engineers' Club of Philadelphia.

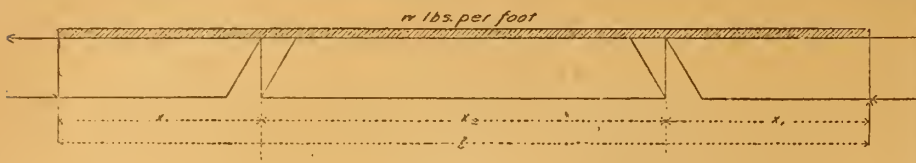


FIG. 6.

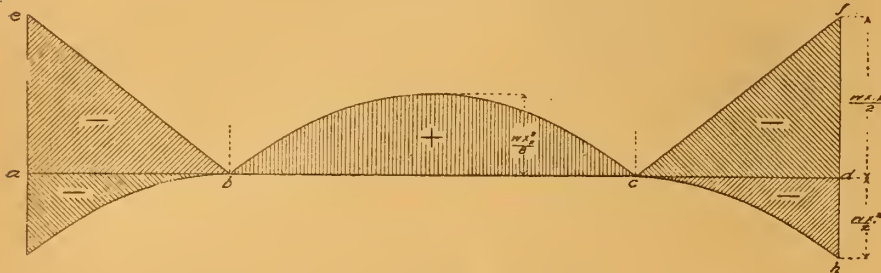


FIG. 6a.

on the variable ratio of live to dead load—by the direct shears from the dead load, the resulting error is unimportant. Through the neglect of the counter-shears, the ratio 1.12 in the above table is slightly less, and 0.96 slightly greater than its true value. It should be observed, also, that, except in the case of very great spans, the intensity of the assumed uniform live load should

be considered only as closely approximate. The variations in the average bending moment and average shear, for all values of the length-ratio z , are indicated by the ordinates to the curves abc and dbe respectively (Fig. 8.) If it be assumed provisionally that the dead load is also uniformly distributed, and that ΣM and ΣS include the effects of the dead as well as the live

concerned, and that no essential increase will result for values of z between the limits of 0.4 and 0.6. *Reverse Stresses in Anchor Trusses.*—No treatment deserves to be considered more than loosely approximate which does not include the variations in the bending moments and shears in the anchor trusses, for different values of the length-ratio z , from loads on the cantilevers and suspended span. These moments and shears vary with the uplift that can be exerted on the anchorages, and are, therefore, direct functions of the maximum bending moment (m) at the fixed end of the cantilever. With the notation in Fig. 6, there may be written—

$$m = \frac{1}{2} w x_1^2 + \frac{1}{2} w x_1 x_2,$$

which for $x_1 = \frac{1}{2} (l - x_2)$ becomes—

$$m = \frac{1}{8} w (l^2 - x_2^2),$$

or, placing $x_2 = z l$, as before—

$$m = \frac{1}{8} w l^2 (1 - z^2) \dots \dots \dots (6)$$

The minimum and maximum values of m occur for $z = 1$ and 0 respectively. The values of m for the conditions previously considered are as follows:—

Conditions.	z	Maximum Bending Moment, m .	Ratios.
Simple truss.....	1	0	0.0
Suspended truss = $\frac{1}{2}$ total span	$\frac{2}{3}$	$\frac{3}{32} w l^2$	1.0
Pure cantilever.....	0	$\frac{1}{8} w l^2$ (max.)	1.5

The values of m from Eq. 6, for the entire range of the length-ratios z , are represented in Fig. 9, as ordinates to the curve. It is to be noted that the vertical scale in this figure is only one-third that used for bending moments in Fig. 8, so that the curvature is relatively much greater than shown. It is seen that the value of m decreases rapidly with the increasing values of z . Considering Fig. 8 in connection with Fig. 9, it appears that the most favourable length-ratio z is necessarily greater than 0.5. Its exact value, in any case, depends partly on the relation of the central span* to the anchor spans, but also largely on the unknown and variable distribution of the dead load, its ratio to the live load, and on the specified unit stresses. It may be of some interest, though of little value practically for reasons just stated, to find that value of z which, with a given arrangement of piers, will reduce the average bending moment and shear throughout the entire bridge to a minimum, considering the live load only. Let the case of a cantilever bridge, consisting simply of a central span and two anchor arms, be assumed. Considering the bending moments, the average value of the ordinates to the line L_2 (Fig. 2) will be $\frac{1}{2} m$. Denoting the length of each anchor arm by kl , the summation of the negative moments for both arms will give, from Eq. 6—

$$klm = \frac{1}{8} w k l (1 - z^2).$$

Combining this with Eq. 2, and denoting the summation of bending moments for the entire bridge by ΣM_1 , there results—

$$\Sigma M_1 = \frac{1}{8} w k l^3 (1 - z^2) + \frac{1}{24} w l^3 (1 - 3z^2 + 4z^3),$$

which becomes a minimum for—

$$z = \frac{1}{2} (k + 1), \dots \dots \dots (7)$$

and a maximum for $z = 0$. If the length of the anchor arms is one-half that of the central span, $k = \frac{1}{2}$ and from Eq. (7) $z = 0.75$. In general, as k decreases z also grows less. It is to be remembered, however, that a decrease in k as well as in z increases the negative reaction at the shore end of the anchor arm, and therefore adds to the cost of the anchorages of which no account has been taken. The summation of the negative shears in the anchor arms, represented by the ordinates to the line L' (Fig. 1), is independent of the span-ratio k , its value being equal to m for each arm. If, then, the summation of shears for the entire bridge be denoted by ΣS_1 , there follows from Eqs. (5) and (6), including both arms,

$$\Sigma S_1 = \frac{1}{4} w l^2 (1 - z^2) + \frac{1}{24} w l^2 (z^2 + 6),$$

which has a minimum value, $\frac{7}{24} w l^2$, for $z = 1$ and a maximum value $\frac{1}{24} w l^2$ for $z = 0$. A consideration of the shears tends therefore to increase the value of z found from Eq. (7), based on the bending moments alone. The consideration of the stresses in the anchorage would show a like influence of z , since the uplift on the anchorage is a direct function of m and decreases rapidly with an increase in z , as is shown in Fig. 9.

* The term "central span" is used for brevity in what follows, and is to be understood as including the cantilever arms and the suspended truss.

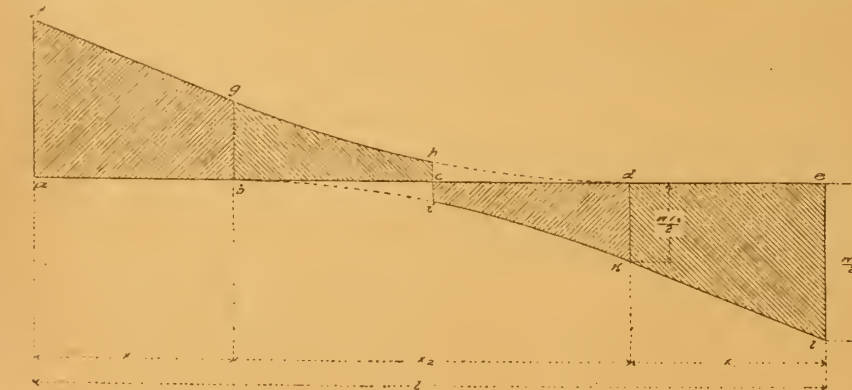


FIG. 7.

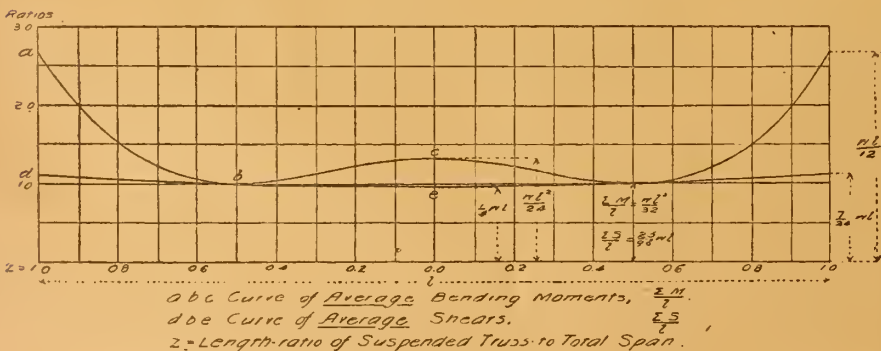


FIG. 8.

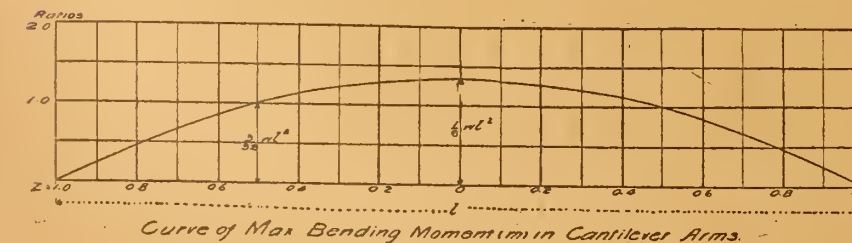


FIG. 9.

be considered as somewhat increased for the direct shears in approaching the centre of the span, as well as for the counter-shears. This observation applies also to the shears near the free ends of the cantilever arms, especially as the suspended span becomes relatively short. For these several reasons the ratios of average maximum shears, given in the last column of the table,

load, the curve abc will remain unchanged. The shear curve will in that case, however, approximate even more nearly to a straight line, since the average shear from a uniform dead load is constant for all values of z . It is seen then, from Fig. 8, that the most favourable length-ratio z is very slightly less than 0.5, so far as the weight of the cantilever arms and suspended trusses are alone

FIG. 10.

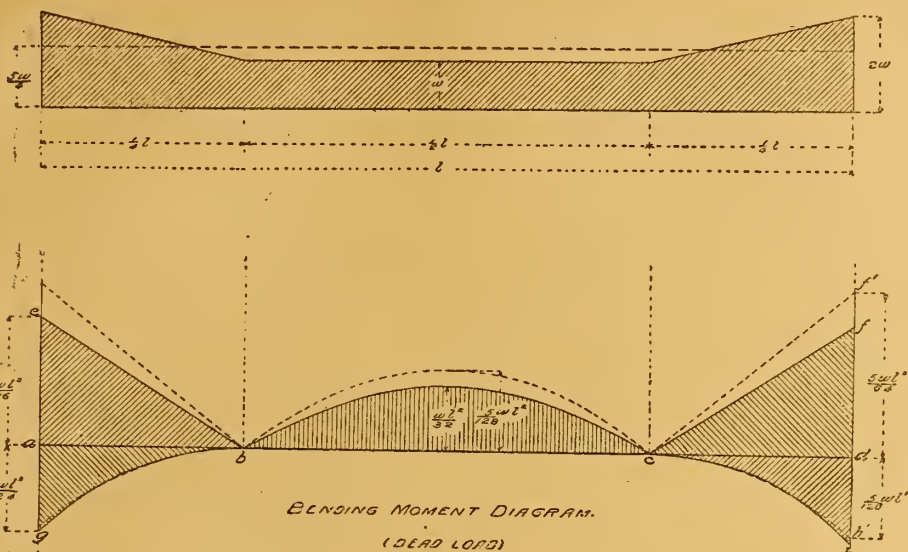


FIG. 10a.

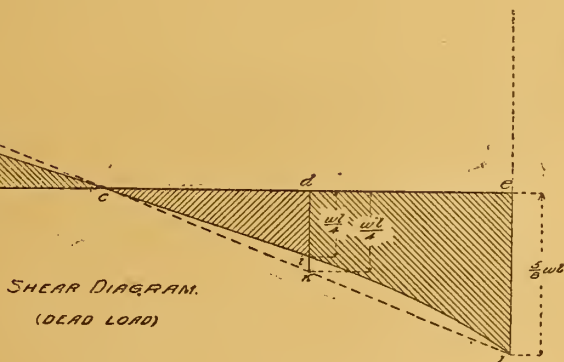


FIG. 10b.

Conclusions.—Although it appears from the foregoing that an accurate general determination of the most economic length-ratio z is impossible, it has been shown that this ratio will in no case be less than 0.5, and that a higher value, probably from 0.6 to 0.7, will be usually found more advantageous. Incidentally, the adoption of a greater length-ratio for the suspended truss will tend to reduce vertical deflections—a matter of particular importance for bridges of the cantilever type. It is true that the erection stresses in the suspended trusses will be increased as this span is made longer, for which some additional material may be required, especially in the end panels of the chords. This is, however, a matter of relatively small importance.

ADVANTAGES OF THE CANTILEVER SYSTEM FOR LONG SPANS.

The advantages of the cantilever system, compared with simple trusses for long spans, may be summed up as follows:—(1) *Lower economic depth of trusses.*—It has been shown that the average bending moment is $2\frac{3}{8}$ times as great for a simple truss as for the central span in a cantilever bridge, with a suspended truss of a length equal to one-half the central span, assuming the load as uniformly distributed. Since the shears have been shown to be essentially the same in both cases, it follows that the “average economic depth” of cantilever bridges is considerably less than for simple trusses. For moderate spans this disadvantage of the latter may be in a measure overcome by using a relatively deeper truss. A span-limit is soon reached, however, beyond which an increase of depth requires also a corresponding increase of width, for lateral stability and to provide against the reversal of the lower chord stresses from wind. This leads at once to an increase in the weight of transverse floor beams, in the dimensions of the piers, and in the case of high piers—the usual condition for long spans—to greatly increased cost of masonry. (2) *More Favourable Distribution of the Dead Load.*—For reasons already stated, the dead load on the cantilever arms increases

rapidly as the piers are approached—a condition of loading greatly more favourable than that of a uniform distribution, more particularly in the case of long spans, where the influence of the dead load becomes relatively more important. The effect on the bending moments and shears from an assumed distribution of the dead load, more nearly in accord with actual conditions, will be now briefly considered. If the suspended truss is of a length equal to one-half the central span, it may be assumed with sufficient accuracy for present purposes that the average dead load per foot on the cantilever arms will be 50 per cent. greater than that on the suspended span.* If further the approximate assumption be made that the intensity of the dead load at the free end of the cantilevers is equal to that on the suspended span, and that its rate of increase towards the piers is a uniform one, its distribution will be as shown in Fig. 10. *Bending Moments.*—To derive a general expression for the bending moments in the cantilever arm, from its own loading, let a section distant z from the free end of the cantilever be considered. If the origin of co-ordinates be taken at this section, the intensity of loading (w'), at any distance x , towards the free end will have the value—

$$w' = w + \frac{4w}{l}(z - x);$$

and if the bending moment at the section considered be denoted by m —

$$m = w \int_0^z \left[1 + \frac{4}{l}(z - x) \right] x dx,$$

or—

$$m = \frac{1}{6} w z^2 \left(3 + \frac{4z}{l} \right) \dots \dots \dots (8)$$

In Fig. 10a these values of m are represented by the ordinate to the curves bg and ch . The

* This agrees well with some of the best recent designs of cantilever bridges, prepared with a view to legitimate economy. The percentage is necessarily variable, however, since, aside from other circumstances, the weight of metal in the floor-system, per foot run, is usually constant for the entire length of bridge.

maximum bending moment (m_1) follows from Eq. (8) by placing $z = \frac{1}{2} l$, whence—

$$m_1 = \frac{wl^2}{24}.$$

By the aid of Eq. (8), the combined area (Σm) of the figures abg and cdh (Fig. 10a) may be determined as follows:—

$$\Sigma m = \frac{w}{3} \int_0^{\frac{1}{2}l} \left(3 + \frac{4z}{l} \right) z^2 dz,$$

or—

$$\Sigma m = \frac{5}{72} w l^3.$$

The combined area of the triangles abe and cdf is $\frac{wl^2}{64}$, and the area of the parabola bce ,

$\frac{wl^3}{96}$. Denoting them by ΣM , the total area of the shaded parts of Fig. 10a—

$$\Sigma M = \frac{5}{72} w l^3.$$

The average bending moment for the entire central span is then—

$$\frac{\Sigma M}{l} = \frac{5}{72} w l^2 \dots \dots \dots (9)$$

The total dead load for the distance l is $\frac{1}{2} wl$, or the mean intensity of loading, $\frac{1}{4} w$. If this load were treated as uniformly distributed over the entire central span l , the average bending moment would have the value found by writing $\frac{1}{4} w$ for w in the expression $\frac{1}{2} w l^2$ (see first table on page 295), i.e.—

$$\frac{\Sigma M_1}{l} = \frac{5}{128} w l^2 \dots \dots \dots (10)$$

Comparing Eq. (10) with Eq. (9), it is seen that the average bending moment for the central span, on the assumption of a uniform distribution of the dead load, is *one-fifth* greater than that resulting from the distribution shown in Fig. 10, which represents actual conditions much more closely. The bending moments from the equivalent uniform load $\frac{1}{4} w$ are shown in Fig. 10a by ordinates to the broken lines. *Shears.*—Proceeding in like manner, and with a similar notation, for the shears (Fig. 10b)—

$$s = w \int_0^z \left[1 + \frac{4}{l}(z - x) \right] dx,$$

or—

$$s = wz \left(1 + \frac{2z}{l} \right) \dots \dots \dots (11)$$

The values of s from Eq. (11) are represented in Fig. 10b by ordinates from a horizontal line through i to the curve il . Placing $z = \frac{1}{2} l$ in Eq. (11), there results for the maximum shear (s_1), from loading on the cantilever alone—

$$s_1 = \frac{3}{4} wl.$$

From Eq. (11) Σs , for both cantilever arms, may be found as follows:—

$$\Sigma s = 2w \int_0^{\frac{1}{2}l} \left(1 + \frac{2z}{l} \right) z dz,$$

or,

$$\Sigma s = \frac{wl^2}{12}.$$

To this must be added, for the area of bch and cdi (Fig. 10b) $\frac{wl^2}{16}$, and for the rectangles ah and ie $\frac{wl^2}{8}$, so that finally—

$$\Sigma S = \frac{13}{48} wl^2.$$

The average shear for the entire span l is then—

$$\Sigma S = \frac{13}{48} wl \dots \dots \dots (12)$$

Comparing this value with that from an equivalent uniform loading of intensity $\frac{1}{4} w$, as before for the bending moments, the shears from the latter loading will be represented by the ordinates to the broken line fil in Fig. 10b, and will have the average value—

$$\frac{\Sigma S_1}{l} = \frac{5}{16} wl \dots \dots \dots (13)$$

i.e., as 15 to 13, compared with the value from Eq. (12), or about *one-sixth* greater. *Uplift.*—Finally, the relative uplift on the shore anchorage for the two conditions of loading is shown in Fig. 10a by the relative length of the double ordinates $eg = fh$ and $f'h'$, whence it appears that for the equivalent uniform load ($\frac{1}{4} w$), this uplift is *one-eighth* greater than for the load distributed, as in Fig. 10. (3) *Decreased Chord Stresses from Wind.*—Essentially the same observations apply to the wind stresses as to the stresses from vertical loading. Except for spans of extraordinary length, the trusses are in parallel

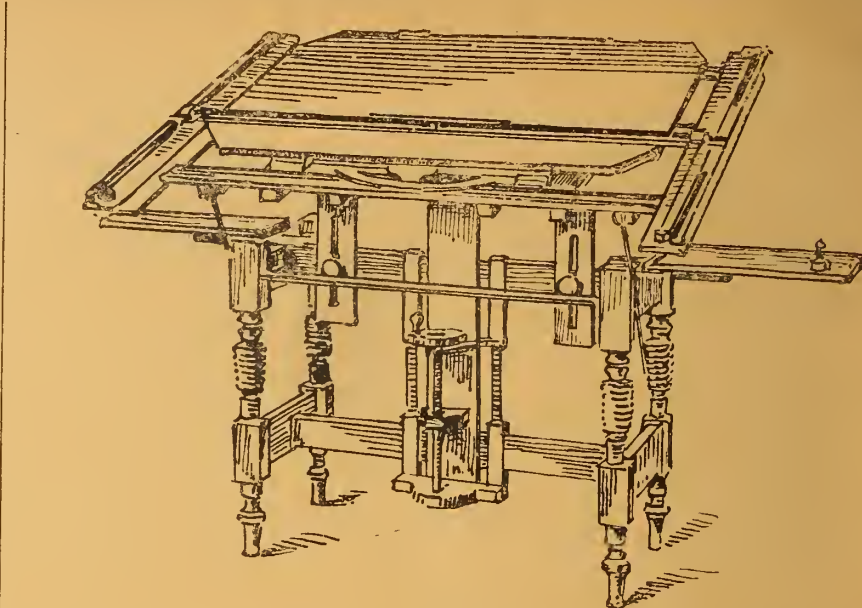
planes, in which case the chord stresses from wind vary directly as the bending moments. Hence, for equal widths, centre to centre of trusses, the average chord stress from wind for the central span is only three-eighths that for a simple truss of equal length, assuming the wind forces as uniformly distributed and of the same intensity in both cases. For the anchor trusses, the average chord stresses from wind exceed those for simple trusses of like span, but since in the former the chord sections required for vertical loading are themselves much greater, little or no increase of section will ordinarily be needed for these wind stresses. (4) *More Favourable Distribution of the Wind Forces.*—Since in cantilever bridges the heaviest construction lies in the vicinity of the piers, the wind pressure upon the structure itself, per foot of length, varies in a somewhat similar manner. It is, therefore, more favourably disposed, as has been shown for the dead load, than if it were uniformly distributed, as above assumed, and as approximately true for simple trusses. (5) *Lower Requirements for Width, Centre to Centre of Trusses.*—This follows from the fact that the mean economic depth of truss is lower, and that the average chord stress from wind is much less for cantilever bridges than for simple trusses, and results in (a) saving in cost of masonry—an important item for long spans, which rest usually on high piers—and (b) saving of material in floor-system and lateral bracing. (6) *Decreased Cost of Erection, with less Obstruction to Channel and greater Security against Wash-outs.*—The adoption of long spans is determined either by the needs of navigation in important channels or by considerations of economy—i.e., to reduce the number of piers to an economic minimum in the case of deep water, high clearance requirements, or difficult foundations. In the first case, the cantilever bridge affords the advantage of keeping the main channel entirely unobstructed during erection, and in the second, of requiring a minimum amount of false-works. It is to be remembered further that a bridge is usually constructed at the narrowest section of a stream, and that the effect of sudden floods is also greatest at such points. The greater vertical deflection of cantilever bridges, as compared with simple trusses, is not a valid objection to their use, when properly designed for long spans, in which the influence of the live load becomes relatively of less importance.

CANTILEVER BRIDGES FOR SHORT SPANS.

For short spans, cantilever bridges are in general not to be recommended, owing to their excessive deflection, aside from their lack of economy. They lend themselves, however, to a more graceful outline—similar to that of the arch or the suspension bridge—than does the non-continuous truss. Again, the arch form may sometimes be advantageously employed for deck bridges, to meet the requirements for overhead clearance. With the cantilever system, no provision is then needed for horizontal thrust on the piers, as for a true arch. When cantilever bridges are used for short spans, for the reasons mentioned, or because the erection of false-works is rendered impossible, every precaution should be taken, especially for highway bridges, to reduce the deflection and vibration under passing loads to a minimum: (a) by using a liberal depth of truss; (b) a liberal length-ratio for the suspended span; (c) by avoiding the use of adjustable counters and flexible secondary members; (d) by providing a rigid system of diagonal and lateral bracing, especially the former; (e) by riveting the stringers between the floor-beams and the latter to the posts, and (f) by employing, if cost will permit, a solid metallic floor-system, with concrete backing.

DISCUSSION.

Mr. J. Christie: I would call Prof. Marburg's attention to the fact that he gave no credit to Sedley, an English engineer, who designed cantilever bridges 25 or 30 years ago. He was one of the earliest engineers who put them into systematic shape, and, I think, built several bridges. About 25 years ago, when the subject of the cantilever became prominent in discussion, it was not infrequently alluded to as the Sedley system. As regards priority, we have to draw the line between continuous girders and the true cantilever. The Kentucky River bridge is sometimes quoted as a cantilever during erection only. Among the early bridges of this type, there is a little bridge in Philadelphia, over the Pennsylvania road, at 40th Street, built during the Centennial year. We might call it a compro-



mise between cantilever and suspension; but it is worthy of a place among the early bridges of that class.

Professor MARBURG: I did not intend to discuss the question of priority, but of construction only. In regard to the second statement of Mr. Christie, I am not prepared to concede that the Kentucky bridge differs in any essential respect from the true cantilever. It will fulfil strictly the requirements of the cantilever bridge of that class.

A NEW DRAWING-OFFICE TABLE.

A DRAWING-OFFICE table, constructed on mathematical principles, which promises to revolutionise the ordinary architect's drawing apparatus, is about to be introduced into this country. The "Laughlin-Haugh Draughting Table" is a Canadian invention, and is made in various forms, suitable for architects, engineers, and technical school and teaching purposes. The drawing-office table shown by our illustration has a framed stand, the board or desk being capable of being raised or lowered to suit the draughtsman; this is attained by an adjusting screw. When at the desired height, the stand can be clamped by the hand-screws, which work in slotted girders below the desk. In addition to this vertical movement, the drawing-board can be adjusted to any angle from a flat desk to an easel incline by clamps—a very important arrangement. It is also made to revolve on a centre-pin and on rollers on a graduated circle divided into degrees and minutes, the desk carrying a pointer, so that the drawing can be turned to any desired angle and be fixed by a clamp. This arrangement can only be estimated by the draughtsman at its proper value when he desires to draw lines at any angle by means of the parallel ruler which runs on guides up and down the board. By simply turning the board to the desired angle on the turntable, and clamping it, the parallel ruler is set to any angle on the paper—a very valuable help to perspective draughtsmen, who only want to find the direction of radial lines by marking their ends on the paper. To insure the parallelism of the ruler, its ends run on small drums along guides fixed to the stand, and these drums work on a catgut cord which is wound round them, running up one side of the stand along the top, and down the other side. By this combination of ruler and movable-board protractors, set squares and other instruments are superseded, as any angle can be immediately obtained, and imaginary lines and indiarubber avoided; drawing-pins, too, so often troublesome to the worker, are dispensed with, as the paper is fastened to the board by spring clips at the corners, which hold the paper securely. The drawing-table is made in several sizes. We saw one adapted as a sketching-board, of portable dimensions, admirably suited for students and architects; another, for making long plans with continuous rolls of paper at each end, called a "detail table," well adapted for engineer's work, and others adapted for technical and art schools. There is no doubt by the use of these tables mechanical and other drawings can be made much

more quickly than on the ordinary boards on which tee-squares and set-squares and other instruments are required.

"SALAMANDER" DECORATIONS.

WE have received an Illustrated Price List of the United Asbestos Co.'s Patent "Salamander" Decorations, which are admirably adapted for walls, ceilings, casings, and other purposes of the architect. The list before us contains several designs in this material, reproduced by a photo-process, by which the real effect of the "Salamander" can be obtained. These designs, in low and high relief, are made in every style from simple trellis to Gothic diaper, Old English, Francis I., Italian Renaissance, Flemish, Louis XV., and Oriental patterns, and have been designed by architects and ornamentists of repute. The substance is absolutely unflammable, and therefore well adapted for ceilings and partitions, is easily hung, and its fibrous nature gives it a better hold on walls and ceilings than other materials. The designs are both in high and low relief, those for friezes and ceilings resembling plasterwork in sharpness, but more durable, not being liable to fracture. Great variety of decorative treatment can also be attained, as it can be easily trimmed and applied in various ways, in door panels, friezes, "fillings," dados for staircases and rooms. We notice two designs, one in the François Premier, and the other in the old English linen pattern style applied to the raking dado of staircase. The Henri I., Elizabethan, and Gothic designs for ceilings show how well the material can be applied to the strap and tracery work of those styles of decoration. The "Salamander" decoration resembles plaster-work, at about one-third the cost, and the facility at which it can be hung and trimmed are important points. For domestic decorations, public picture-galleries, theatres, and all public buildings, this decoration has the merit of economy, unflammability, and cleanliness, and it can be supplied in its natural colour or otherwise. The United Asbestos Company's West-End depot is 158 to 160, Charing Cross-road, and their chief offices are at Dock House, Billiter-street, E.C., and provincial branches in every important town.

An arcade is about to be built near the Tramway Junction, Above Bar, Southampton, from plans by Mr. R. M. D. Lucas, of that town. It will be 17ft. wide, 120ft. long, and 20ft. high. Over the shops will be two stories, the lower one being faced with red bricks and Nottingham red stone, and the upper being tile hung. Messrs. Stevens, of Southampton, have taken the first contract for excavations and shops.

A new organ, built by Messrs. Forster and Andrews, Hull, has just been introduced into Ayr Free Church. The instrument has been fitted into a bay, with stained glass windows, immediately behind the pulpit. It has nine stops in the great organ, ten in the swell, two in the pedal, and five others, while the pedals are concave and tubular pneumatic. The cost of the instrument is about £500. Electric light has also been introduced into the church by Messrs. Higgs and Co., Glasgow.

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THE "TROCADERO" RESTAURANT.—"A GALLANT OFFERING,"
BY JAN STEEN.—CHURCH OF ST. HELEN, CLIFFE-AT-HOO,
KENT.—HOUSE AT DELAMERE FOREST, CHESHIRE.—HOUSE
AT BOWDON, CHESHIRE.—BUSINESS PREMISES, MAN-
CHESTER.—PROPOSED MANUFACTURERS' PREMISES, MAN-
CHESTER.—OAK CHEST OF DRAWERS IN THE STUART
STYLE, MDCCVII.

Our Illustrations.

"TROCADERO" RESTAURANT, GREAT WINDMILL
STREET.

This building has been erected on the site of the Argyle Rooms in Great Windmill-street. The principal entrance is in Shaftesbury-avenue; it gives access to the spacious entrance-hall, from which are entered the dining-hall and saloon. A marble staircase leads to the upper floors, which consist of a large banqueting-hall, small hall, and private dining-rooms. The grill-room is in the basement approached from the entrance, and also from Great Windmill-street. A passenger lift runs from the basement to the third floor. Lavatory accommodation is provided on each floor. The service rooms are to the left of the dining-hall, and lifts communicate with the kitchens, which are in the top floor. The elevation is carried out in red Dumfries stone and Aberdeen granite. The drawing of the entrance-hall was hung in last year's Academy exhibition. Mr. Hatchard Smith, F.R.I.B.A., of 41, Moorgate Station-buildings, E.C., acted as Messrs. Lyons' architect, Mr. W. J. Ancell assisting in the preparation of the drawings. Mr. Martin Roberts superintended the ironwork, Mr. Oakley being responsible for the decorative work.

OLD MASTERS FROM THE CONTINENT.—NO. XXXVII.
"A GALLANT OFFERING."

This Dutch master, the well-known Jan Steen, fond as he ever was of the humorous side of everyday life, had a keen appreciation of grim satire, and although it must be admitted that his sense of fun not infrequently ran into the extreme and consequently became coarse, his fellow-feeling was generally inspired by a pathetic instinct, and his success often is largely due to the sympathy he evinced with his subjects. The typical character and gestures of his figures are undoubted, and the accuracy with which he portrays their subtle expression is evident to all who know his work. Accidental combinations in his hand become features of prime consequence in his compositions, and mere accessories are with great skill contrived in such a manner as to render them essential to the general effect. Reynolds thought so highly of Steen's unconscious grace and the grandeur, too, with which he rendered the action of some of his figures, that Raphael's productions were compared with his. As a dramatist, he has been likened to Molière. The example which we have chosen to-day of Jan Steen's painting is replete with several of the points to which reference has just been made. It comes from the Royal Gallery at Brussels, and represents a Dutch interior with figures displaying life and animation, well reflecting the manners and customs of the painter's con-

temporaries. Steen was the son of a brewer, and was born at Leyden about 1626. Nicholas Knupfer, of Utrecht, and Jan Van Goyen, his father-in-law, were his instructors in painting. On his return to his native city, after many years' absence, in 1658, he kept a tavern and continued his work as a painter. He died in 1679, and was buried at Leyden.

CHURCH OF ST. HELEN, CLIFFE-AT-HOO, KENT.

This parish, some two miles N.E. of Higham, was one of the earliest possessions of Christ Church, Canterbury, and belonged to that ancient monastery till the Dissolution. The church, like most of those connected with this foundation, still possesses good miserere stalls, screens, and internal woodwork. There is a rich stone sepulchre in the presbytery, and several sepulchral slabs with Norman French inscriptions may be seen in the nave and north aisle. The earlier parts of the building date from 1260, but Mr. Arthur W. Vercoe's measured drawings, of which we give our first selection to-day, are copiously furnished with notes of dates and other information. The traceries in the windows are particularly admirable, and have often been chosen as typical examples. The origin of the name Cliffe-at-Hoo has been generally regarded as the *Cloveshoo*, at which, during the seventh and two following centuries, the church of the Saxons held numerous councils. The place is first mentioned in 673, when Archbishop Theodore, in a council at Hertford, arranged with the other bishops and clergy of his province for an annual meeting at *Cloveshooch* (Beda, H.E. IV. 5). Authorities differ, and some have placed Cliveshoo at Abingdon in Berks, or at Clifton Hoo in Bedfordshire. Whatever the archaeology and historic associations of the building may be, there can be no doubt that, as a specimen of Medieval architecture typical of Kentish work, this church is well deserving of the careful illustrations furnished us by Mr. Vercoe, and these details serve well to supplement the sketches which we published on the 7th inst., with our account of the places visited by the excursion party of the Architectural Association. We gave some prize-medal sketches of the Jacobean pulpit, its hour-glass, and panels of this church, drawn by Mr. Reginald J. Beale, in our issue of Nov. 1, 1895, and a set of measured drawings of the church by Mr. Herbert Goodall will be found in Vol. I., New Series, of the Architectural Association Sketch Book, published in 1881.

HOUSE AT DELAMERE, CHESHIRE.

It is proposed to build this house from the designs of Mr. Frank W. Mee, F.R.I.B.A., of Manchester, on the Crown land at Delamere Forest, Cheshire. The site is on an elevated portion of the forest, and commands an extensive view of the country for miles round. There is to be no basement, and the entertaining rooms and hall are to be laid with wood-block flooring; the other portions of ground floor to be concreted in red concrete. The walls are to be faced with Knutsford pressed bricks, and the roof to be covered with Knutsford tiles. The walls are cavity walls, and above the first floor are treated with half-timber work, characteristic of the neighbourhood. The woodwork inside is chiefly of pitch-pine, and is to be of its natural colour, simply polished. The whole of the windows are to be filled with lead glazing of a simple pattern.

HOUSE AT BOWDON, CHESHIRE.

It is proposed to face this house with a cream-coloured facing brick, with Ruabon tile covering and tile hanging. The hall is to be panelled to a height of 7ft. with oak wainscoting, and the walls above are to be treated with half-timbering in oak. The floors are to be laid with parqueting in hard woods, and the whole of the glazing is to be in lead lights of a quaint pattern. Mr. Frank W. Mee, F.R.I.B.A., of Manchester, is the architect.

MACBETH'S BUILDINGS, XXIII. KING-STREET, MANCHESTER.

THESE premises have been built as an addition to old buildings belonging to Messrs. George Macbeth and Sons, the ground floor being used by them for the purpose of tailoring, and the upper portion being let as offices. The general contract has been let to Mr. C. Normanton, of Manchester. The basement is laid throughout with wood-block flooring by Messrs. Roger Lowe and Co., of Farnworth. The mosaic, tilework, and grates have been supplied and fixed by Messrs. C. W.

Williams and Co., of Manchester, and the heating apparatus has been put in by Messrs. W. Wilson and Co., of King-street, Manchester. Mr. Millson, of Manchester, did the stone carving and modelling, and Messrs. Goodall and Co., of the same town, did the decoration; the whole of the fittings being supplied by Messrs. Pearson and Brown, of Salford. Mr. Frank W. Mee, F.R.I.B.A., of Manchester, was the architect.

PROPOSED PREMISES, MANCHESTER, FOR MR. SAMSON HARRIS.

(See article and sketch-plan on page 319.)

CHEST OF DRAWERS (LATE STUART STYLE).

This piece of old English cabinet work, though dated 1707, belongs in point of style to the Late Stuart period. As will be seen by reference to the measured drawings herewith given, it stands something over 4ft. high, and a little over 3ft. wide, with a projection of 1ft. 9in. It possesses five drawers—three long ones below with two drop handles, and fitted with locks and escutcheons, and two half-drawers above with a handle apiece, but no locks. The half-balusters, or spindles (of oak in common with the rest of the piece), are planted on the framing in pairs. The long drawer containing the date is of a different character to the other four, the moulding round the two panels not being broken in this case, and within are two smaller raised panels, slightly sunk in the centre, which record the date. The date and four pairs of initials in the drawer below are cut in the wood, while the octagonal panel contains the carved crest—a hand holding two branches, in a shaped sinking. A curious feature is the variation that exists in the spacing-out of the panels. Amongst the details will be found the stretcher to open part beneath drawers: the top with oval centre containing initials, and border with ornamental angles—all cut in the wood. This interesting chest may be seen at Bethnal Green Museum, having been lent by Mr. Vincent J. Robinson, C.I.E., to the exhibition there.

CHIPS.

A new mission-hall has just been completed for the Society of Friends at Forger Hill, near Aldington and Bonington, Kent. It has been erected by Mr. H. Knock, builder, of Ashford, is faced with red brick, will seat upwards of 100 adults, and has cost £400.

At a special meeting of Farsley District Council, held on Thursday night in last week, Mr. H. A. Johnson, C.E., of Bradford, was appointed, out of 16 competitors, to prepare a scheme of sewage outfall works, proposed to be constructed on 12½ acres of land purchased by the council at Rodley.

A committee of the City Council of Leeds have bargained with a syndicate who had purchased three properties on the north side of Wood-street, to sell the necessary land for the widening of that thoroughfare throughout to 36ft. The street, which connects Vicar-lane and Briggate, varies in width at parts from 11ft. 6in. at the ends to 26ft. in the middle, and the sum to be paid as compensation for the widening is £15,000.

After a long delay, the work of constructing a Government fort on Neil's Point, Barry Island, has been commenced under the supervision of the officials of the War Office Department.

The committee who are conducting the "free library" agitation in Islington, in order to get the ratepayers to adopt the necessary Acts and thus benefit by Mr. Passmore Edwards's offer of £10,000 for a central and two branch free library buildings, have arranged for a "Free Library Sunday," when all the ministers of religion in the parish will be asked to advocate the scheme from their pulpits.

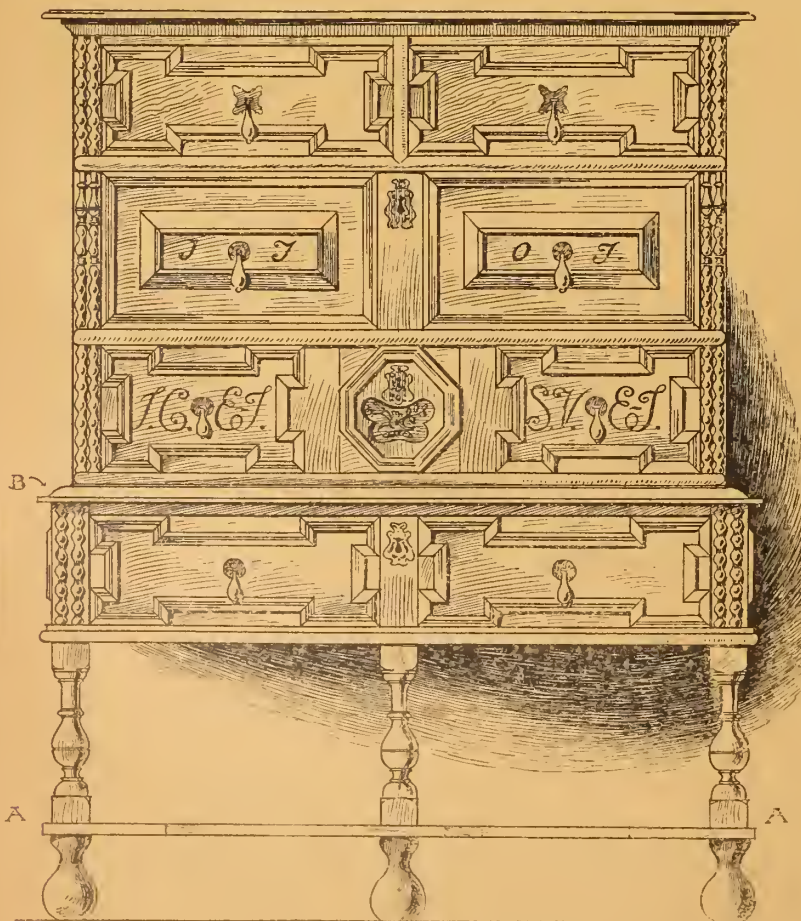
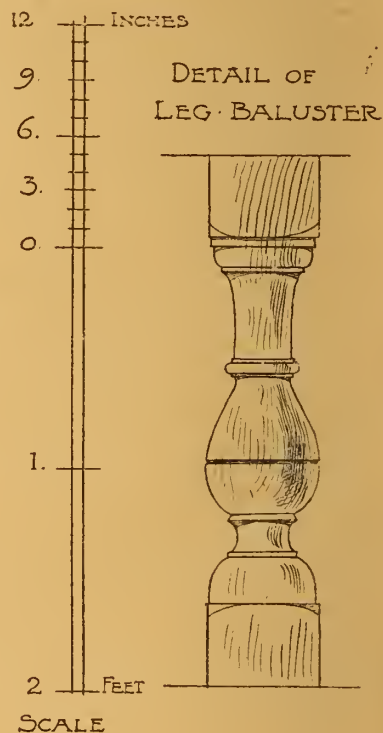
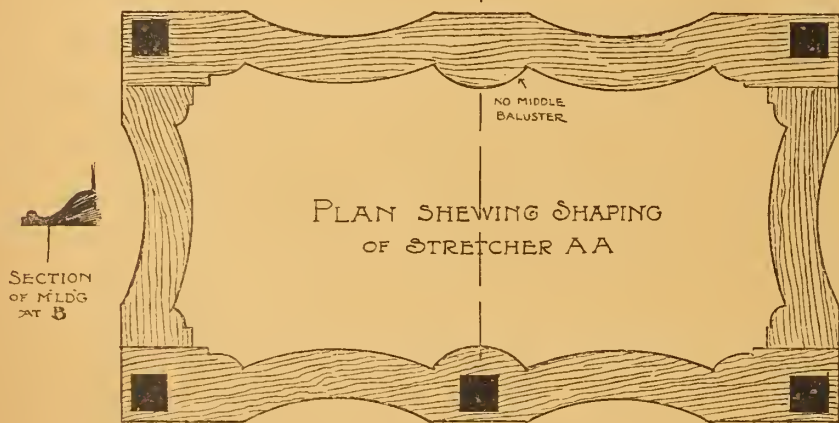
The Duke of Norfolk has purchased a site for £13,000, on which it is proposed to erect a Roman Catholic college at Oxford. The site chosen is situate in Holywell parish, to the north-east of the city, and near the Unitarian Manchester College and the Congregationalist Mausfield, the building of the Racquet Courts Company now standing upon a portion of the site.

The east window of Dodbrooke Church has been filled with stained glass, designed and executed by Messrs. Fouracre and Sons, of Plymouth. The tracery of the upper part of the window incloses the "Agnus Dei" and angels bearing censers. The five large lights are filled in as follows:—The centre light, "The Crucifixion"; the right-hand and left-hand lights being respectively St. Mary the Virgin and St. John; and the outside lights figures of St. Augustine, the first Archbishop of Canterbury, and St. Thomas-a-Becket, to whom the church is dedicated.

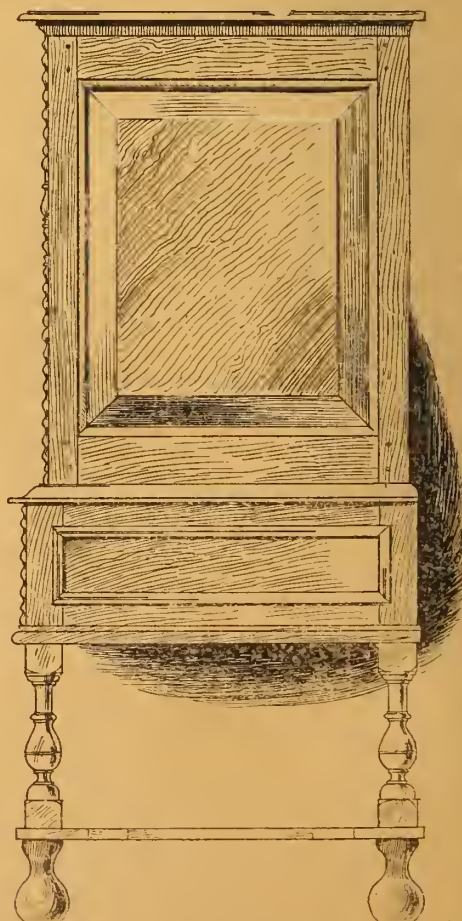
OAK CHEST OF DRAWERS
IN THE LATE-STUART STYLE.
DATED 1707.



PLAN OF TOP SHEWING INCISED INITIALS & BORDER

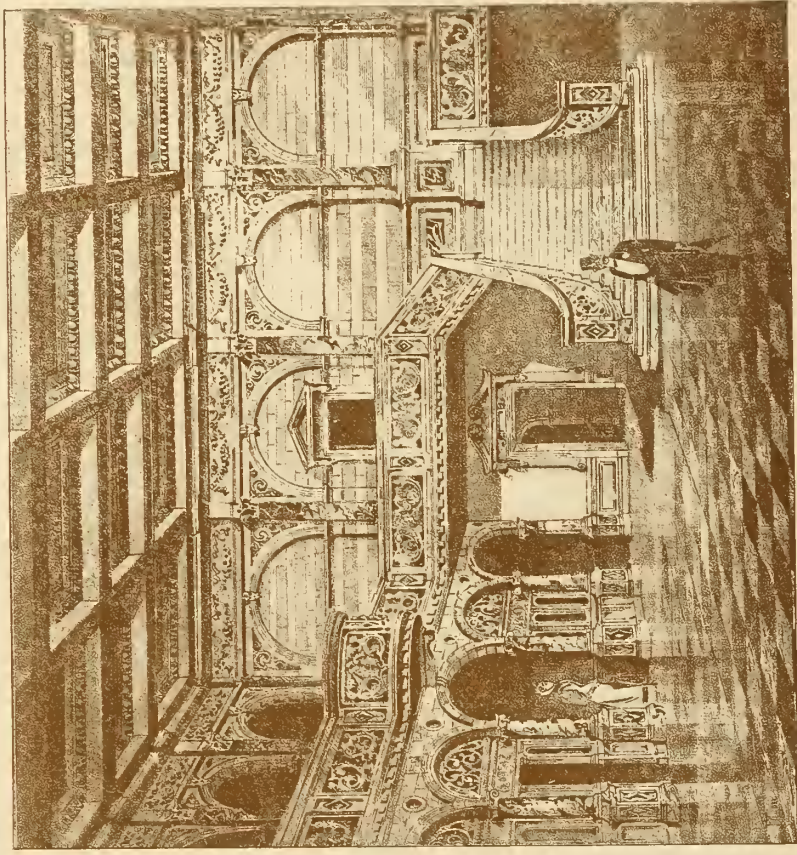


FRONT ELEVATION



SIDE

*Designed by
A. Nash-Hawthorn*



ENTRANCE HALL

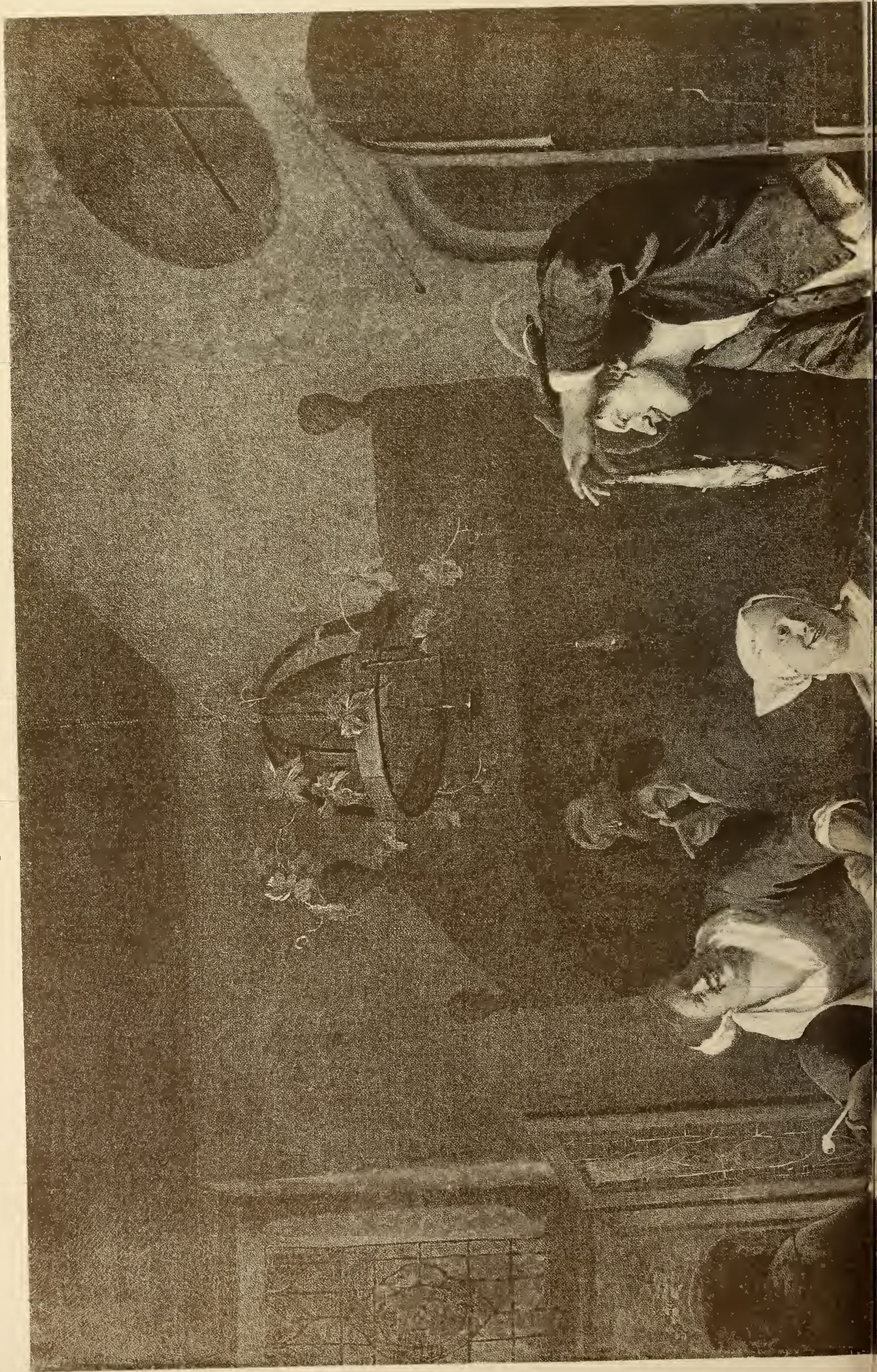




"PHOTO-TINT" by James Albert MacKenzie, Queen's Quay, London, W.C.

THE 'TROCADERO' RESTAURANT FOR MESSRS J. LYONS & CO LTD. J. HATCHARD SMITH FRIBA ARCHT

THE BUILDING DEWS, AUG 28, 1896.





"Photo-fine" by James Akerman, 6, Queen Square London W.C.

OLD MASTERS · ON THE · CONTINENT · N° 37.

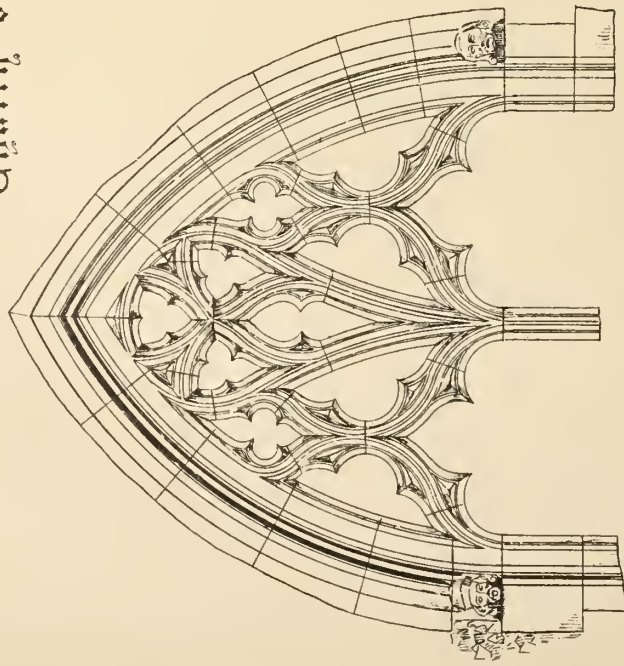
A · GALLANT · OFFERING (BRUSSELS) BY JAN STEEN · (B 1626? D 1679) DUTCH SCHOOL.

FROM A PHOTO BY FRANZ HANFSTAENGL.

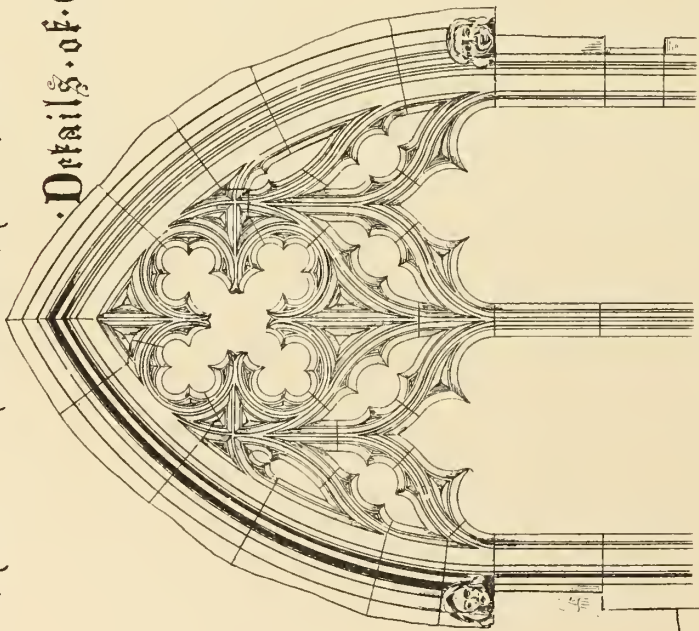
Church of S. Helen · Cliffe-at-Hoo · Kent.

DRAWN BY ARTHUR VERCOE.

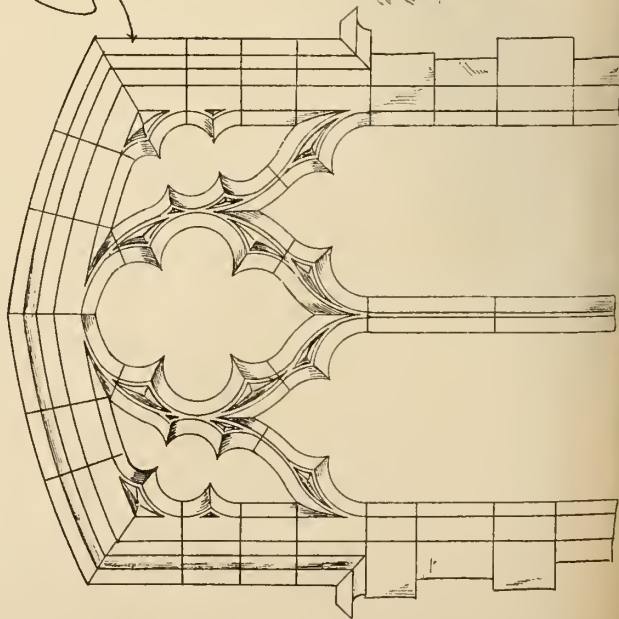
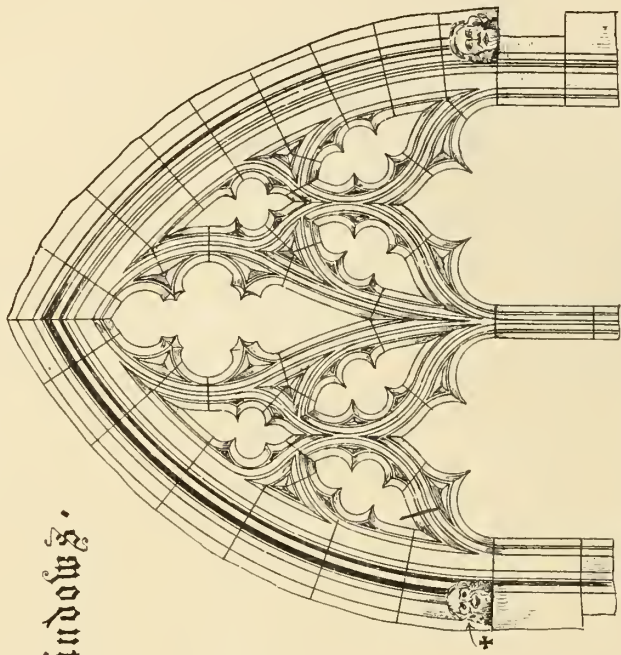
Details of Windows.



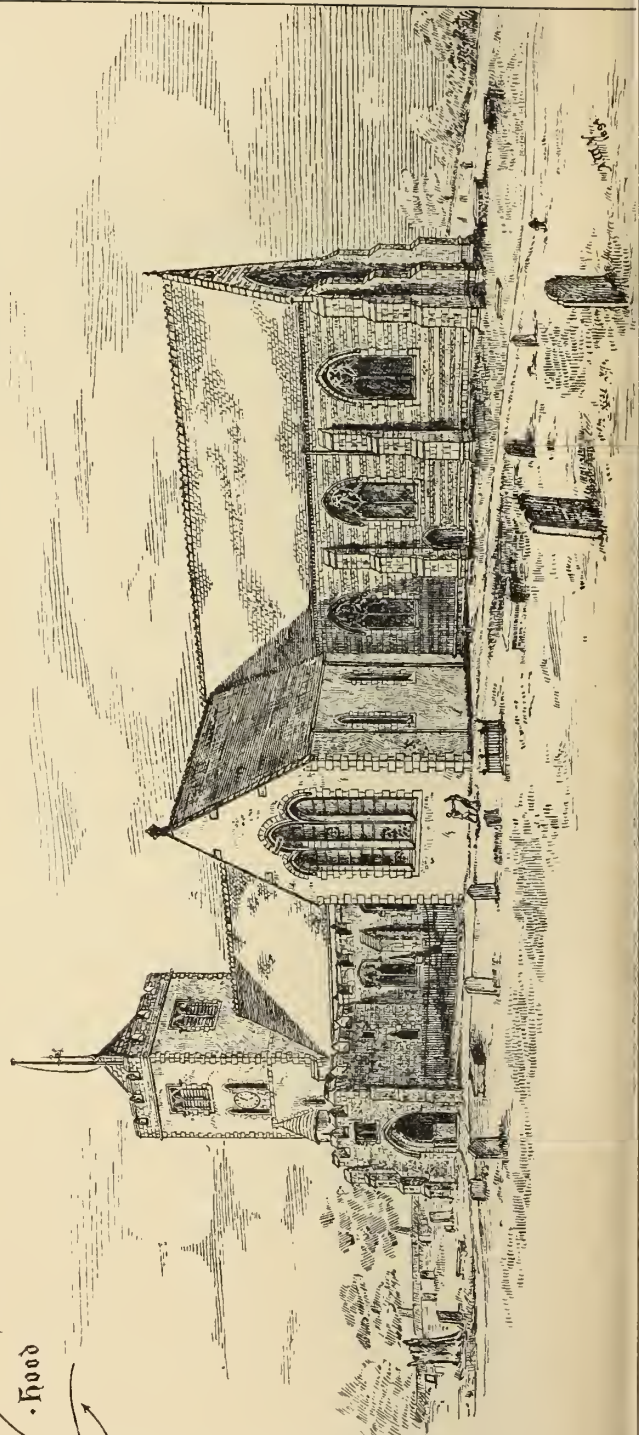
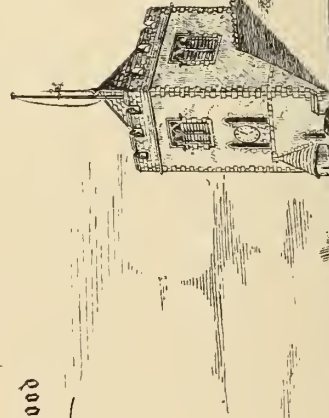
Chancel · 2nd · from · E · end ·

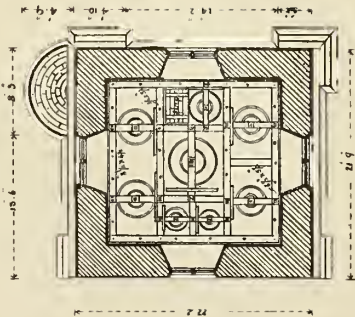
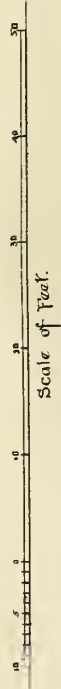


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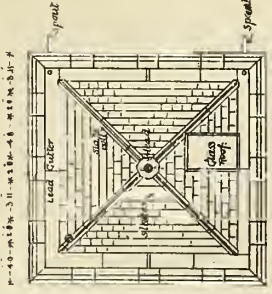


Hood

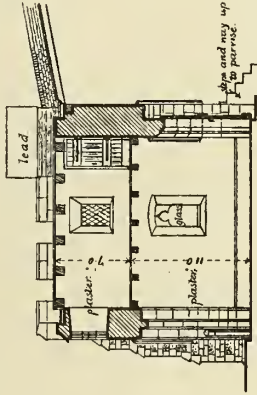




Basement Plan.

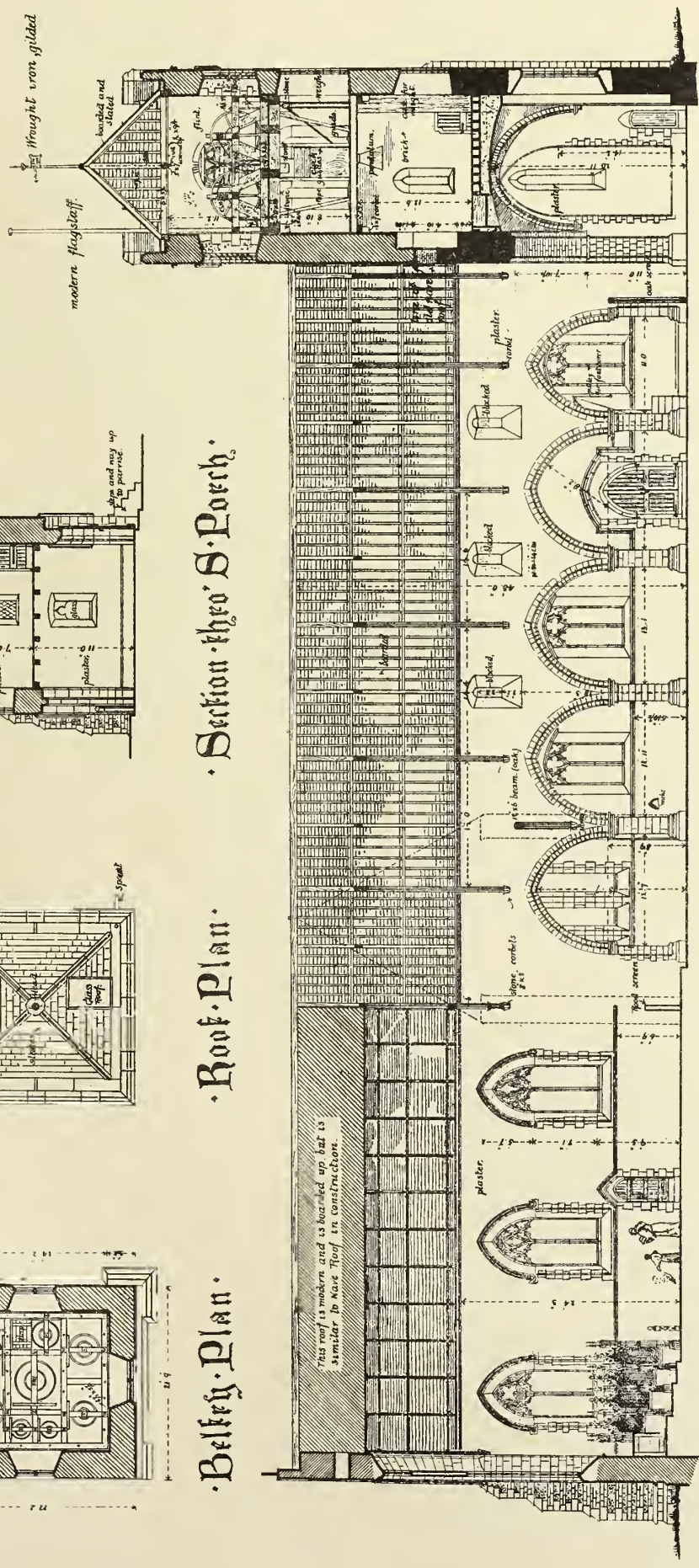


Roof Plan.



Section of the S. Porch.

Note. All stone joints from actual measurement.



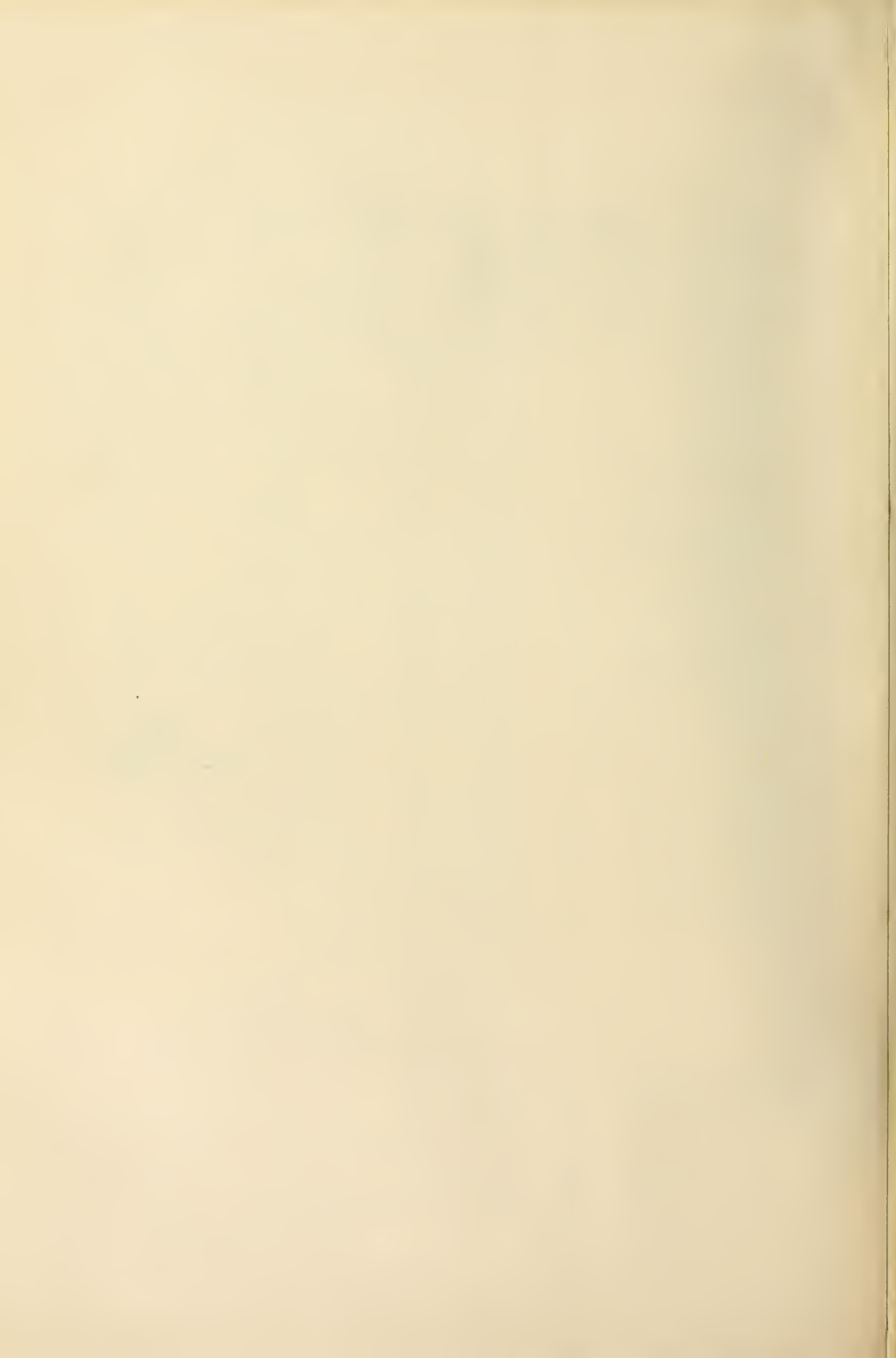
Longitudinal Section.

Part of roof circa 1260 shown thus :
" " " 1310 " "
Modern restoration " "

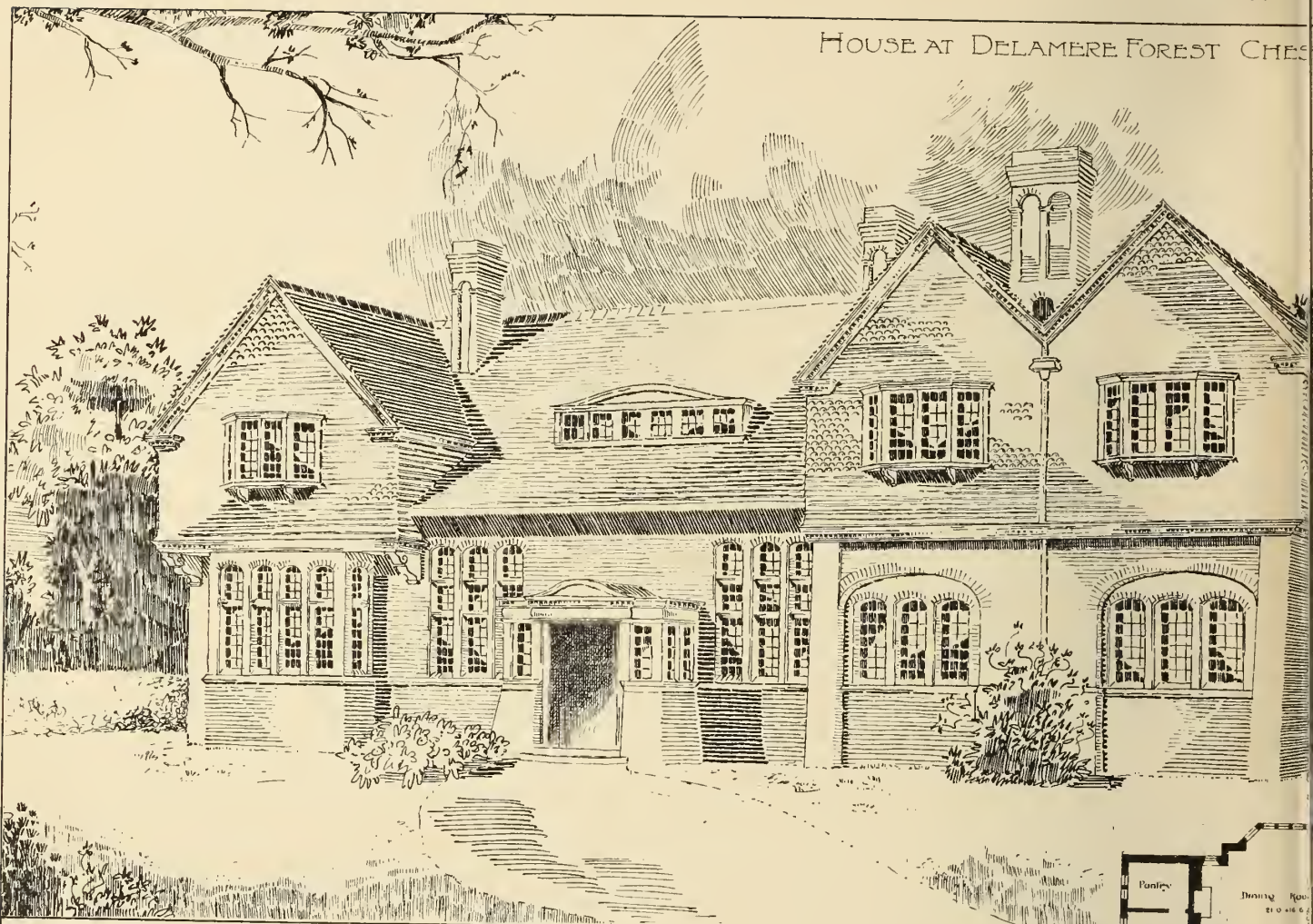
Materials, etc.
The walls are constructed of flint with bands of Kentish Rag and dressings principally (aer stone, internally they are plastered. The roofs are covered with red tiles and are mostly modern. That of the S. Aisle is a lead flat laid in 1873 and partly blocks the nave clerestory windows as shown. The N. Aisle is tiled in a similar fashion to the nave roof and the windows are clear. All the old woodwork remaining in the choir stalls, lower part of flood screen, screen at W. End, beam across nave bell opening is oak. The original roof of Nave was covered with lead and was of much flatter pitch as can be seen on the roof of tower.

Measured and plotted in the Church July 1893.

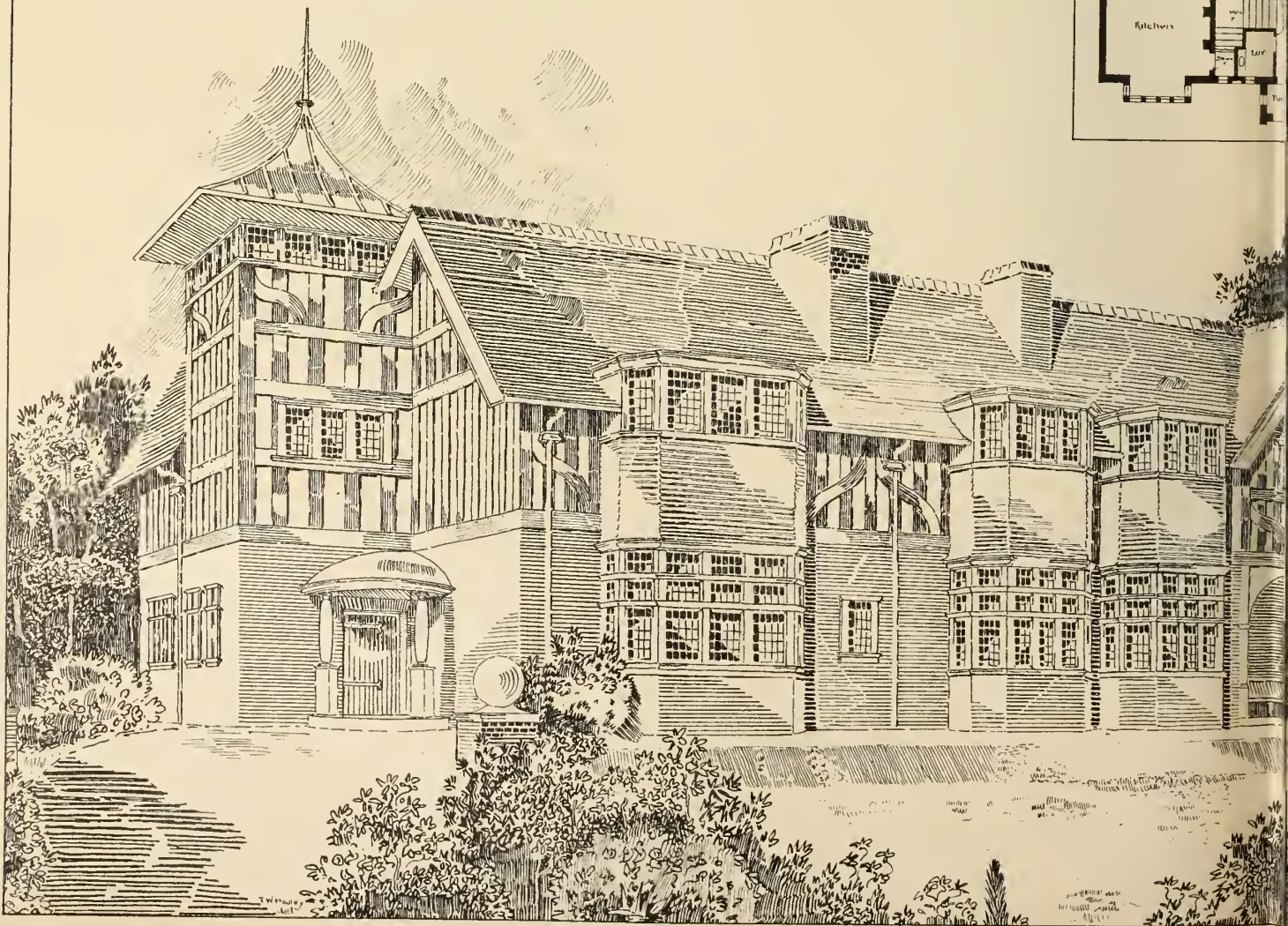
All Roofs shown in this Section (with exception of South Porch) are modern restorations
In the tower there is a fine peal of eight bells



HOUSE AT DELAMERE FOREST CHES



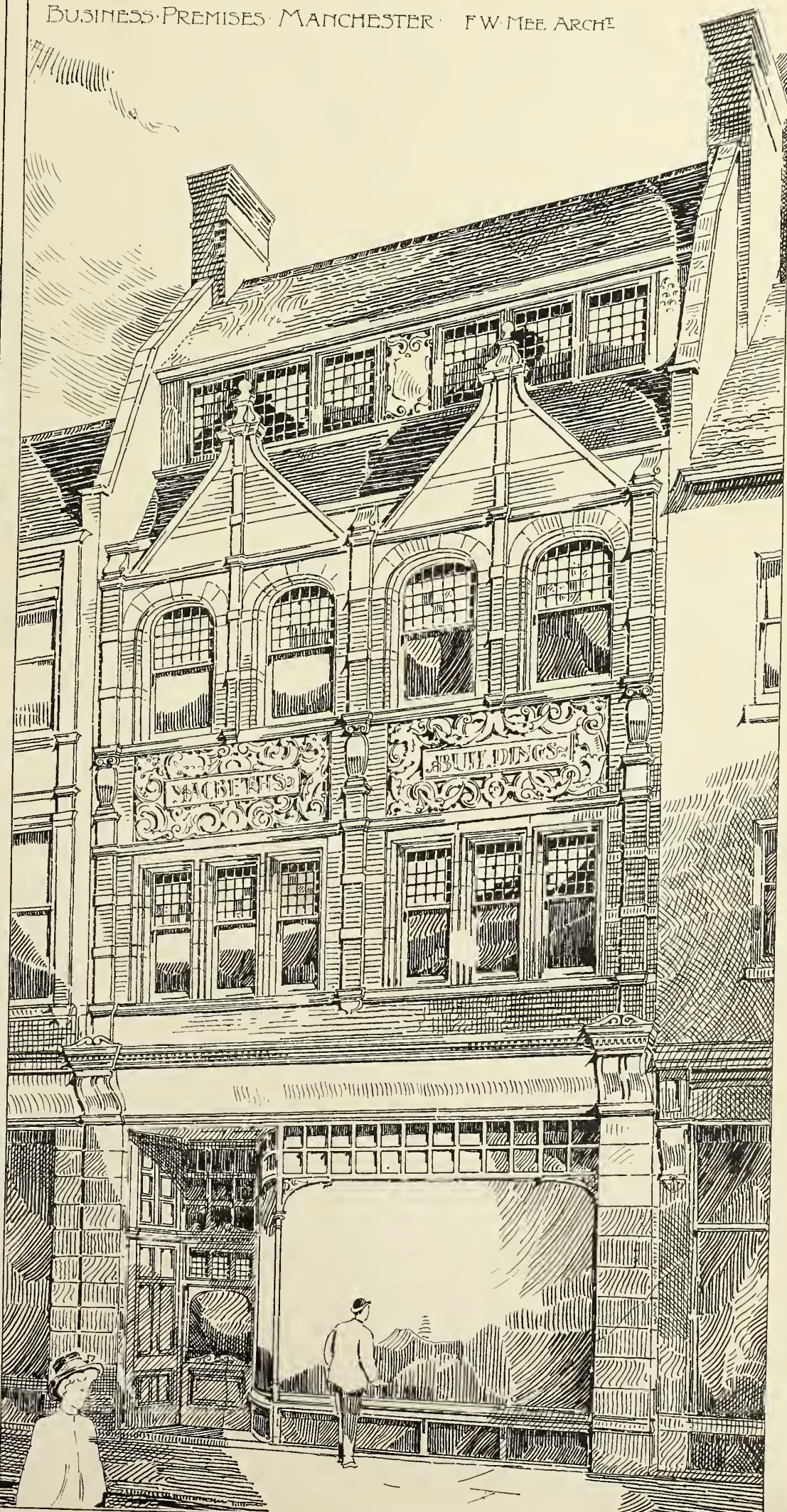
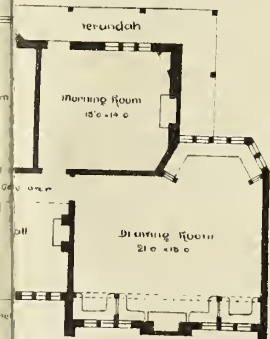
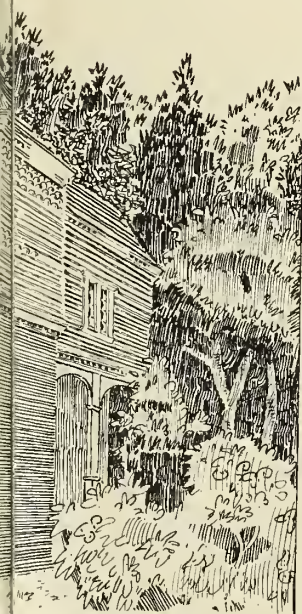
HOUSE AT BOWDON · CHESHIRE F.W.MEE ARCHT

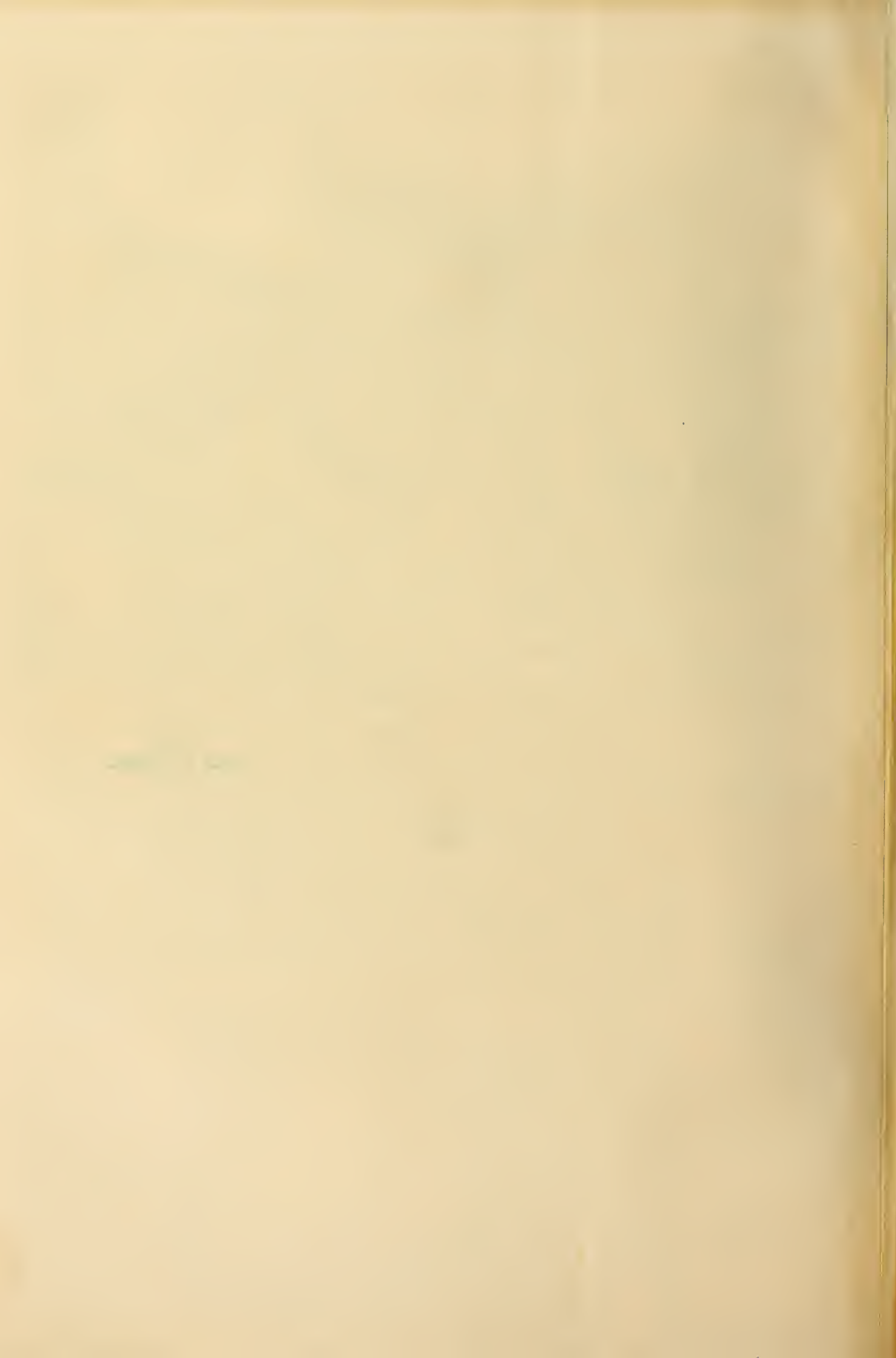


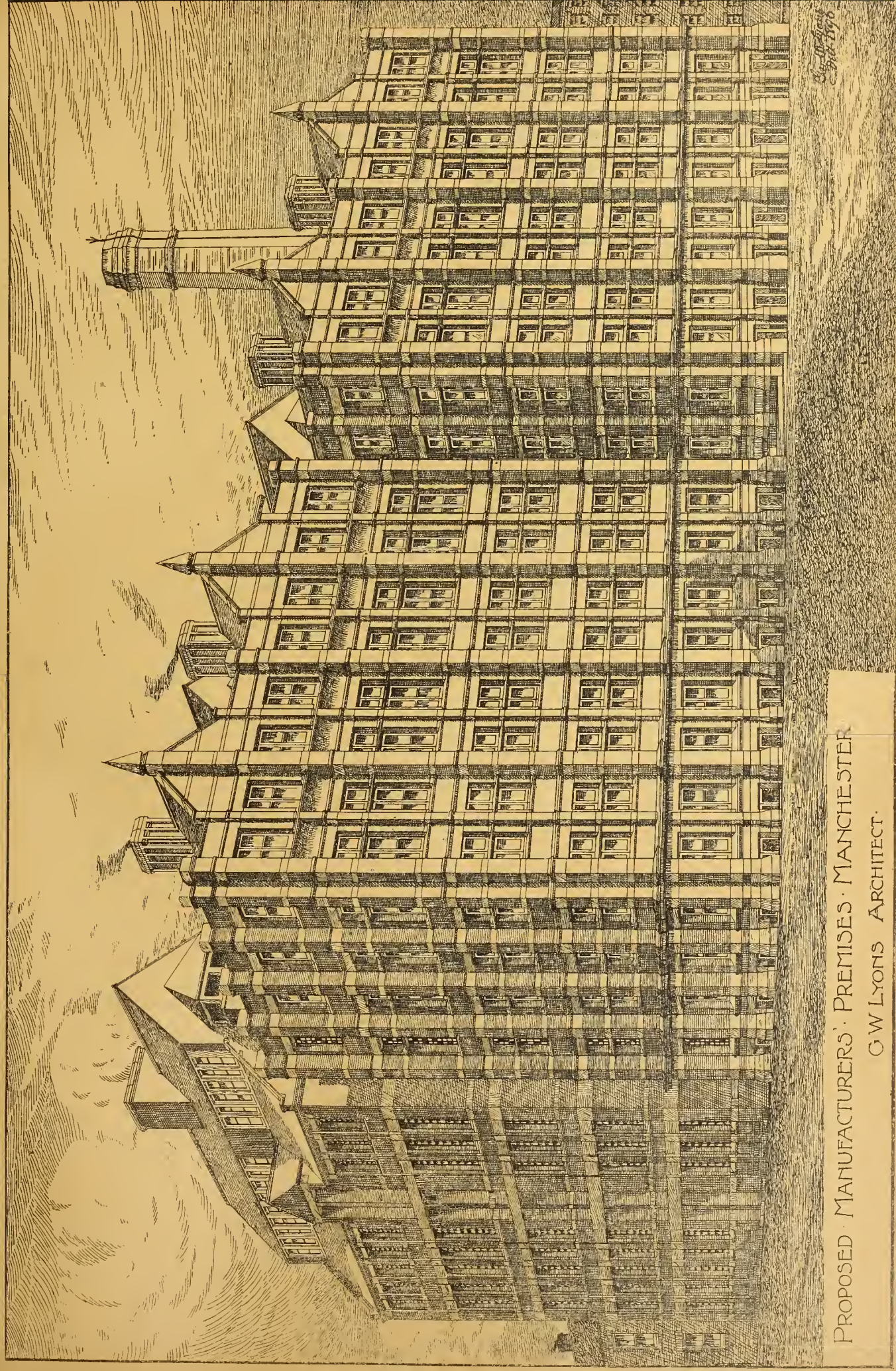
AUG 28, 1896.

SURE · FW MEE ARCHT

BUSINESS PREMISES · MANCHESTER · FW MEE ARCHT







PROPOSED MANUFACTURERS' PREMISES, MANCHESTER

G W LYONS ARCHITECT.

By G. W. Lyons
Architect

OBITUARY.

THE death of ALEXANDER HENRY GREEN, M.A., F.R.S., Professor of Geology in the University of Oxford, from paralysis, occurred on Thursday in last week. Professor Green was born at Maidstone on October 10, 1832, and was appointed to the Geological Survey of England and Wales in 1861, of which he was a member for 14 years, working more especially upon the coalfields of Yorkshire and other districts in the North of England. In 1875 he resigned his post on the Survey on being appointed Professor of Geology in the then newly-founded Yorkshire College at Leeds, and after a time he became also Professor of Mathematics in the same college. In 1888, after the resignation of Professor Sir Joseph Prestwich, he was appointed to the Chair of Geology in the University of Oxford. He threw himself heartily into the work, and at the time of his death was endeavouring to arrange an extensive and not very conveniently-housed collection. He was a Vice-President of the Geological Society of London, and was elected a Fellow of the Royal Society in 1886, on the council of which he served about two years ago. He was also President of the Geological Section of the British Association at the Leeds meeting in 1890, and was an Examiner in Geology for the University of London at the time of his death. He was regarded as a leading authority on matters relating to coal-mining, and his advice was often sought on questions of water supply. He was the author of a small volume on the "Birth and Growth of Worlds," and of a larger work on Physical Geology.

THE death, in his 74th year, is announced of Mr. GEORGE SHAW, J.P., D.L., who from 1868 till his decease has been one of the representatives of the Ward of Farringdon Within, in the Court of Common Council. He had occupied the chair of most of the various committees of the Corporation, and in 1883 was chairman of the City Commissioners of Sewers. He was especially interested in matters connected with the Guildhall Library. He was a prominent member, and formerly Master of the Plumbers' Company, and took a leading part in the initiation of the scheme for the registration of plumbers. He also suggested and carried through the interesting reproduction, from the designs of Mr. G. H. Birch, now curator of Sir John Soane's Museum, of a street in "Old London," which was a feature of successive exhibitions at South Kensington. Mr. Shaw was one of the Corporation's delegates on the board of the City and Guilds Institute, and he represented the City of London on the Association of Municipal Corporations of the Kingdom.

An organ, built by Messrs. Vowles, of Bristol, has been placed in the Calvinistic Methodist Chapel at Aberavon, Cardiganshire.

Mr. Patrick C. Keely, a well-known architect, died in Brooklyn, N.Y., on August 11th. Mr. Keely, who had designed and built over 600 churches in the United States, was born in Kilkenny, Ireland. He studied architecture under his father, and built a number of churches in his native land. He was the designer of the Roman Catholic cathedrals in Chicago, Providence, Boston, Hartford, and the unfinished cathedral in Brooklyn.

The newly-founded Society of Miniature Painters will open its inaugural exhibition at 175, New Bond-street, about the middle of September. Mr. Poyuter, R.A., Mr. H. R. Steer, Mr. Edward Tayler, and other well-known artists are members, and Mr. Alma-Tadema and Sir James Linton are honorary members. The honorary secretary is Mrs. Theo. Smith-Dorrien.

The marble statue of St. Winefride, which has been sculptured in Rome, and which is to be placed in the new Roman Catholic Basilica intended shortly to be built in Holywell, was, on Saturday, solemnly blessed by Pope Leo XIII. The statue has been executed by Mr. J. M. Wynne, and it is intended to be brought in solemn progress by road from Cardiff to Holywell. Another statue of bronze, a figure of the Sacred Heart, upwards of 10ft. high, was placed on the pedestal outside St. Winefride's Well on Monday.

The foundation-stone of a new church was laid on Friday at Carlou-in-Cleveland by Mrs. Reeve, the lady of the manor. It replaces the old edifice burnt down some fifteen years ago. The new church is to be a larger one, in Early 15th-century Gothic, and will have oak ceilings and fittings. The walls are being built of local freestone given by Earl Feversham. It is to seat 140 persons, and will cost £2,000. Mr. Temple Moore, Loudou, is the architect, and Mr. R. Broton, Bilsdale, the contractor.

Building Intelligence.

BIRMINGHAM. — Mr. Richard Cadbury has undertaken the provision of a suite of rooms for the Upper Highgate Mission, Birmingham. The main entrance to the buildings will be in the Moseley-road; but the large hall for meetings will be in the rear, with an entrance in Oughton-street, and it will provide accommodation for 2,000 persons. Underneath this room will be a gymnasium, tea kitchens, and cutting-up rooms. On the Moseley-road side there will be a crush lobby and large coffee and reading rooms. A glass-covered verandah will also be provided, and there are also to be gardens and shrubbery. In addition there are to be 15 small classrooms and a lecture hall 33ft. by 66ft., a house for the manager, and an office for the secretary. Mr. Cadbury further proposes to build 33 almshouses for old people at Bournville, and the designs for these, as well as for the institute in Moseley-road, have been prepared by Mr. Ewen Harper. The almshouses will be of one story only. Each will contain a living-room, with bay window, a bedroom, scullery, and coal-house; each will have a separate yard, while the entrance will have a porch with rustic seat. The almshouses will be arranged in two quadrangles, divided up with paths to form gardens, laid with turf, and fringed with shrubs and flower-beds. In the centre of the building is to be a wide carriage entrance, and above a clock-tower with four dials. On one side of the carriage entrance will be the matron's residence, and on the other a hall or chapel. The gables are formed of half-timber of solid oak; the buildings themselves are to be constructed of bricks, with stone or terracotta dressings. In order to provide a maintenance fund for the almshouses, a scheme has been formulated for the erection on ground adjoining of a number of semi-detached villas, to let at rentals of from £20 to £40 per annum.

CASTLEREA. — The new Roman Catholic Church of St. Patrick, Castlereagh, was solemnly dedicated on the 16th inst. by the Bishop of Elphin. The building hitherto in use as parish church of Castlereagh was over a mile from the boundary of the town, and was small in size, and possessed little architectural features. The new building is in the town, facing St. Patrick-street, on the road leading to the railway station. It is in the Pointed style, and is cruciform on plan, consisting of nave, aisles, chancel, and transepts. The aisle and clerestory windows are pairs of lancet lights. The chancel has a traceried five-light window, and a similar window pierces the front gable over the principal entrance. The height of the building to the roof ridge is 65ft.; it measures 160ft. in length in the clear, and is 61ft. wide across the transepts. The walls are of faced ashlar with limestone dressings. The tower is a campanile, standing at the northern end of the western or principal entrance. The cost of the building exceeds £13,000, of which £9,500 was for the structure itself, and the remainder for the internal fittings and decorations. The church, which is said to have been designed by the late Bishop of Sligo in conjunction with the clerk of works, Mr. John Scannell, was built under the supervision of the latter by Mr. John Clarence, of Ballisodare. It will accommodate 1,500 worshippers.

LLANDUDNO. — The finance committee recently opened tenders for the erection of the proposed new municipal buildings as follows:—William Cowlin and Son, Bristol, £17,285; John Dallow, Blackheath, £15,500; Hayward and Worcester, Bath, £15,520; William Gradwell and Co., Barrow-in-Furness, £14,940 14s. 9d.; Jacob Long and Son, Bath, £14,982; H. Willocks and Co., Wolverhampton, £14,285; Samuel Warburton, Milcs Platting, £13,300. The architects, Messrs. Silcock and Bray, were in attendance. It was resolved that in consequence of the lowest tender being higher than what was contemplated by the council, owing to several alterations and necessary improvements carried out during the preparation of the working drawings, the whole of the tenders be referred to the council in committee for further consideration. At the meeting of the council in committee, Mr. Silcock, who was in attendance, gave particulars of various improvements which had been found necessary in the scheme, and which he estimated meant an increase in the expenditure, roughly speaking, of about £1,400. With regard to the question of using Bath stone for front

dressings, the surveyor read replies from various seaside places, a list of which had been furnished by Mr. Silcock, showing that in some of the places the stone answered very well, and in other places very badly. The architect explained that everything depended, in the first place, upon the quarry from which the stone was taken, and secondly, upon the manner in which the stone was laid. It was also resolved that a committee be appointed to go thoroughly into the question of the use of Bath stone, and to consider also the possibility of reducing the total cost of the proposed building. These minutes were passed.

LLANWRTYD WELLS. — The Ven. Archdeacon Bevan, of Brecon, on the 19th inst., opened the new church dedicated to St. James. The church has been chiefly built by local workmen in the Early Geometrical style, consisting of a nave, 58ft. long by 25ft. wide, with a porch 8ft. by 7ft. at the western extremity of the south side. The chancel is 26ft. long by 19ft. 6in. wide, with a vestry on the north side 14ft. by 10ft. There are chairs for 226 worshippers. The walls are built of local river pebble-stone in flintwork; the roof is covered with Portmadoc blue slates, and Ruabon red ridging and crosses, with a bell-cot on the western gable. The contractor for these was Mr. William Thomas. The dressings are of red Grinshill sandstone; the contractor for this work was Mr. Thomas Barker. The roof is open-timbered, slightly stained and sized. The contractors for the carpenter and joiners' work were Messrs. Samuel Williams and Son. The walls are internally finished in warm tinted stucco, with cement dado. The porch, nave, aisles, and choir floors are laid with tessellated tiles, and the chancel with encaustic tiles; the contractor for these was Mr. John Richards. The windows are glazed with square and lozenge mixed cathedral tinted shades. The whole has been carried out from the designs and superintendence of Mr. David Jenkins, F.R.I.B.A., architect, Llandilo.

CHIPS.

Colouel A. G. Durnford, one of the inspectors of the Local Government Board, conducted an inquiry at the Workhouse, Selly Oak, on Friday, relative to an application made by the King's Norton District Council for sanction to borrow £4,500 for works of street and bridge improvements.

Last year a subscription list was opened for the repair of the pillar which was erected on the summit of the Breidden, in Shropshire, in 1781, in honour of Admiral Rodney and his victory over the French and Spanish in the West Indies. The work, which has just been completed, consisted of the overhauling of the monument, and was intrusted to Mr. Rees, of Smethwick. The ball on the top of the pillar, which had got out of position, was put right, and a tablet, executed by Messrs. Davies and Mantle, of Oswestry, has been fixed on the side of the pillar looking towards Welshpool. The work was superintended by Mr. Pryce, of Pentrehyllin. The completion of the work was marked by a formal ceremony on Saturday afternoon.

At the last meeting of the rural district council of King's Norton the resignation of Mr. Robert Godfrey, for the past 14 years surveyor to that authority, was tendered and accepted.

In the case of G. A. Shepherd, Shaftesbury-road, Upton Park, and Walpole-road, Walthamstow, builder, the discharge from bankruptcy has been suspended for five years ending July 28, 1901.

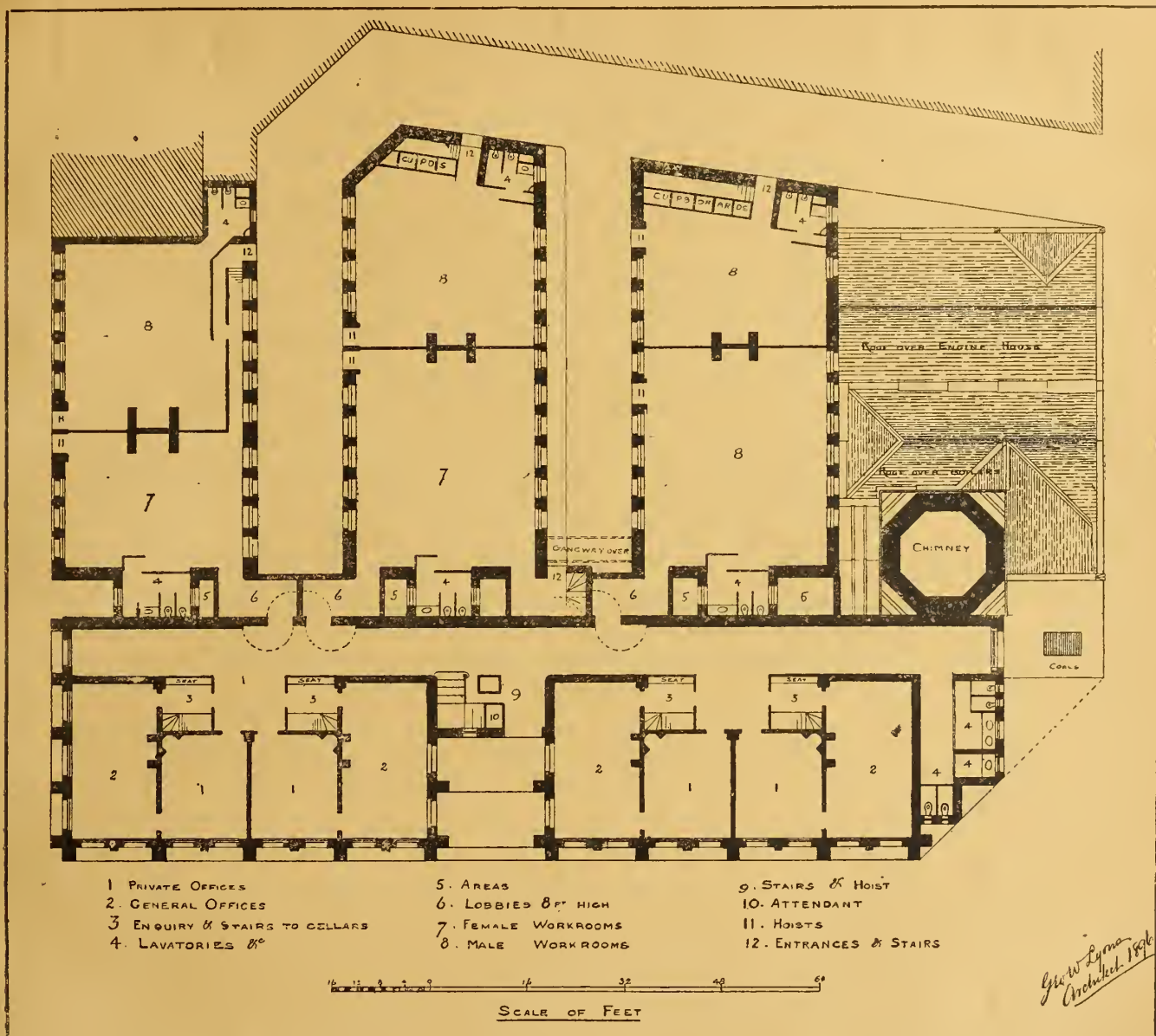
A stained-glass window has been inserted in St. Peter's Church, Sudbury, Suffolk, in memory of the late Mr. G. W. Audrewes, who was churchwarden for half a century, was mayor of the borough when the Queen came to the throne, and also in the Jubilee year.

On Sunday the Most Reverend Dr. Henry laid the foundation-stone of the new Roman Catholic Church of St. Mary-on-the-Hill at Carrumoney, near Belfast.

The Baroness Burdett-Coutts, who was accompanied by her husband, Mr. W. Burdett-Coutts, M.P., laid the memorial stone of the new schools at the Westminster Baptist Church, Romney-street, on Friday.

A new tramway line, which has been laid in Queen's-road, Aberdeen, as an extension of the present system westwards, was inspected on Friday by Major Marindin, the Board of Trade inspector, and afterwards opened for public traffic. The new line has cost about £3,000.

The ceremony of laying the memorial stones of a new Welsh Congregational church in Bank-street, Ponkey, Ruabon, took place on Tuesday week. The chapel will have seating accommodation for about 230, and the estimated cost is £1,045.



PROPOSED PREMISES, MANCHESTER, FOR MR. SAMSON HARRIS.

THIS building will accommodate cap, slipper, and clothing manufacturers, with suites of offices adjoining, and is proposed to be erected in a congested part of the city. The offices are divided from the workrooms by a thick wall, with double iron doors in same. The workrooms are planned so that portions of them can be let off to tenants requiring only rooms and power, but by a small alteration can be adapted with an office to same on each floor. The architect is Mr. G. W. Lyons, of Higher Broughton, and the works will be commenced on the expiration of the tenants' leases in the property at present on the site and the old buildings cleared away.

THE JUBILEE OF LLANDUDNO.

IN a letter to the *Liverpool Mercury*, Mr. O. Williams, of Plas Lodwig, Upper Bangor, gives the following account of the part he played half a century ago in originating this popular and beautiful watering-place:—

In the year 1846 a particular friend, in Liverpool, on a very fine bright summer day, happened to say to me that he was going to a mine meeting in Llandudno, and he asked me to accompany him, as it would be a nice little run for me. "Where is Llandudno?" was my reply. "At the foot of the Great Orme's Head," he answered. After a little chat I agreed to go with him. On landing from the steamer I ejaculated to Mr. Jones, my friend, "What a charming watering-place this would make," as I looked upon the Little Orme's Head on my left; the Great Orme's Head on my right; and the Gloddaeth mountains in front; for then there was no town—only a few

thatched cottages, in which the miners resided. Then, it may be mentioned, there were two mines worked in the Great Orme's Head, one being near to the entrance to the present parade and pavilion, and called the New Mine, and the other was near the other end of the Head—its name was the Old Mine. Large quantities of copper ore were being obtained from the New Mine and Old in 1846, and for a few years afterwards, when the sea broke in and drowned the New Mine. A very large sum was expended on new and strong machinery in the hope of getting the water out, without success. And near the cottages, nearly opposite Church Walks, fronting the sea, was a small farm, known as Pwll-y-Gwichiad. I suppose George Eliot's eyes rested upon this farm and the cottages about 40 years ago, when she came to the conclusion that Llandudno was ugly.

Well, as soon as I landed, being in Llandudno for the first time, I rambled about and found my way to the top of the Great Orme's Head.

My friend went about his mining business, so I had to do the best I could alone, and a very great treat I had. In the afternoon the shareholders in the mines dined at a small hotel, called the King's Head, on the side of the mountain; it is still there. At that time it was the principal hotel. I was invited to dine with the shareholders. At the table was a Mr. John Williams, who was the secretary of the mines company. And my friend mentioned to the company the suggestion I had made—namely, that Llandudno would make a fine watering-place. This created a great laugh, and brought forth a good deal of banter. My reply was, "Well, gentlemen, deal out as much chaff as you like; my real opinion is that should Llandudno ever become a watering-place, letters will soon be addressed 'Conway, near Llandudno,'

instead of 'Llandudno, near Conway,' as at present."

The next day my friend and I returned to Liverpool. Two or three days afterwards I received a letter from the Hon. Edward Mostyn Lloyd Mostyn, who resided at Gloddaeth, Llandudno, inviting me to call upon him on business. Then I did not know Gloddaeth or Mr. Mostyn. My reply to him was that possibly the letter was intended for some other person, and misdirected, but if for me I asked in my letter of reply the nature of the business he wished to see me upon, so that I might be the better prepared to meet him. It appeared that the Mr. John Williams who was the secretary to the mines was also agent for the Gloddaeth estate. He informed the Hon. Mr. Mostyn of the suggestion I had made about Llandudno being very suitable as a future watering-place, and Mr. Mostyn in his reply to my last letter to him referred to that fact, also that he desired to see me on that subject.

The London and North-Western Railway Company were about to construct a very large goods station for the north end of Liverpool in front of the Clarence Dock; also a tunnel for goods from it under the town to the Edgehill Railway Station. I was engaged with another gentleman in scheduling property all along the line which would be over the line of tunnel, also that which was on the land required for the goods station, for the book of reference to be lodged in Parliament with the plans of the station and the goods tunnel. (That is the tunnel which has been recently appropriated for the passengers of the Atlantic and other steamers.) I informed the Hon. Mr. Mostyn that I could not be at liberty to meet him until the plans and book of reference had been deposited in Parliament, which would be about the beginning of the following December. That being

done, by appointment I met Mr. Mostyn and his agent in Llandudno, arriving there by a steamer. There was a bathing-box a little above high-water mark belonging to Mr. Jones, which was a fixture. Because it rained heavily, Mr. Mostyn, his agent, and I entered the box for shelter, and there conversation commenced. In reply to questions, I said that the first thing to be done was a survey of the land that would be required for the future town. Afterwards a plan of the streets should be made for approval, and specifications for the construction of the roads and sewers. Also, I suggested that a table should be prepared to show the terms on which the land should be leased to builders. Because Llandudno was so very little known then, I felt that the proper thing to do was to lease the land for 75 years rather than part with the freehold, for I could not see that the owner of the land was at all likely to obtain the sum per yard for it as a freehold which I fancied I saw in the freehold of a future. The Honourable Mr. Mostyn there and then in that bathing-box instructed me to begin the work, which I did. In due course the plans and other matters above named were completed, and sent to Gloddaeth for approval. All were forwarded to London to the steward of the estate, Mr. C. Lloyd, and the solicitors, for examination and approval. Those gentlemen returned the parcel to Gloddaeth, with a few words on notepaper to the effect that whoever was the person who had done that work was the one to carry it out. The same parcel and the note were forwarded to me from Gloddaeth.

In the above I have given a short sketch of the history of Llandudno. Now it is 50 years since I began my work. This is, therefore, the jubilee year of Llandudno's history as a watering-place.

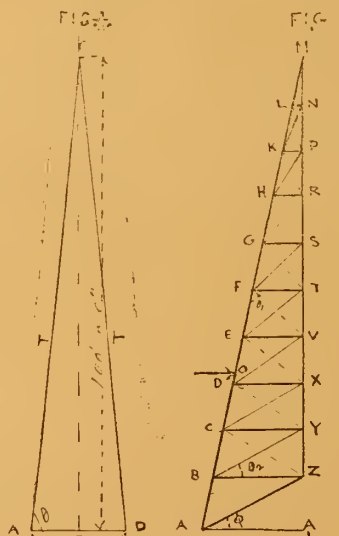
FRENCH WOOD-CARVINGS FROM THE NATIONAL MUSEUMS.*

WE have received a copy of this beautiful work on French wood-carvings from South Kensington Museum. These examples are printed in collytype from photographs specially taken from the carvings. They have been classified in chronological order, and refer to the late 15th and 16th centuries, and have been selected from the collection purchased by the South Kensington Museum last year. The carvings are divided in point of time into Early, Middle, and Late. The editor has derived much of her information from Mons. A. de Champeaux's work "Le Meuble," to whose work she recommends the student. This part contains 18 plates, 14 of which are Gothic, and the remainder Renaissance examples. The late 15th-century Gothic oak coffer, given in plate I., is a very fine Northern French instance of floral and fruit ornament which is not common. The panels are carved about $\frac{1}{2}$ in. in relief and the figures $\frac{3}{4}$ in. The panels are subdivided into two compartments and are well filled. The figures represent SS. John, Peter, and James. The author refers to some points of interest in the work, as the sloping towards the pattern of the inner line of the margin of panel; also the way the moulding stops against the muntin or centre upright piece which receives the ornamental iron lock, and a chamfer takes the place of moulding along the bottom of panel. Three upright muntins—one central and two at the ends—separate the panels. A carved Gothic oak cabinet (Plate II.) of the same date, in two horizontal divisions richly panelled, is another beautiful example. The centre and side doors of the upper part have tracery panels, and the lower long panel of flowing tracery is very rich. The section of top moulding is admirable in profile. The next plate gives an oak seat or bench-end carved with Gothic tracery of a rich and delicate kind. A late 15th century traceried panel from the Abbey of Cluny is a fine example of Gothic tracery relief, as also is the fragment shown in the next plate. The very tool-marks and grain of the oak are recorded in this beautiful collytype. Another oak panel of good design (late 15th century), with ogee arch and crocketed head, the spandrels filled in with tracery of late rather German character, has a shield bearing the sacred monogram. A very rich oak chest of the same date, with three panels with ogee arches and crockets, and deeply relieved tracery filling, with pinnacled buttresses between, decorated with scales, is especially worth notice. We also notice a fine oak door with tracery panels;

a beautiful spiral staircase casing (hardly a vestibule, as described), a unique specimen of Late work; Plate X., an oak retable, doors, panels, &c. Miss Eleanor Rowe's work is an extremely valuable contribution, and will be of much use to professional and amateur wood-carvers. The authoress's critical remarks are useful. She refers to the value of mouldings as an indication of date, the need of margin to carved surfaces, the value of sloping the inner line of margin towards the ground of the carving, the effect of V-cut grooves to form a dark line round the panel and framing, and other points. Again, she indicates in every case the depth of relief, which enables the student to realise the effect. Many of the examples are from the Emile Peyre collection. This collection of beautiful collytypes has been published with the sanction of the Science and Art Department of the Committee of Council on Education. The plates can be purchased separately at 6d. each, and are published in portfolios of 18 plates. Other series will shortly be published.

CONSTRUCTION OF STEEL SPIRES AND STEEPLES.—IV.

IT will be manifest, from the example of a general method of ascertaining the stresses upon structures of the character before us, that the stresses upon the bracing between the sloping rafter and the vertical hollow column or shaft are comparatively very small. They will, in fact, be subsequently found to be so small in amount as not to require consideration, except so far as the stress upon the diagonal bar and horizontal strut



in the last panel but one nearest the support is concerned. The reason for the bracing, both horizontal and diagonal, being so light is due to the nearly vertical position of the truss, which brings almost the whole static load to be borne by the rafter, which thus acts the part of an upright column. In our first article, the effect of the position of the truss, or, in other words, the effect of the angle of the pitch of the truss, or the value given to θ , was fully demonstrated. There are one or two points to be attended to before proceeding further with our design. In Fig. 1, which represents an elevation of one half truss or principal, the height of which is 100ft., and the angle of pitch 75° , the thick lines show members in compression and the thin lines those in tension. In the first place, the direct stress upon any one panel length of the sloping rafter and upon the horizontal strut, resulting from the action of a single weight at their common apex or joint, will be constant for each of them respectively. Make θ_1 equal the angle between the horizontal strut and the sloping rafter, then—

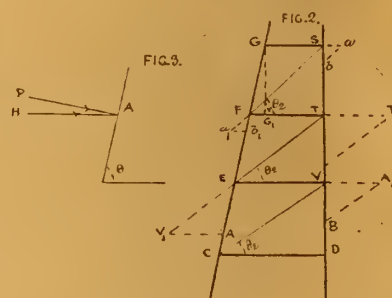
$$\theta_1 = (180 - \theta),$$

but θ is constant, so also is θ_1 , since it is the supplementary angle of that of the pitch of the roof, and—

$$\theta_1 = (180 - 75) = 102^\circ.$$

It will be also apparent that the actual stress upon any one panel length, such as D E of the rafter A M in Fig. 1, due to the single weight at the apex E, may, without sensible error, be

regarded as equal to that weight. Let Fig. 2 be an elevation of any one panel length drawn to an enlarged scale. From the point G draw the dotted line G G₁, representing any weight, W,



and let S equal the stress upon the panel length G F, then—

$$W = S \times \cos. (90 - \theta),$$

from which we obtain—

$$S = W \times \sec. (90 - \theta).$$

Inserting the value already given for θ , the equation becomes—

$$S = W \times \operatorname{cosec}. \theta = 1.02234 W$$

which is practically the same as the vertical load at each apex, supposing W to equal one ton in this particular application of the general rule. Following out the same method for determining the stresses, put S₁ for the stress upon the horizontal strut and W equal the weight unity as before. From these data we obtain—

$$W = S_1 \times \cot. (90 - \theta).$$

Substituting value for θ , and reducing—

$$S_1 = \frac{1}{4.7046} = 0.21256,$$

it is evident, therefore, that the summation of all the separate direct stresses upon the last horizontal strut B Z in Fig. 1 would be hardly worth taking into account. It must be borne carefully in mind that this observation is altogether independent of the stresses arising from the pressure of the wind, which we have yet to ascertain.

The summation method of calculation does not apply to the stresses due to the static load at the respective apices of the half-truss, so far as relates to the members F S and S T in Fig. 2, and the other diagonal braces, and other upper and lower panel lengths of the vertical hollow column, M Z, in Fig. 1. As the stresses upon these vertical and diagonal members are also comparatively small, the maximum can be taken as ruling generally those of a lesser amount. It remains, therefore, to determine under what conditions the stress upon these parts of any particular panel length becomes a maximum, and thus save a large amount of unnecessary and tedious calculation. In Fig. 2, the stress S₁ upon the strut G S is equal to F G₁. Upon G S produced plot off to the same scale S a equal to F G₁, draw a b parallel to F S, and the lines a b and S b will give the respective stresses upon the diagonal brace F S, and the vertical panel-length S T. To find when both of these are a maximum, let S₂ = stress upon the diagonal F S, and S₃ = that on S T, then—

$$S_1 = S_2 \times \sin. (90 - \theta_2) = S_2 \times \sec. \theta_2,$$

from which—

$$S_2 = S_1 \times \operatorname{cosec}. (90 - \theta_2).$$

Similarly we have for the value of S₃—

$$S_1 = S_3 \times \cos. (90 - \theta_2),$$

so that S₃ becomes in the equation—

$$S_3 = S_1 \times \tan. \theta_2.$$

Both these trigonometrical functions vary indirectly proportionally with the value of the angle θ_2 , and the formula for each becomes, therefore, a maximum when the angle θ_2 also reaches its maximum. On referring to Fig. 1, it will be seen that this maximum is attained when—

$$\theta_2 = \text{angle } L N K P = 67^\circ.$$

As practically the bracing in the two topmost panel lengths of the truss must be a good deal stronger than what theory demands, it is not necessary to take so extreme a general value for θ_2 . If we make $\theta_2 = 52^\circ$, we shall obtain satisfactory results. One more calculation is required. Upon S F produced, plot off F a₁ = a b, draw a₁ b₁ parallel to F T, and these lines will represent the increment of stress upon F E and

* Edited by ELEANOR ROWE. First series. London: B. T. Batsford, High Holborn.

F T. It has already been assumed—in fact, shown—that the stresses upon the sloping rafter are so nearly equal to the vertical loads themselves, that the trifling differences may be disregarded, and consequently the increment of the stresses last determined may be considered equal to those represented by the lines *S a*, *S b*, and *a b*.

The design in Fig. 1 is a little different from that shown in our last article, and has the advantage of placing the shorter bracing members in compression, and the longer in tension. The diagonal bar *A Z* may be regarded as a strut, transmitting the total vertical stress upon the last panel-length *Y Z* of the hollow columns to the final point *d'appui* at *A*. Any tendency that the sloping rafter might display towards spreading out at the support *A* will be checked by the "steel cradle," which will tie back the thrust of the half-truss in the direction of the line *A A*, in Fig. 1. Summing up, on the assumption that there is a load of one ton at each of the sloping panel lengths from *L* to *B*, and also an increment of stress at each apex, except that at *L*, the total stress upon the lowest panel length will be equal to—

$$9 (1 + 0.25) = 11.25 \text{ tons.}$$

Similarly, the total stress upon the horizontal strut *B Z* may be taken equal to the summation of the direct stresses and those of the increments, that is equal to—

$$9 (0.25 + 0.25) = 4.5 \text{ tons.}$$

So also for the stress upon the lowest diagonal tie *B Y* the amount is equal to—

$$8 (0.40 + 0.40) = 6.4 \text{ tons.}$$

The stress upon *Y Z* will, by the same reasoning, amount to—

$$8 (0.20 + 0.20) = 3.2 \text{ tons.}$$

Lastly, let *S*₁ be the total stress on the sloping member *A Z*, *S* that on *Y Z*, and ϕ the angle, as shown in Fig. 1. Then—

$$S = S_1 \times \csc \phi.$$

Substituting the values of *S*₁ and ϕ , the equation becomes—

$$S = 3.2 \times 2.1627 = 6.6 \text{ tons.}$$

We have now to consider the effect of the pressure of the wind, and first, since the separate trusses are all firmly and rigidly connected together over the supports, they come under the category of those which have "both ends fixed." This condition very much simplifies the calculation, as it is necessary to regard the wind-pressure only upon one side of any truss, the maximum stresses can be obtained without the trouble of investigating those of lesser amount induced upon the various component parts of the half-truss to leeward. It will be well, perhaps, to clearly define the manner and direction in which the wind is assumed to act, although probably it can, and does, blow at different times at almost any and every angle, except the actually vertical. The direction of the wind is then assumed to be horizontal, so far as concerns bridges, roofs (especially those of an excessively high pitch, as in the present instance), chimneys, and all similar structures opposed to its violence and fury. Having once accepted this assumption, the pressure of the wind in any other direction can be ascertained sufficiently approximate for all practical purposes, although at the same time it must be admitted that our real knowledge of this frequently irresistible natural force is exceedingly imperfect. Many very elaborate and valuable experiments have been made by engineers and scientists nearly all over the world; but the conditions attached to each particular case are often so widely at variance that no hard-and-fast rules can be laid down. Generally if *H*, in Fig. 3, be the horizontal pressure of the wind against any inclined surface, it causes a perpendicular or normal pressure which may be represented by a line *P*. Many years ago Mr. Hutton deduced a formula for finding the value of *P* for any given value of *H*. More recently Professor Unwin has stated that Duchémin's formula gives equally satisfactory results. As this latter is much simpler than Hutton's, it is here given. Taking *H* and *P* as before, and making θ equal to the angle of pitch of roof, we obtain—

$$P = H \cdot \frac{2 \times \sin \theta}{1 + \sin^2 \theta}.$$

The following table, which is a very useful one, gives the values of *P* for different values of θ , when *H* = 40lb. to the square foot.

One rather important point to be kept in mind with respect to the general action of wind pres-

sure is, that its average pressure on a comparatively large surface is less than upon a smaller surface. This important fact was satisfactorily established by the valuable extensive experiments carried out by Sir Benjamin Baker during the construction of the Forth Bridge.

Angle of Pitch of Roof.	Values of P.	Angle of Pitch of Roof.	Values of P.
10°	13.35	50°	38.45
20°	21.18	60°	39.80
30°	29.45	70°	39.96
40°	34.86	80°	40.26

In the present instance, since the exterior surfaces of the octagonal sides of the spires so nearly approach the vertical, the wind pressure may be supposed to act in the direction shown by the arrow at *O* in Fig. 1—that is, horizontally. It will be evident, therefore, that the wind pressure upon each of the panel lengths *A B*, *B C*, *C D* . . . *K L* may be taken as acting directly at the points *A*, *B*, *C* . . . *K*, *L*, and thus producing a compressive stress upon all the horizontal transverse struts. These can be resolved at the correspondingly opposite panel apices belonging to the vertical member of the truss, and the maximum stresses determined in the same manner employed for those arising from the static loads. It is quite sufficient to compute the stresses on the assumption that the wind is blowing in one direction, as similarly situated members in the same panels will be equally stressed when the wind pressure is in the opposite direction. In order to find the total wind-pressure, and also the proportional amount assumed to be acting upon the apices of the respective panel lengths, let Fig. 4 represent an elevation of one of the sheeted sides of the spire, in which the inclined members of the half-trusses radiating from the central hollow octagonal shaft are marked by the letters *T T*. A plan of this elevation, with the diagonal and horizontal cross-bracing, was given in Fig. 6, in our last article. If we make *H* equal the vertical height of the spire, *L* the length from base to summit of the sloping surface measured along the centre line, and θ equal to the angle of pitch, as before, then—

$$L = H \times \sec. (90 - \theta).$$

Substituting and reducing, the value of *L* becomes—

$$L = H \times \sec. 12^\circ = 102\text{ft.}$$

It will be seen, on reference to Fig. 4, that each of the radiating half-principals *T T* supports only one half of the total wind-pressure on the whole triangle *A C D*. If *P* equal the pressure of the wind per square foot in pounds, *B* the base of the triangle, and *P*₁ the total pressure on the exposed sloping surface, then—

$$P_1 = \frac{P \times L \times B}{2}$$

and if *P*₃ be the total wind-pressure on each half-principal, we obtain—

$$P_3 = \frac{P_1}{2} = \frac{P \times L \times B}{4}.$$

As the example of construction under analysis is in a very exposed situation, it will be advisable to assume a high value for the wind-pressure per square foot—that is, the value of *P* may be taken equal to 50lb. Putting *B* equal to 15ft., and solving for the value of *P*₃ in tons, we have—

$$P_3 = \frac{50 \times 102 \times 15}{4 \times 2,240} = 8.53 \text{ tons,}$$

which is in round numbers equivalent to a horizontal force of one acting at each apex of the individual panels. Similarly to the case of the stresses due to the action of the vertical or static loads, the individual wind pressures at the apex points *B C* . . . *K L* in Fig. 1 will produce direct as well as indirect, or transmitted stresses in all the members of the truss. In Fig. 2, plot on the line *F T* produced *T T*, equal to one ton, draw *T₁ V* parallel to the diagonal brace *T E*, and we obtain *T T₁* equal to the stress upon the horizontal strut *F T*; *T₁ V* measured to the scale gives the stress upon *T E*, and *T V* that upon the vertical panel length designated by the same letters. A repetition of the same process, on the assumption previously made of the value of the angle θ , being a constant, can be made at each apex of the inclined member of the truss and a similar result obtained. There are, however, the transmitted stresses, or increment of stress upon each member at each inferior apex to be considered. These may be ascertained by producing the diagonal

brace *T E* to *V*₁, making *E V*₁ = *T₁ V*, and pursuing the same graphic method of solution already followed in computing the static stresses. It will be noticed that while there are no direct stresses upon the sloping panel lengths of the truss, the transmitted stresses are very much greater than the same description of stresses resulting from the influence of the static loads. Upon the bracing, both horizontal and diagonal, the similar stresses are increased. It remains now to sum up the maximum stresses upon the different parts of the truss, and from their amount, in combination with certain practical information and data, to assign to each member and component part its particular form and sectional area.

THE DECORATION OF THE SCOTTISH NATIONAL PORTRAIT GALLERY.

MR. J. R. FINDLAY has given a further donation of £10,000 for the external and internal adornment of the Scottish National Portrait Gallery at Edinburgh, bringing up the sum of his donations for the building and equipment of this building to £63,000. The offer has been accepted by the Scottish Board of Manufactures, who have adopted the recommendation of their architect, Dr. Rowand Anderson, and have decided to carry out forthwith the following works.

Four of the statues originally suggested to be placed on the exterior of the Gallery buildings will be undertaken without delay by the Board at a cost of about £200 each, and these statues will consist of George Buchanan, Dunbar the poet, James Watt, and David Hume. All the carved stonework of the interior in the hall and ambulatory which still remain unfinished will be gone on with as soon as possible; selected students of the School of Applied Art are to be invited to make designs for this work, the successful students to receive money awards. The ambulatory railings will be treated with gilding, and the shields in the centre of each panel will be carved with the arms of the members of the board at the time the building was erected. The dark rooms at the east end on the ground floor of the museum will be painted with white paint to improve the lighting.

With regard to a proposal by Dr. Anderson, that the walls of the staircase should be adorned by the introduction of a number of commemorative panels, such as may be seen in the Bargello at Florence and other places in Italy and Spain, the committee are inclined to think that this might be favourably considered by the board. In connection with a proposal by the architect, that colour should be introduced into the sculpture heraldry on the exterior of the buildings, the committee think before coming to a decision in this matter that an experiment might be made by means of coloured paper on one or more of the shields to try the effect. With regard to the adornment of the walls and ceilings with decorative painting, the committee approve of Dr. Anderson's suggestions:—(1) That certain artists named by him should be asked to submit sketch designs for historical subjects; (2) that the students of the School of Applied Art should be invited to submit designs for the decorative treatment of the staircase ceilings; (3) that the effect of gesso work should be tried on a small portion of the brickwork of the interior walls, but that no painting or similar decoration should be commenced until all the carved stonework in the hall and ambulatory is completed. As regards the stained glass in the windows, the committee are of opinion that the possible introduction of some stained glass in the windows of the hall and staircases should be delayed until the character of the decoration of the hall and ambulatory is fixed upon and completed. The statue of Dunbar has been intrusted to Mr. Pittendrigh Macgillivray, A.R.S.A., and that of David Hume to Mr. C. M. Bride, both of Edinburgh.

The terms of the deed of gift of £100,000 by Mr. Andrew Usher to the corporation of Edinburgh for a City Hall have been published. In the deed, Mr. Usher says that it is his desire that the hall and premises should become and remain a musical centre for Edinburgh.

A new district church is being built in Whatley-road, Clifton, from designs by Mr. W. V. Gough, of Bristol. It is Gothic in style, is built of warm local stone with dressings of Bath stone, and will cost about £3,000. The contractor is Mr. E. Walters, of Montpelier, Bristol.

Engineering Notes.

BLACKPOOL.—The gigantic wheel at Blackpool was formally set revolving on Saturday. The wheel, which was designed by Mr. Cecil Booth, has been constructed and carried through by Mr. W. R. Bassett, the same engineer who was responsible for the one at Earl's Court, London, Mr. Nasmyth being the consulting engineer. The diameter of the wheel is 200ft., with a periphery 10ft. deep, and, being adapted to the principle of a bicycle wheel, it has stout steel hawsers for spokes. The axle, which is a solid steel forging, 40ft. 8in. long, and 26in. in diameter, is supported by eight columns, each 3ft. square, the two sections of four columns being imbedded in 11ft. of concrete. The total weight of the structure is about 800 tons, and, under the superintendence of Mr. Booth, the work has been finished in about eight months, without fatality. The wheel, although only two-thirds the diameter of the original wheel at Earl's Court, possesses the financial advantages of carrying more passengers and revolving at three times the speed.

CHIPS.

The town council of Gravesend approved block plans at their last meeting for the erection of no fewer than 175 houses, to be built from time to time for one owner on the Cemetery Estate.

Messrs. Wright and Son have secured the contract for the erection of new stands, &c., on the Lincoln side of the grand stand on the racecourse, for about £2,600, and the work, which has to be completed by the end of October, in time for the autumn races, has been taken in hand at once.

The Corporation of Glasgow have under consideration a scheme of municipal insurance against fire. It is found that small householders very rarely protect themselves against loss by fire, and when a misfortune of that nature overtakes them they are practically ruined. The proposal is that the Corporation should insure all tenants paying rents under £10 per annum, taxing them to an extent not exceeding 1d. per £1.

The retirement, under the age rule, of Mr. G. F. Duncombe, the assistant secretary of the Science and Art Department, took effect on Friday; and the Vice-President of the Council on Education has appointed Mr. A. J. R. Trendell, C.M.G., to the vacant post. Mr. Trendell was assistant secretary to the British Section of the Paris Exhibition in 1867, and at Vienna in 1873, and secretary to the British Commission for the Philadelphia Exhibition of 1876. He also acted as literary superintendent of the series of South Kensington exhibitions held during the years 1883-6.

The Urban District Council of Gainsborough, at their last meeting, directed their surveyor to prepare plans for the conversion of Mr. Winn's property, purchased at the cost of £3,200, into a council-chamber, offices, &c.

The death occurred on Wednesday week, at the age of 58, of M. Julius Lange, Professor of the History of Art at the Copenhagen University. His works on art have been translated into almost all European languages.

A Unionist club-house is about to be built in the High-street, Galashiels, at an estimated cost of £3,000, from plans prepared by Mr. Black, of that town.

At the Estate Market, Tokenhouse-yard, business was very dull last week, the total realised being only £29,853.

The opening of the Central Promenade at Douglas by the Lieutenant-Governor of the Isle of Man, Lord Henniker, took place on Wednesday, when the completion was also inaugurated of the double line of tramways extending from the Queen Victoria Pier to Derby Castle gates, and of the Upper Douglas Cable Tramway. The construction of this Central section completes the Douglas Promenade, which now makes the entire circuit of the bay.

Mr. Meade King, C.E., Local Government Board inspector, held an inquiry at Swinton on Friday, into an application to borrow £8,200 for the drainage of Sindsley, Folly-lane, Broad Oak Park, and improvements at the sewage works. The proposed schemes were explained by Mr. Entwistle, surveyor, and a visit was afterwards paid to the works.

In celebration of the Queen's 60th year of her reign, the town council of Windsor have resolved to transform a piece of ground in the centre of the town, known as the "Bachelor's Acre," and an adjoining disused burying-ground, where the late Charles Knight was interred, into an ornamental pleasure ground, with a fountain, band-stand, and children's playground at one end, the cost to be defrayed by public subscription.

COMPETITIONS.

"OWEN JONES" PRIZE.—This competition was instituted, in 1878, by the Council of the Society of Arts, as trustees of the sum of £400, presented to them by the Owen Jones Memorial Committee, being the balance of subscriptions to that fund, upon condition of their expending the interest thereof in prizes to "students at the School of Art who, in annual competition, produce the best design for household furniture, carpets, wall-papers and hangings, damask, chintzes, &c., regulated by the principles laid down by Owen Jones." The prizes are awarded on the results of the annual competition of the Science and Art Department. Six prizes were offered for competition in the present year, each prize consisting of a bound copy of Owen Jones's "Principles of Design," and a bronze medal. The following is a list of the successful candidates:—Arthur Ford, School of Art, Macclesfield, design for wall-tiles; Cecil Jones, School of Art, Coalbrookdale, design for painted bowls; Agnes Kershaw, School of Art, Sheffield, design for a casket; James H. Milner, School of Art, Huddersfield, design for gesso ceilings; Lizzie G. Naismith, School of Art, Corporation-street, Glasgow, design for a carpet; Henry Osipov, School of Art, Cavendish-street, Manchester, design for stained glass. The next award will be made in 1897, when six prizes will be offered for competition.

The memorial to the late Canon Courtenay and his wife, Lady Caroline Courtenay, has been completed at St. John's Churchyard, Bovey Tracey. The memorial consists of a crucifix at the head of the graves, with stones, and a Maltese cross bearing the initials of the deceased. A carved figure is surmounted by a hood, in which is the inscription "I.N.R.I." Midway between the figure and the base is a shield with the letters "I.H.S." On the base stone is an inscription. There is also a kneeling stone 2ft. by 1ft. 6in., projecting from the base stone. The work has been carried out under the directions of Viscount Halifax, by Messrs. Farmer and Brindley, of Westminster Bridge.

A portrait of John, second Marquis of Breadalbane, has been presented by Mr. Guthrie Lornie, of Birnam and Pitcastle, to the town and district of Aberfeldy. The portrait, which is by J. M. Barclay, R.S.A., has been placed by the Commissioners in the Town Hall, Aberfeldy.

County Councillor J. W. Rowe is just now engaged in several building contracts at Melton Constable and Sheringham, for the Midland and G.N. Joint Railway Company. Mr. Rowe has just finished the new station at Sheringham, and is now building a school at Melton Constable to accommodate 250 children, as well as 22 houses and workshops (bakers and butchers), and other works. These are in addition to sixteen houses he built there last year.

A new line of railway from London to Norwich is being projected. The line will be about one hundred miles in length. Commencing by a junction with the Great Northern Railway at Holloway, it is proposed to run it through Stoke Newington, Walthamstow, Woodford, Chigwell, Ongar, Dunmow, Clare, Bury St. Edmunds, and Wymondham, to Norwich. There will also be a branch from Ongar, through Chelmsford and Maldon, to the mouth of the Colne, where it is proposed to construct a deep-water harbour.

The sanctuary of the Roman Catholic Church of SS. Thomas and Stephen, at Market Drayton, has been decorated and a new altar erected. The work has been carried out by Messrs. Hardman and Powell, of Birmingham, from designs by Mr. A. J. Pippett, of Solihull. Three stained-glass windows have been put in, the subjects being Our Blessed Lord, Blessed Virgin Mary, and St. Joseph, representing the Holy Family. On the right-hand side of the sanctuary are paintings, representing three incidents in the lives of St. Stephen Harding and St. Thomas Aquinas. The new altar is of alabaster, with reredos of Caen stone. In front of the altar there are four angels in Caen stone, bearing shields with emblems of St. Thomas Aquinas and St. Stephen Harding. The statues in the reredos represent St. Francis of Assisi, St. Thomas Aquinas, St. Stephen Harding, and St. Clare.

Mr. Ritchie, the president of the Board of Trade, received at Holyhead on Friday a deputation from the district council which urged upon him the importance of the Government carrying out certain much-needed improvements in the harbour at Holyhead. The estimated costs of the suggested works, including the removal of the Platters Rocks, is £250,000. Mr. Ritchie received the deputation favourably, and promised to use his influence with the view of securing the adoption, if not of the whole scheme proposed, at any rate of a modified plan which would to some extent overcome the difficulties at present experienced.

ARCHITECTURAL & ARCHÆOLOGICAL SOCIETIES.

NORTHERN ARCHITECTURAL ASSOCIATION.—On Saturday afternoon an excursion visit was made to Darlington by a good gathering of the members of this Association. The party was met at Bank Top Station by Mr. G. G. Hoskins, F.R.I.B.A., a past-president of the Association, and after some time spent at St. Cuthbert's Church and the Free Public Library, inspections were made of buildings now being carried out in accordance with the designs of Mr. Hoskins, comprising the new offices for the Darlington Guardians, the Technical College, and some new business premises, the terracotta used in all these buildings being greatly approved of, both for its excellent quality and the truth with which the architect's detail drawings are being adhered to. The visit concluded with an inspection of the recently-erected King's Head Hotel, where high tea was served, Mr. Hoskins having previously asked those members who had signified their intention of joining the excursion to consider themselves his guests on the occasion.

The Freemasons of Kent have decided to present a window to Canterbury Cathedral, at a cost of £600, in celebration of the 1,300th anniversary of the baptism of King Ethelbert.

The Roman Catholic Bishop of Liverpool on Sunday afternoon laid the foundation-stone of a new school-chapel at Boothstown, near Manchester. The chapel is being built to accommodate 240 people, the architects being Messrs. Sinnott, Sinnott and Powell, of Liverpool and Manchester, and the contractor is Mr. Frank Clarke, of St. Helen's.

At Blackburn County Court, on Monday, a jury awarded Frederick Downing, joiner, of Great Yarmouth, £230 and costs for the loss of an arm, this sum representing three years' wages, the maximum amount recoverable under the Employers' Liability Act. Plaintiff was engaged in boring holes to receive the bolts of some cylinders which were being removed at a corn-mill at Daisyfield, Blackburn, when his arm was caught in some bevelled wheels and crushed to such an extent that amputation was necessary.

A new national free library at St. Phillip's, Bristol, will be ready for occupation next month. The building occupies a site in the New-road, adjoining Holy Trinity Vicarage, and facing the Lawford's Gate pleasure grounds. The architect is Mr. W. V. Gough, and the contractor Mr. E. Walters, of Montpellier. The structure is of brick, with Bath-stone dressings. The hall, which is approached through a large vestibule, has a pitch-pine block floor and an arched roof of pitch-pine. One portion of the hall will be used as a general news-room, and the other will be occupied by the lending and reading department, an arcade marking the division.

At a town's meeting held at Coventry, on Monday night, under the presidency of the Mayor, a resolution was passed calling upon the corporation to put in force the powers they possess under the Housing of the Working Classes Act, 1890, by the erection of suitable dwellings for artisans, to be let at such rents as will cover the cost of erection and maintenance only.

The fine abbey buildings at Echternach in the Grand Duchy of Luxembourg, were almost completely destroyed by fire in the early hours of August 15th. The buildings were an exceptionally complete specimen of the monastic style of the middle of the last century, having been entirely rebuilt by the Abbot Gregory Schuppe, the date 1753 being on the entrance archway. No part of the edifice has escaped injury, and some portions are completely gutted. The basilica has, however, not been injured. The fire originated in a part of the building used as a straw-bonnet factory, and was soon beyond the powers of the limited local fire appliances.

The Haarlem Museum has recently bought an important Jan Steen, representing a village festival; and the gallery at Amsterdam has acquired one of the most considerable of Jan Van der Meer of Delft's works, entitled "The Letter"; likewise a small, but fine Wouwermans, for which 17,000 florins were paid; 41,000 florins was the price of the Van der Meer.

A sum of about £500 is being expended in restoring the parish church of Gosherton, and the work will very shortly be completed. Mrs. Everard, of Leamington, has undertaken the cost of restoring the screen inside the church; whilst she also proposes to put a stained glass window in St. Catherine's chapel, and to bear the cost of repairing the spire and tower. The church has also been refloored and resealed. A movement is now on foot for re-hanging the bells and putting an additional bell into the steeple, making the peal six bells. This work will cost £140.

EXTRAS AND LIQUIDATED DAMAGES.—His Honour Judge Yate-Lee gave judgment on the 19th inst. at the Whitechurch (Salop) County Court in an action brought by Geo. Dodd, builder, of Whitechurch, against John Weaver Churton, solicitor, of the same town, for the sum of £26 10s., balance of account due on a contract for work done by plaintiff for defendant. With the exception of 10s., the claim was not disputed, but the defendant put in a counter-claim of £50—25 weeks at £2 per week—for alleged breach of contract in respect of the time in which the work was to be completed. His Honour, who had reserved his decision from the previous court, in giving judgment, remarked that Mr. Churton had submitted that the penalty of £2 per week for delay in completion was to be taken as liquidated damages, and that was not disputed by plaintiff's counsel. But some extras were ordered beyond the work expressly mentioned in the specification. Mr. Dodd had stated in his evidence that he could not have completed the work, with the extras, within the stipulated time. Mr. Churton had claimed the £2 per week for which the work was delayed after deducting two weeks, which he maintained was a fair time for doing the extras. Upon the question whether the order for extras prevented a claim for liquidated damages under a contract in the particular form which the parties had entered into, each side relied on the views of certain writers, but no decisions were produced, although the names of several, cited in the textbooks, were given. He had however, examined the leading cases on the subject, and, in his opinion, they established that

under a building contract with conditions framed as in the present case the builder was relieved from his obligation to perform by a stated time where the employer ordered extras. The damages here were not the actual damages suffered, but an artificial sum agreed upon beforehand by the parties for a particular event, and when the event was altered by even a slight amount of extra work the damages were not liquidated for the new event and were not necessarily the £2 per week with allowance of time for doing the extras. To him no question as to a cross-action being necessary arose, and therefore it must be dismissed.

SKY SIGNS.—At Marylebone Police Court, on Friday, Henry Hewitt Bridgman, architect and surveyor, Poultry, and also a common councillor and a member of the St. Pancras Vestry, appeared on an adjourned summons for, at the Camden Turkish Baths, Kentish Town-road, unlawfully retaining a sky-sign without the license of the London County Council. Mr. Chilvers prosecuted, and said that the case was first before the Court on the 24th ult. Since then something had been done by the defendant, but not what the Council required. The defendant said that he could not controvert the evidence of the Council's surveyor; he, however, had a surveyor present, who would prove that the sky-sign was perfectly sound, and that the highest wind would not affect it. Mr. Curtis Bennett said that the only judge of the security of the sign was the Council. The defendant would be fined 20s., with £2 ds. costs.

A SURVEYOR'S FEES FOR EXTRAS.—**RYAN V. LANDRAY.**—In this case, heard by Mr. Justice Rogers, assistant judge, and a jury at the City of London Court on August 19th, the plaintiff, Mr. W. P. Ryan, surveyor, of 2, Metal Exchange Buildings, sued the defendant, Mr. J. G. Landray, of 23, Lime-street, for £9 9s., the balance of an account amounting to £30 9s., for professional services rendered in the preparation of plans, specifications, and drawings. The plaintiff had been employed by the defendant to superintend the erection of a house at Richmond, and the plaintiff's fees had been agreed at 20 guineas. Before the work was completed the defendant abandoned it, and sold the ground to Mr. Bryant, his builder. On receiving an account for £30 9s. he sent it on to Bryant, who had undertaken to pay the plaintiff's charges. Mr. Bryant paid 20 guineas, but declined payment of the nine guineas sued for, and which the plaintiff now said was for extra services rendered. It comprised an item of three guineas for preparing extra tracings for the parish authorities, and another of six guineas for alterations made in the plans after they had been approved. The defendant's case was that it was the custom of the profession to make tracings without charge, and that therefore the plaintiff was not entitled to the three guineas, and that, with regard to the six guineas, the plaintiff was bound by his agreement to carry out the defendant's views with regard to the drawings. His Honour found for the plaintiff for £9.

THE BRICKWORKS MANAGER AND THE CORPORATION WATER.—At the Birmingham Police Court, on Tuesday, Harry C. Davies, builder, 378, Green-lane, Small Heath, was summoned for using corporation water for other than domestic purposes, he not having agreed with the corporation for the supply of water for manufacturing purposes. For the corporation it was stated that the defendant occupied premises at 378, Green-lane, Small Heath, and he was the manager of the Bordesley-green Brickworks Co., situated in Charles-road, 140 yards distant. From the defendant's private premises there ran a drain to the works, and water was conveyed along this from the house to the works. The works had been occupied since 1888, and a water-meter was placed there, and a rent had been paid for the water used for manufacturing purposes. The rent averaged about £30 14s. per annum. On Jan. 7 of the present year, at the defendant's request, the supply for other than domestic purposes at the brickworks was cut off, and the water-meter was removed. On July 17 of the present year Police-constables Lancaster and Wood heard the dripping of water somewhere in the brickworks. They cutred, and found water running into a clayhole. An investigation followed, and the water was traced along a drain which led to the tap in the yard at the defendant's house. Attached to the tap, in order to deaden the sound, was a piece of cloth, down which the water ran to the ground. On July 27 an inspector from the Water Department went to the house, and saw the water running. The defendant's attention was called to it, and he at first said it was waste water that was running into the claypit; but it was pointed out to him that the tap was running at the rate of from 1,100 to 1,500 gallons per hour. Defendant afterwards admitted that he was doing wrong, and said he was exceedingly sorry. The first mark of contrition was that on Aug. 2 the water was found running again as badly as ever, and this time defendant had adopted a new method for deadening the sound of the dripping. A bucket had been fixed close to the nozzle of the tap, and the bucket hung inside a tub, so that the water

might overflow to the drain. The water was running on July 20, and on Aug. 2, 6, and 7. On the latter date Davies admitted that he had turned on the water to wet the clay, thus deliberately using the water for manufacturing purposes. The case was proved by several police-constables, a detective, and Mr. Barnum, inspector of the Water Department, and defendant was fined in penalties amounting to £16, in addition to costs.

WHO WAS THE "BUILDER"?—At the North London Police Court on Wednesday, George Matthews, a jobbing builder, of Weston-place, Mare-street, Hackney, was summoned at the instance of Mr. Alexander Payne, one of the district surveyors of Hackney, for erecting a building at the rear of a shop in Mare-street without giving notice to the district surveyor, as required by the London Building Act of 1894. Mr. S. Myers, solicitor, appeared for the defence, and at once raised the objection that the defendant was not the builder. He explained that the defendant had been engaged by a Mr. Jefferson, a corn merchant, of Mare-street, Hackney, to re-erect a shed at the rear of his premises, the work being done entirely under Mr. Jefferson's supervision. In fact, said Mr. Myers, the defendant was simply a labourer carrying out Mr. Jefferson's orders. Mr. Paul Taylor said the Act of Parliament provided that notice should be given by the builder engaged in the work or by any other person causing the work to be carried out. He wished to know from Mr. Payne why Mr. Jefferson had not been summoned. Mr. Payne said that the words of the Act only suggested an alternative proceeding. It would be hard to penalise its owner, who probably did not know the Building Act, for not giving notice when a builder was employed. It was the practice to proceed against the builder because the builder knew the Act. In many cases small builders like the defendant, when they received orders to carry out work which was not exposed to public view, preferred to run the risk of not giving the required notice, as that notice involved certain fees. Mr. Myers said he would call Mr. Jefferson to prove that he was the actual builder. Mr. Jefferson went into the box and said that he was the builder, but in cross-examination he admitted that Matthews provided the bricks and other materials, and found the labour. He then sent in a bill to witness for the cost of both the material and labour. Mr. Paul Taylor said he should hold that the defendant was the builder. He imposed a penalty of 10s. with a further penalty of 6d. a day for 25 days, and 12s. costs.

The death of Mr. William Dyer, the well-known picture restorer, occurred recently at his house in Camden-road. Mr. Dyer, who was 74 years of age, had for the last 15 years had charge of the pictures in the National Gallery, as well as those in many of the best private collections, and among those restored for the former institution were Sebastiano del Piombo's "Raising of Lazarus" and Holbein's "Ambassadors."

A meeting of the Leeds sanitary committee was held on Tuesday for the purpose of appointing a district sanitary inspector at the munificent salary of £75 a year. There were no fewer than 59 applications received for the position, the successful applicant being Mr. Edward W. Turner, of Grimsby, a registered plumber.

The ceremony of securing the first pile of the deep-sea pier to be constructed at Herne Bay was performed on Wednesday. The new pier is to extend three-quarters of a mile into the sea, so as to be available to steamers at all times of the tide. The cost of the work is estimated at £35,000.

Extensive structural alterations are being made in the offices connected with the Mansion House Justice Room, with the object of providing increased accommodation and facilities for the transaction of business. The works, which are being carried out under the supervision of the City Surveyor's Department, Guildhall, are fast approaching completion. The principal alteration is the providing of a new room in the basement of the Mansion House for the taking of affidavits. The old affidavit room has been converted into an office in connection with the Justice Room.

The annual report for 1895 of the Education Department is issued this week as a Parliamentary paper. It states that as a result of the revision of the public elementary schools a much higher and more satisfactory level has been reached both in regard to their fitness for educational work and their sanitary condition.

At a meeting of the Castletown Commissioners, on Monday night, a proposal was submitted by Mr. Collier, from plans by Mr. Flaxney Stowell, to build a public baths and marine lake, 40 acres in extent, at a cost of £700. It is proposed to inclose the south end of Castletown Bay, from Queen-street to Scarlett, 1,000 yards in length and 200 wide, for the purpose named. It is felt that public baths will greatly improve the prospects of Castletown.

WATER SUPPLY AND SANITARY MATTERS.

POCKLINGTON.—A scheme of main sewerage and sewage disposal for the town of Pocklington, near York, having been submitted to the Local Government Board, a local inquiry has been held by Mr. G. W. Wilcocks, M.Iust.C.E., one of the engineering inspectors. The scheme comprises 3½ miles of main sewers, with appurtenances, including the use of Hassall's water-tight jointed pipes, in water-logged subsoil. Ample flushing is provided by means of Adams's automatic flushing tanks, each of 1,000 gallons capacity, placed at the head of all sewers. The purification of the sewage will be effected by chemical precipitation in the use of aluminoferric and artificial filtration through coke breeze. Land for final filtration is provided, as required by the Local Government Board, so as to obtain sanction to a loan for 30 years, and to secure an effluent up to the standards of the River Pollution Commission. It has been necessary to obtain a provisional order for the compulsory purchase of the land, which has now been satisfactorily acquired. The scheme was explained by the engineer, Mr. D. Balfour, M.Iust.C.E., of Newcastle-on-Tyne.

CHIPS.

The ex-Mayor of Truro, Mr. Silvanus Trevel, F.R.I.B.A., was last week the guest of the Mayor of Rouen, and was officially presented to M. Faure during the visit of the President of the Republic to that city.

At Spittal, on Tuesday, Mr. Ducat, Government Inspector, held a public inquiry relative to the application by Berwick Town Council to borrow £1,500 for new sewage works at the rising health resort of Spittal.

Work is about to be commenced by the contractors, Messrs. Lucas and Aird, of London, on the branch line to Mallaig, of the West Highland Railway Co.

The committee of the Sir Walter Scott memorial in Westminster having recently selected, from various copies of the Chantry bust in Abbotsford, one submitted to them, at their request, by Mr. John Hutchison, R.S.A., it has since been offered to, and accepted by, the Dean of Westminster for a place in Poets' Corner. An appeal to the lovers of Scott for the requisite funds (estimated at £650) will shortly be made.

A village hall at Overbury, on the Severn, built from designs by Mr. Norman Shaw, R.A., by workmen employed on the Overbury Court Estate, was opened on Friday last.

In the Roman Catholic church of the Star of the Sea, Dungannon, Waterford, a stained-glass window has lately been inserted, illustrating the Baptism of Our Lord, and a penitent at His feet. The work has been executed by Messrs. Atkinson Brothers, Newcastle-on-Tyne.

At St. Michael's Church, Hulme, Manchester, a memorial window and a brass tablet in remembrance of the late rector, Rev. J. N. Pocklington, M.A., were unveiled and dedicated on Saturday. The window has been designed and executed by Mr. A. L. Moore, of Southampton-row, London. The brass tablet, mounted on a black marble slab, is fixed on the south side of the chancel.

For the new Grand Theatre, Heaton, Newcastle-on-Tyne (architect, Mr. W. Hope, of that city), Messrs. Jas. Stott and Co., 149, Pilgrim-street, Newcastle, have supplied one of their high-power "Stott-Thorp" ventilating sun-burners, and for the new Métropole Theatre at Gateshead, for the same architect, a similar sunburner is being supplied.

The chancel of St. Paul's Church, Burslem, Staffs., has been recently enriched by the erection of a handsome reredos, which was presented by Mr. Joseph Green, of Kiug's Heath, in memory of his parents and brothers. The main structure is of oak, relieved by walnut, ebony, pear, olive, and other woods, and is elaborately carved throughout in the 14th-century style. This reredos was exhibited at the Paris Exhibition of 1878, and was the means of securing a silver medal for Jones and Willis, of Birmingham and London, who constructed the work from the design of the late Mr. W. Scott Champion, architect. A brass tablet on a dove-marble slab, commemorating the gift, has also been erected, this also being manufactured by Jones and Willis.

For lighting the new board school at Low Fell (architects, Messrs. Oliver and Leeson, of Newcastle-on-Tyne), the Gateshead School Board have adopted the "Stott-Thorp" reflex lights, and these are being supplied by the patentees and makers, Messrs. James Stott and Co., 149, Pilgrim-street, Newcastle-on-Tyne, who are also supplying their patent lights in ventilating form with their automatic roof exhaust ventilators in conjunction, for the new Primitive Methodist church and schools at Bellingham, near Hexham, from the plans of Mr. Welton.

Our Office Table.

THE autumn exhibition at the Walker Art Gallery, Liverpool, which opens on Monday next, will be the finest display of pictures that has been seen on the banks of the Mersey for many years past. The collection embraces some of the leading Academy pictures of this season, and, while all the prominent artists who have their home in the Metropolis are worthily represented, there is no lack of meritorious work contributed from the various artistic centres in the provinces. Over three thousand works were sent in; but of these only about one-half have found a place on the walls. The hanging committee consisted of Mr. W. L. Wyllie, A.R.A., Mr. J. J. Shannon, and Mr. Albert E. Brockbank, of Liverpool, assisted by Mr. Charles Dyllal, the curator of the galleries. The place of honour in the Grosvenor Room has been assigned to Sir Edward Burne-Jones's well-known picture, "Spousa de Libano." Mr. G. F. Watts, R.A., is represented by a couple of canvases, these being "The Infancy of Jupiter" and "Time, Death, and Judgment," and Sir John Millais by "The Empty Cage." There are also hung works by W. Q. Orchardson, Sidney Cooper, Jas. Sant, Frederick Goodall, Briton Rivière, Luke Fildes, and Frank Dicksee. Of water-colours there is a large collection. The private view takes place on Saturday.

EARLY in October there will be opened at the City of Birmingham Museum and Art Gallery an exhibition of works by William James Müller, of Bristol (1812-45), which should prove to be the finest and most extensive collection of pictures, water-colour drawings, and sketches by this famous landscape artist ever got together in one room for the benefit of art critics and students. Indeed, this is the first special loan exhibition of Müller's works ever held, with the exception of the Bristol Exhibition in 1893, when a number of this artist's paintings were included in the collection of pictures got together on that occasion. Mr. Whitworth Wallis, the director, has succeeded in borrowing many fine examples. Among the pictures will be found "The Slave Market," "Gillingham," "Alexandria," "Turkish Merchants with Camels," "The Bay of Naples," "Carnarvon Castle," "Venice," "The Treasure Finders," "Pandy Mill," "The Money Changers," "Stapleton Woods," "Rhodes," "Lynmouth," "The Avenue of Sphinxes," and the original sketches for "Prayer in the Desert" and "The Arab Shepherds"—the two brilliant examples of this artist's skill which the citizens of Birmingham happily possess.

THE suburban authorities on the southern and south-western sides of Manchester are just now considering rival proposals for the establishment of the electric light within their several areas. The corporation of Manchester are desirous to extend their electric light system into the Manchester suburbs, and with this object in view the Gas and Electric Lighting Committee propose that a conference of the local authorities of Moss Side, Withington, Stretford, and Levenshulme should be held. Then a company has been formed and has offered to supply the Moss Side district with the electric current for lighting purposes, and, further, a syndicate of capitalists have undertaken not only to give the electric light to residents in the Manchester suburbs, but to provide a system of electric tramways. This syndicate, acting in conjunction with Messrs. Andrews and Butterworth, architects and surveyors, of Manchester, have approached the local authorities with the object of arranging terms for installing the electric light and providing electric haulage for tramways. The scheme put forward by the syndicate embraces a very great extension of the tramway system, to be conducted by means of electric haulage, new tram lines being proposed from Stretford to Peel Causeway; another from Stretford, by way of Edge-lane, through Chorlton-cum-Hardy, to Withington and Didsbury, thence to Heaton Chapel and Stockport; a third line to run from Old Trafford to Chorlton-cum-Hardy, where it would join the other lines; and a fourth from Chorlton-cum-Hardy along Upper Chorlton-road, through the Moss Side district, and on by way of Moss-lane to Longsight. The syndicate offer to go the length of putting down an experimental system of electrical traction in the streets of Manchester if necessary, and to take it away at their own cost if it should be found not to meet the views of the community. The syndicate favour the overhead system of haulage

for the suburban districts, with central poles where possible in the wide thoroughfares, the poles to be used as illuminators either in substitution for or in addition to the existing lamps along the various highways.

IN a letter addressed to the secretary of the French Academy of Sciences, the well-known anthropologist, M. E. Rivière, announces that, in the course of a mission confided to him by the Ministry of Public Instruction, he has discovered in the Department of the Dordogne a prehistoric cave, of which he has explored one hundred and twenty-seven metres. Its walls are covered with drawings of animals; these drawings are cut deep in the rock, some of them being buried under stalagmites. The fact is, according to M. Rivière, most important, as it constitutes an undeniable proof of the great antiquity of the drawings in question.

QUARTZ slate, a highly refractory natural stone, is quarried at Crummendorf, near Strehlen, Silesia. It is, according to a recent German report, a cheap substitute for fireproof brick, exceeding the latter greatly in durability. Quartz slate is a mineral of greyish white colour, and is deserving of notice on account of its extremely rare occurrence, the Crummendorf quarry being the only one in Germany. Examined by means of a microscope, it shows a fine texture of sharp quartz molecules, which only by the pressure of an enormously high water column can have been brought into connection. The slate is found in layers from 2 in. to 10 in. in thickness. Its high contents of silica (91.4 per cent.) makes it extraordinarily fireproof, and it can be worked easily on account of its softness. Its fibrous nature excludes the blasting out of particles by expansion produced by heat. Since 1854 it has been extensively used in Eastern Germany, especially in the manufacturing district of Upper Silesia, in Austria-Hungary and Russia, and has recently been used in the Rhine province and Westphalia for cupola, welding and puddle furnaces, Bessemer converters, for glass houses, sugar, cement, and porcelain factories, in short, in all branches of industry where highly fireproof constructing material is required.

MEETINGS FOR THE ENSUING WEEK.

WEDNESDAY.—Sanitary Institute's Congress opens at Newcastle-on-Tyne. Reception by the Mayor. 1 p.m.

Inauguration of the Exhibition at Olympia, by the Duke of Cambridge. 3 p.m.

THURSDAY.—Sanitary Institute's Congress at Newcastle. Conferences from 10.30 a.m. to 2 p.m.

FRIDAY.—Sanitary Institute's Congress at Newcastle. Section I.: "Sanitary Science and Preventive Medicine." 10.30 a.m. to 2 p.m.

Contracts have been concluded for extensions of the railways in Matabeleland. The railway from Mafeking is to be continued to Bulawayo by the end of next year; and a considerable portion of the line from the East Coast to Salisbury will be available for traffic early in 1897. On this line the contract for the construction of the section from Chimoio, the present terminus, to the Portuguese frontier, has been entered into. Nearly 40 miles of the earthworks and bridging are finished, and it is anticipated that this portion of the line will be available for traffic early in 1897.

The report of Mr. Davidson Hainsworth, Inspector of Buildings to the Leeds Corporation, has just been issued. It shows that during the year ended March 25th last 1,681 houses were completed and certified for occupation, including 17 villas, six semi-detached villas, 429 through houses, and 1,229 back-to-back houses. During the year 918 miscellaneous buildings were completed, including one church, one chapel, three mission-rooms, one synagogue, seven schools, and three hotels and public-houses.

For the past sixteen years the Okehampton Board of Guardians have been "considering" how to cope with the difficulties created by the overcrowding of the workhouse. At their last meeting the board received a communication from the Local Government Board approving of the amended plans presented for a new infirmary and boiler-house. The board then considered the report of the building committee which was presented at the previous board meeting, recommending the building of a new workhouse at a cost of £8,000, in preference to the expenditure of about £4,000 on the erection of a new infirmary ward. After a long discussion, a resolution was carried by 13 votes to 12 "that the whole question be allowed to drop," and although some of the members protested against the board's thus stultifying itself, the clerk was ordered to send a copy of this resolution to the Local Government Board.

Trade News.

WAGES MOVEMENTS.

DUBLIN.—The dispute between the master builders and the bricklayers in Dublin was settled on Friday at a conference presided over by Archbishop Walsh. The men have been granted an increase of a ½d. per hour, and the working week has been reduced from 57 to 54 hours, thus bringing the bricklayers into uniformity as regards hours with kindred trades. The term for apprenticeship has been increased from six to seven years. This settlement will bring into work an immense number of destitute labourers. The only remaining trades to be conciliated are the plasterers and masons.

NANTWICH.—The strike of joiners in the Nantwich district of the Amalgamated Society of Joiners reached an acute stage on Friday, when notices were posted throughout the district informing the public that the employers absolutely refused to meet the men. The strike has now reached its third month, and the men, with assistance from other branches, have decided to fight to the bitter end. They are being supported in their protracted struggle by levies from Lancashire, the Potteries, London, Cardiff, Chester, and elsewhere. The strike is due to the refusal of the masters to concede 1d. per hour increase, and to grant working rules.

PORTSMOUTH.—Early last week a letter was written by the committee of the Carpenters' and Joiners' Association to the Master Builders' Association, asking for another conference, and offering conditions, the acceptance of which would terminate the strike. These conditions were the appointment of a conciliation board, to be composed of five masters and five workmen, to whom should be referred all matters of dispute. In the event of their being unable to agree, an arbitrator was to be appointed whose decision both sides should bind themselves to accept. The rate of wages was to be 8d. per hour instead of 7½d., as paid before the strike, from November 1st. These conditions, it was suggested, should remain in operation until the 1st of May, 1900. The letter was considered by the master builders on Saturday, and the proposals were rejected, the following resolution being passed:—"That as the men had already been told that the masters would not accept any offer such as had been made, it would be useless to meet to discuss the matter."—By a majority of 124 to 102, the carpenters have since decided to withdraw their notices and close the strike, which had been in progress sixteen weeks. They have written to the Master Builders' Association, offering to resume work at the old rates. The operative painters have not yet decided to follow suit, but are issuing strike pay as before.

On Saturday the streets of Fort-William were lighted for the first time by electricity.

Operations have just been commenced in the deepening of Port Henry harbour, near Peterhead. The contractor is Mr. Nott.

Towards the sum of £6,000 required for the restoration of Ely Cathedral, the sum of £2,323 has at present been subscribed.

The urban district council of Camborne have adopted plans by Mr. Collins for an infectious diseases hospital estimated to cost £1,500.

Messrs. J. Stott and Co., 149, Pilgrim-street, Newcastle-on-Tyne, have lighted the new Miners' Hall, at Ashington (Messrs. Bools and Hardy, of Morpeth, architects), with their "Stott-Thorp" patent high-power ventilating sunburner.

New schools have just been erected at Troedyrhiwfuwch, for the Galligaer School Board. The builders were Messrs. Williams and Son, of Tredegar, and the outlay was £1,820.

The Mayor of Newcastle-on-Tyne has put forward a proposition that the infirmary be either remodelled on the present site or provided with new premises, as a local celebration of the sixtieth year of the Queen's reign. He asks that £60,000 be raised for this object on Tyneside, and suggests that the entire outlay on either of the alternative proposals for rebuilding or a new infirmary would be about double that amount. An exhibition is to be held in the city, the profits to be devoted to this object.

Of the Royal exhibitions in art awarded by the Committee of Council on Education, five have been gained by students of the South Kensington Training School. The others go to Berwick, Bristol, Leeds, Maidenhead, and Manchester. Of the local scholarships, Leeds wins three, Brighton, Reading, and Nottingham two, while Bristol and Maidenhead are again represented.

At a mass meeting of Lord Penrhyn's Caruarnvorshire quarrymen, on Saturday night, it was decided, before striking, to ask his lordship to again meet a deputation of the men to discuss the grievances complained of. The attitude of the men is very determined.

CHIPS.

The new intermediate schools, Whitland, South Wales, are being warmed and ventilated by means of Shorland's patent Manchester grates and special inlet tubes, the same being supplied by Messrs. E. H. Shorland and Brother, of Manchester.

Mr. E. H. Martineau, F.R.I.B.A., of Weymouth-street, Portland-place, has presented to the National Gallery an oil-painting by his brother, Robert B. Martineau, entitled "The Last Day in the Old Home."

A two-light stained-glass window, with medallion centres, has been inserted in the Free Church, Prestoupans. The window was executed at the studios of Messrs. Ballantine and Gardiner, Edinburgh.

Mr. W. O. E. Meade-King, M.I.C.E., Local Government Board inspector, will conduct an inquiry at the Town Hall, Bootle, on Tuesday next, with reference to the application of the Bootle Town Council for sanction to borrow £2,724 for works of street improvement, and £1,700 for the construction of an open-air swimming bath.

The Spanish Government is contemplating some important works in the Philippines, which, if carried out, will comprise an extensive arsenal (with a dry dock) upon the Island of Luzon.

A new organ for the church of St. Michael and All Angels, Bishopston, which has nearly been completed by Messrs. Vowles, St. James's Square, Bristol, will be opened on St. Michael's Day. It stands on the north side of the chancel, has two fronts of oak with decorated pipes, and consists of three manuals, and thirty-two speaking stops, with couplers and other accessory movements. It has tubular pneumatic action to the pedals and manuals.

On Saturday Mr. Robert Bowden, 62, who for the past 20 years has held the position of foreman painter of the Earl of Duham's Philadelphia Engine Works and estate, Co. Durham, committed suicide by cutting his throat. About a month ago deceased fell from some scaffolding in the New Herrington Boys' Schoolroom whilst supervising painting operations, and at the inquest a verdict of "suicide whilst temporarily insane, due to his accident," was returned.

The Hamburg International Exhibition of Gardening will be opened at Hamburg at the beginning of May, 1897, and close at the end of September. The exhibition is intended to show all branches of gardening and the cultivation of all kinds of plants; and it is proposed to make it the most extensive and important exhibition of gardening ever held.

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TENDERS.

*** Correspondents would in all cases oblige by giving the addresses of the parties tendering—at any rate, of the accepted tender: it adds to the value of the information.

BERMONDSEY.—For the erection of warehouses, offices, boiler-house, and chimney shaft at Riley-street, Bermondsey, S.E., for Messrs. Grant and Co. Mr. W. Seckham Witherington, F.R.I.B.A., 33, Great Tower-street, E.C., architect. Quantities by Mr. T. J. Fife, 2, Whittington-avenue, E.C.:—

Larke, W. G., and Sons	...	£9,260	0	0
Perry and Co.	...	8,558	0	0
Lascelles, W. H., and Co.	...	8,397	0	0
Smith, W.	...	8,383	0	0
Patman and Fotheringham	...	8,189	0	0
Holloway, H. L. (accepted)	...	7,900	0	0

BOURNEMOUTH.—For renovating the East Cliff Congregational Church Manse, for the deacons. Messrs. Lawson and Donkin, Yelverton Chambers, Bournemouth, architects and surveyors:—

George and Harding	...	£51	0	0
Jenkins and Sons	...	49	15	0
Shears and Son	...	49	10	0
Hoare, W. (accepted)	...	44	0	0

(All of Bournemouth.)

CHEWTON, CHRISTCHURCH, HANTS.—For detached villa residence, for Miss Elphinston. Messrs. Lawson and Donkin, Yelverton Chambers, Bournemouth, architects and surveyors:—

Entwistle and Cox	...	£1,800	0	0
Jones and Sons	...	1,718	0	0
Hoare, W.	...	1,662	0	0
Jenkins and Sons	...	1,622	0	0
McWilliam and Sons	...	1,588	0	0
George and Harding	...	1,565	0	0
Frampton's Sons, Christchurch	...	1,500	0	0
Lucas, J. W., Poole-road (accepted)	...	1,490	0	0

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THE BUILDING NEWS

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MAKING AN ARCHITECT.

AFTER interminable discussion and the expression of opinions, the question of what ought to constitute an architect remains in the same unsettled position it has ever held, and for this simple reason: that there are many—we might say a majority—who still regard the profession as they do other vocations like that of law or medicine, or auctioneering, or surveying, as a calling that can be acquired by a certain amount of apprenticeship, training, and examination. The idea among such men is that the architect can be made out of any "material"; they attach little importance to natural aptitude, mental qualification, or artistic sense, and, therefore, it is impossible on two such different platforms to obtain any agreement on the question. The recent remarks at the Institute on the election of Fellows, show to what extent this view of the matter obtains, and yet there are few of that body who have reached any eminence in the profession, who will maintain that their position has been attained by any external means, such as draughtsmanship or technical knowledge. It has been mainly through their own natural endowment and personal effort. The architect, in short, cannot be made by feats of mere draughtsmanship, by knowledge of construction, or cramming. These things may train and develop, but cannot implant. No doubt a great many who have made headway in the profession have been favoured by opportunities, by something happening which has given them a start in their career, a successful competition, the patronage of a great name, and so on; but these accidents do not make the architect, as there is abundant evidence to show. The opportunity architect and the advertising architect are creations or professions of our own time, but we cannot put them with men like our Scotts, Barrys, Streets, Norman Shaws, Jacksons, our Georges and Petos. In spite of all organisations, or cliques, or societies, the true architect will always remain an independent creation. No efforts, educational or otherwise, will be able to claim him, or classify him, or confine him within certain limits. He is born, not made; and for a like reason it is useless to assert that he can be created or be produced by certain modes of training, like those of draughtsmanship, art instruction, technical knowledge—all necessary and useful acquirements, but insufficient of themselves. Every architect must be a draughtsman; but every draughtsman is by no means an architect. He must know how to construct and be able to build; but we know that this qualification in itself does not make the architect. The engineer of the Forth Bridge—a constructive marvel of the age—could scarcely claim to be more than a constructor. Nor could it be contended for a moment that any examination or amount of "cram" could make an architect, as was pointed out the other day at the Institute. Why draughtsmanship should be taken as, *par excellence*, a guarantee of a young man's fitness for the profession, it is hard to say; just as well might we make the medical practitioner's qualifications to depend on his skill in handling drugs and dispensing. It is true, of course, that in one case, as in the other, each of these acquirements is indispensable: they are the A B C of the profession. No man could design anything unless he knew how to express his idea in lines or drawing, and therefore it is necessary in this sense only, and the more

facile he is in the use of his pencil, the better. To contend that drawing is more than this—that it guarantees a man's fitness for architecture—is going too far, and is about as absurd as to say that the literary talent is guaranteed by the candidate's caligraphy or penmanship. As the instrument of interpretation, drawing, like writing, is essential and important; but it by no means always accompanies ability or talent of an inventive order. Any teacher of drawing or master of a school of art will bear us out in the remark that many of those persons who have a natural fondness for drawing are mere copyists or "cribs." By no means all the ablest designers we can think of have been brilliant draughtsmen. We have our Wrens and our Chambers. Indeed we can point to many skilful architects of a past generation like Sir John Soane, Sir W. Chambers, the late Sir Chas. Barry, Sir Gilbert Scott, whose powers of drawing, though respectable, would not have won them distinction. On the contrary, many of the most accomplished of our draughtsmen who have won prizes for the Soane Medallion at the Royal Academy, and whose work has been placed high in competitions, have not given any evidence of artistic power in architectural design. It is not given to every one to become an inventor; though many are able to assist in carrying out the schemes of another, and to do useful service in this way.

How far draughtsmanship and examination qualify for the profession has been much debated of late. While some members appear to attach great importance to it as a test, there are others who plainly see that no examination of skill in drawing can make an architect; that it would be a great mistake, for instance, to select a man for his drawings, but rather for the skill and invention displayed in the design they unfolded. This vital difference must be kept in view by the Institute if they seek to make their election to the Fellowship a real distinction, or a mark of architectural ability; but it will be difficult to regard it if the most strenuous efforts are not made to appoint the proper men to examine the drawings submitted, so as to insure that it is for the design a man is elected, not as a mere employer of "ghosts," as was pointed out by Mr. J. M. Brydon. An architect must be judged by the quality of his work—for something that he has actually done. Nor can it be said that an architect is made by examination, for every one knows that the best architecture has been produced by men who could not answer a dozen questions of an examination-paper on some subjects—in the way, at least, they have been set. It is impossible to "make" an architect by examination, though one may find out whether he is so or not—this is another thing altogether. Is the natural instinct in him? We cannot put it into him, though we may find out whether he has it. Examination must be directed to this end. On these grounds it cannot be expected that an architect in practice will submit to pass an examination which a younger man is able and willing to undergo; and we cannot believe, as someone has suggested, that architects of age and experience would prefer to enter the fold by the associates' examination rather than by "climbing up some other way." The man who has designed and carried out buildings of merit has surely proved his fitness for the vocation in the only satisfactory manner.

On this point we endorse the remarks of Mr. Arthur Cates, who, by the way, does not take so rosy a view of the Institute's work as some of his colleagues, that a man desiring to enter that body should be examined, not by his drawings, in which questions of taste and draughtsmanship might arise, but one "so framed as to take into account his experience and professional knowledge in design and practice—anything, in fact, but

a student's examination." Making an architect nowadays is very different to the old method. It is cramming him with certain technical and routine knowledge, setting him up with an office having a brass plate, and getting him to engage in all sorts of commercial speculations with the object of getting work, no doubt plausible enough in the eyes of the present generation of brain-suckers, "pot-boilers," and popularity-seekers, but not worthy to be compared with the way which naturally encouraged the youthful aspirations and instincts, and gave them an opportunity of developing under certain restraints. It was the old brotherhood way of studying art. We wonder how it is that so many able men go to the wall, while a few, a mere fraction of the whole, survive and flourish and obtain all the work, and more of it than they can properly do. Is it not because the born architects and craftsmen of the old days derived strength from brotherhood, and banded themselves together for the purpose of unity and strength, and of making their artistic powers felt? Is it not the same with everything—commercial enterprise, missionary work—that more can be done by uniting and working in unison than in isolation? Was this not the secret of success in the art guilds and religious orders? Was it possible that so much could be done to evangelise Europe, if the great order of the Benedictines had not been founded by St. Francis, and taken the work in hand? Could isolated missionaries have done so much for religion or for art? All this is altered. Now the isolated individual has to fight single-handed, and only a very few—the stronger of them—make a living. These are men who take their own initiative, introduce styles, and found cliques. But the others grope their way into notice, join societies, but do not hold together. The isolated system of instruction has not been favourable to the advancement of art. In the future it will be the men who can "pass" an exam. who will enter into the ranks—not those who by nature have been gifted with artistic abilities. Many of the fittest men will be excluded by the process which is now exercising our professional societies. Touting for members, as Mr. Robert Williams said, will not do, and is at least undignified. To say to Mr. So-and-So: "Pass this or that examination, or pay a few guineas a year, and we will admit you to the roll of members," will not induce men who have practised architecture with success to join that which they can do without. No, the policy of isolation will encourage cliqueism; it says in effect, "We associate together to exclude others; we have no claim but our membership, and that we shall use to the best of our ability to shut out men probably of more talent than ourselves, but who do not belong to us." Such association would be right and proper if it included all the able or born architects; but the conditions imposed exclude them. In short, the making of the modern architect is surrounded by conditions of a very different kind to those which have been in operation in the past. Competition among professional men conducted on purely commercial principles have led them to seek exclusive methods. If the best wins it is by the sheer strength of his own superiority, which cannot be contested; but it is generally one who has a name, or has possessed the means of employing other talent than his own. The architect can be made by deputy; he can delegate all his real duties to others. Competition is answerable for all this, for it has rendered individual conflicts remunerative by a variety of ways not strictly honest. Thus it is the "ghost" that wins the competition; or it is the managerial business that pays—the real worker is behind the scenes. It is the same in the office as in the external duties of the architect. We have heard much lately about professional men

accepting trade commissions; but it is the natural outcome of the commercial and business system. The contract or competition system has made it possible. "If I specify your goods I shall expect a commission," is the suggestion, if not explicitly spoken, which appears to determine the average employment, instead of the selection of the best.

Many other circumstances can be mentioned by which it will appear that modern professional training has produced a class of commercial experts rather than architects. Surveyors, quantity-takers, constructional experts, engineers, sanitary specialists—all developments of architecture—thrive better than artists, and for those the modern systems of instruction supply the needful preparation.

SKETCHING AND HOLIDAY NOTES.

THERE are three ways of making an architectural tour profitable. One is to map out the district into routes, and visit the edifices or antiquities of interest, making such sketches and notes of them as time and opportunity permit; another plan is to select a centre and devote one's self to one or more buildings, and to make measured drawings of them. A third course, for the tourist who has less time at his disposal, is to make rambling notes and sketches of all subjects of interest he comes across on his journeys. In these days of photographic processes and published sketches, the first and third of these courses are those which chiefly commend themselves to the student. With a "Murray" in his hand and a sketch-book, it is possible for any student to do a good deal of useful work in exploring a given locality. As everyone desires to make the most of his time, it is better that those routes should be taken first which possess objects of the most important interest, leaving others of lesser importance to the last. By this means the buildings which have a greater claim on our attention are first attacked; time for sketching is not so urgent, and we can afford to spend more time in a careful study of the subject. In every case a note of the plan should be made, its bearing, and position, a rough dimension or two of important distances; then to follow with any sketch or sketches of portions that command our attention. General views are now unnecessary, as photographs are often to be obtained of these, and are more reliable than rough sketches. The details of one bay of an old church or abbey may be all that is required after noting material and other particulars of the building.

Mr. Paul Waterhouse, M.A., in some recent remarks, has referred to the less demand there is now for sketching except as a useful training, and a mode of fixing our memory. As he observes, fifty years ago it was different. There was the duty of sketching as a means of record; the young architect was expected to take "a grand tour" on the Continent, and to sketch any building of importance he saw. He brought home drawings in pencil or sepia of a great cathedral, churches, conventual buildings, fortresses, and castles, and these were sometimes published in folios. Such records are now unnecessary. The great examples of Mediæval architecture, as of Classic Greece and Italy, have been photographed times out of number, and numerous publications and drawings are accessible to every student. These records are also more accurate and better than any drawings made in a few hours' time. Our own illustrations have supplied the student with almost every example of note, so that he is independent of sketching them. But there is still a value in sketching. No representation or photograph can give the student all he wants; he can only obtain a full and accurate idea from visiting and making personal sketches for himself. Again, comparative archaeology

is a science that can be learned only from these tour notes, and it is only recently that the study has become possible: our illustrated books and photographs have made it easy. Then the value of sketching as a training and discipline cannot be doubted. An architect who has never sketched cannot realise the educational value of observing and expressing, of studying details, and of comparing one building or style with another. The brain, it is truly said, works with the pencil. Every time we draw a building we learn a great deal more of it than we can do by simply looking at it and reading about it. The modern sketching tourist has this further advantage over his forefathers, he can draw what he likes, he can confine his sketching to one building or to one portion of it, or to details, as he knows he has materials in his possession or that can be referred to that will give him the whole. He can even make a complete drawing of a building from a few sketches and a photograph. Our readers will pardon this digression, as there are many who now think that sketching is useless in these days. How to make the most of our impressions is a question of moment. Those who can make simple wash or colour sketches will find the practice useful; there are also various ways of making sketches, as may be seen by looking over the plates of the "A. A. Sketch-Book," some methods more detailed and painstaking than others; others in which a very few well-chosen lines can be made to express a great deal. Slight shading is indispensable if we wish to preserve the connection, solidity, or contour of parts; but we may fill this page with rules that are better left to each individual. The notebook is too often neglected. Nothing adds so much to the value of sketches, whether they be rough and desultory, or undertaken as a record, as carefully-made notes in the margin or in a separate notebook. The things to be noted are briefly: (1) Materials, their qualities and colour; (2) construction and peculiarities; (3) age and historic data. A sketch of a doorway or an arcade is incomplete and of little value to the architect if the kind of stone is not stated, and the joints and masonry or bond are unindicated. A note should describe in most cases what cannot be sketched, so as to supplement the information of the drawing. Thus the number of bays or compartments, figured dimensions of parts, and any peculiarity in the design ought to be so given. Again, a profile of a jamb or window-head, a rib, or capital would be useless without describing its position or height from the ground level. And a detail has little value unless it is figured with a few dimensions, though it is often made without any reference to size or position, and it is impossible to say in a few years its position or to get any idea of its relative size.

Those who adopt the third course we have mentioned of making rambling sketches and notes would probably do well to confine their attention to general notes and outlines, more with the object of retaining impressions than of study. A rough ground-plan, or a bit of the screen of an old church, or any good moulding that one sees may be sketched, and it is better to confine oneself to "bits" than sketches. The rambling tourist may, with more profit, fill his notebook with information about the stone of the locality and its durability, particulars of quarries, geological data, and descriptive notes of wood-work, carving, monuments, architectural features of the locality, the types of towers, or roofs or windows prevalent, and any local features that arrest his eye in his rambling walks or cycling expeditions. We have not yet an "architectural camera and cycle club"; but why not? It is always better to strike out right away from railway and main roads, where something fresh is to be

found, and the cycle and camera give us some promise of this in the future. Many hidden and out-of-the-way buildings that have never yet been sketched may yet be laid under contribution. The cycle, with camera or sketch-book, have yet a good store for the future, if they only permit us to penetrate into places that have hitherto been inaccessible, and to do a better day's work, and so lengthen our holiday. The coming mode of locomotion may, indeed, become a stimulus to sketching by affording the tourist more time. The architectural tourist now goes not to fill up pages of finished drawings or make pictures, but to pick up something that may be profitable, and it is well that he should ever bear in mind as a maxim the saying of the late William Burges: "Draw what you cannot remember as well as what you admire."

GRAPHIC STATICS.—I.

INTRODUCTORY CHAPTER.

THE beauty and value of the graphic methods of determining and exhibiting the stresses to which structures are subjected can hardly fail to force themselves on the notice of anyone who has even slightly studied the subject of Graphic Statics. This fact is well brought out in that interesting article, "Tables and Textbooks," which appeared in the *BUILDING NEWS*, Aug. 14, 1896.

The present writer has long felt that the subject should have been brought prominently before the minds of our students, and in such a way as, without introducing too much theory, would show how the methods employed are deduced from the simplest propositions of mechanics. The various formulæ which are given for calculating stresses are frequently a complete mystery to the student, since he has no clue to the principle on which any given formula is based. The student who understands the principles of graphic statics may often, with the help of a little mathematics, deduce the formulæ for himself, and thus he will be enabled to use them intelligently, instead of blindly, and will in this way vastly increase his power of comprehending and applying mechanical formulæ. In fact, the proper study of graphic methods will greatly enlarge the understanding, and help the student to deal independently with many of the practical problems which are continually presenting themselves for our solution.

It is here assumed that the reader is familiar with the use of scales and with the simple problems of practical geometry, and that in many cases it is unnecessary to define the terms employed. It is further assumed that the idea of representing forces and velocities by straight lines, drawn respectively parallel to their directions and proportional to their magnitudes, is not altogether new to him.

The science of *Statics* deals with the forces which act in and upon bodies which are in equilibrium, and are therefore at rest. Still, it is easier to grasp the principles of the subject if we first consider some cases of a body in motion under the action of forces. It will, therefore, be convenient to begin with Sir Isaac Newton's "Laws of Motion," and, to some extent, to follow his method for a little way.

First Law of Motion.—Every body continues in a state of rest or of uniform motion in a straight line, except in so far as it may be compelled to change that state by force acting on it.

Second Law of Motion.—Change of motion is proportional to the acting force, and takes place in the direction of the straight line in which the force acts.

Third Law of Motion.—To every action there is always an equal and contrary reaction; or the mutual actions of any two bodies are always equal and oppositely directed in the same straight line.

Two of Newton's illustrations of the Third Law will here be helpful. "If anyone presses a stone with his finger, his finger is also pressed by the stone." "If a horse draws a stone fastened to a rope, the horse is drawn backward, so to speak, equally towards the stone."

The full meaning of these laws will most likely not be grasped at once, and for our purpose it is only their most elementary applications which will be required. A careful reading will convince

the student that they are more than merely "Laws of Motion." The third law is very frequently used in statics.

It is easily seen that a body may have at the same time more than one velocity imparted to it. For instance, a shot fired from a train in motion would have the velocity given it by the motion of the train, and the velocity given it by the force of the explosion, besides which, as soon as the shot left the gun, the force of gravity would begin to generate another velocity. By means of the following, which Newton gives as one of the corollaries to his Laws of Motion, we may find graphically the resultant of two velocities not in the same straight

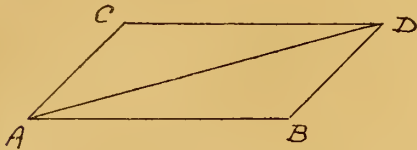


FIG. 1.

line. "A body acted on by two forces will describe the diagonal of a parallelogram in the time in which it would describe the sides under the influence of the forces singly." Suppose that a body, in a given time, under the influence of a single force which acted at A, Fig. 1, would move with uniform velocity from A to B; and suppose that the body in the same time, under the influence of another single force, which acted at A, would move with uniform velocity from A to C; complete the parallelogram ABDC by drawing CD parallel to A B, and B D parallel to A C; then, if both forces act simultaneously at A, the body will move uniformly in the given time from A to D. For, by the Second Law, the force which acts along A C, which is parallel to B D, will not change the velocity of approach towards the line B D, which is produced by the other force. Thus the body will reach the line B D in the same time whether the force along A C act or not, and so at the end of the given time will be found somewhere in the line B D. By the same reasoning it follows that the body at the end of the given time will be found somewhere in the line C D. Therefore the body will be at D, which is the only point common to the two lines. The body must move from A to D in a straight line, by the First Law of Motion.

It should be observed that the two forces have been supposed to act *instantaneously* and not *continuously*. The principle just explained is called the Parallelogram of Velocities, and is usually enunciated thus:—If a body have communicated to it simultaneously two velocities, which are represented in magnitude and direction by two straight lines drawn from a point, then the resultant velocity will be represented in magnitude and direction by the diagonal, drawn from

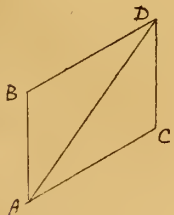


FIG. 2.

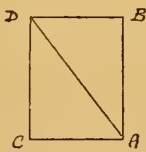


FIG. 3.

that point, of the parallelogram constructed on the two straight lines as adjacent sides.

As an example, suppose that while a train is going at the rate of 90 ft. per second in the direction A B, Fig. 2, a stone is thrown in such a manner that, if the train were at rest, the stone would go in the direction A C, at 60° to A B, at the rate of 120 ft. per second, and let us find the actual direction and velocity of projection. The first thing to decide is the *scale* to which we shall represent the velocities. In this instance we will take a length of 1 in. to represent a velocity of 100 ft. per second. Thus, A B is made '9 in., and A C 1'2 in. (usually written '9" and 1'2"). The length of A D is found to be about 1'82", which, to our scale, represents a velocity of 182 ft. per second, and thus we get for our answer a velocity of 182 ft. per second in the direction A D.

Let us now see if we can deduce the parallelogram of velocities from considering the motion of a body which is acted upon by *continuous* forces. Let us suppose a ship under sail to have a certain velocity given it by the wind—say a velocity of four miles an hour in still water. If at the same time the vessel is going *with* a current which by itself would carry it at the rate of three miles an hour, the velocity of the vessel will evidently be the *sum* of these two velocities—i.e., seven miles an hour. If the current is against the vessel, the rate will be the *difference* of the two velocities—i.e., one mile an hour. If the directions of wind and current make an angle with each other, the resultant velocity will lie between 7 miles an hour and 1 mile an hour.

Suppose now that the wind alone would drive the vessel northward at the rate of 4 miles an hour, and that the current alone would take it eastward at the rate of 3 miles an hour. Draw (Fig. 3) A B to represent the northerly velocity of 4 miles an hour to, let us say, a scale of $\frac{1}{4}$ " to 1 mile an hour; and A C to represent the easterly velocity of 3 miles an hour to the same scale. Thus A B = $1"$ and A C = $\frac{3}{4}"$. Complete the parallelogram by drawing B D parallel to A C and C D parallel to A B; join A D; then A D represents the magnitude and direction of the resultant velocity to the scale of $\frac{1}{4}"$ to a velocity of 1 mile an hour. As in the former reasoning, the wind alone would take the vessel from A to B in the same time as the current alone would take it from A to C.

By Newton's Second Law the change of motion caused by the current takes place in the direction A C, and does not affect the rate of the vessel's approach to B D, which is parallel to A C. Hence, the vessel, under the combined action of wind and current, will reach some point in the line B D in the same time in which under the influence of the wind alone, it would go from A to B. By the same reasoning, the vessel, under the combined action of wind and current, will reach some point in the line C D in the same time in which, under the influence of the current alone, it would go from A to C. Hence at the end of the time under consideration the vessel is at some point in B D, and also at some point in C D. That is, the vessel must be at D, the only point common to the two lines B D, C D.

Further, we see that in going from A to D the vessel must go along A D, since for any point P in the path of the vessel we shall have, if E P be parallel to B D, A E equal to the distance the vessel has been carried by the current, and E P equal to the distance the vessel has been driven by the wind. Therefore A E : E P :: 3 : 4, and therefore A E : E P :: A C : C D, which shows that the triangles A E P, A C D, are similar, and therefore that P is on the line A D. Thus we find, since A D is $1\frac{1}{4}"$ long, that the resultant velocity is five miles an hour along A D. It should be noticed that it would not be allowable in this case to use the First Law to deduce the *straight line* A D as the path of the vessel.

We have in this introductory chapter devoted a large part to theory. This is almost unavoidable if we are to obtain anything like a clear conception of the principles which lie at the root of our subject.

J. C. PALMER.

ADAPTABLE SPECIFICATIONS.—VII.*

CARPENTRY AND JOINERY : FACTS AND MEMORANDA.

Different kinds of wood in use for building :—

1. *White Deal*.—This, as imported from the Baltic, is the wood of the spruce fir (*Abies excelsa*). *Pinus alba* and *P. nigra* also furnish an American variety of white or spruce deal. All varieties of it are chiefly used for joists, in inferior work, and for flooring-boards. It is of whitish yellow colour, smells of turpentine, but is only slightly resinous. The poorer qualities of it contain a large number of small, dead knots. The sapwood, in this timber is almost indistinguishable from the heart wood. White deal splits easily, but irregularly, and is liable to warp when less than an inch in thickness. It is less durable than yellow deal, and from the hardness of the knots is unsuitable for moulded or delicate work. American white deal is more liable to warp than that from the Baltic. Both are chiefly used on account of their cheapness. The best Norwegian

white deal comes from Christiania, and the best Russian white deal from Onega.

2. *Yellow Deal*.—This is the wood of the Scotch fir (*Pinus sylvestris*). It is otherwise called "red deal," or "red fir." The ground colour of the wood when good is of a honey-yellow, it is resinous, and is marked with a strong reddish grain. The knots are redder, and less opaque than those in white deal, and, in good samples, are not loose or "dead." Red deal should be distinctly marked or veined, red and heavy. What is used in England comes almost entirely from the Baltic. The best "logs" of this kind are shipped at Memel, Dantzie, and Stettin. Riga red fir is less resinous, and softer. Norwegian and Swedish red fir are inferior in quality, pale in colour, or of a sickly, pinkish hue, and when equally dry, are much lighter in weight than the best qualities of red deal. The modern practice of using, for carpentry, deal imported in scantlings instead of having it cut in England from logs or balks, is the cause of many failures. For really good work, a safe course is to have everything above 3 in. in thickness cut of good Memel logs. Of red deal imported ready sawn into scantlings, Onega is probably, on the whole, the best. It is straight-grained, heavy, and easily worked. Although Swedish whole timber is objectionable, very good Swedish deals come into the market from Gefle and Soderhamn, the best part of the trees being selected for them. Good Norwegian deals were formerly to be obtained from Christiania, but the supply has nearly ceased. Archangel deals, which are remarkably free from knots, may probably be considered next in quality to those from Onega; and after these come Petersburg and Wyburg deals. Russian deals are usually sorted into two qualities only, of which the first quality alone is to be trusted, all the middling and inferior stuff being lumped together as second quality. Swedish deals commonly have the first and second qualities classed together, and called by shippers "mixed." After these come thirds, fourths, and so on. These mixed deals are what timber merchants and builders in England always call "best Swedish." Norwegian sawn deal is very inferior, and is chiefly in scantlings of 6½ in. by 2½ in. The roots of Norway red fir, being naturally bent, were formerly used as knee-timbers in shipbuilding.

3. *Yellow Pine*, otherwise called Weymouth pine, is the wood of the American *Pinus strobus*. It is soft, straight-grained, free from knots, and very easy to work. Planks can be obtained up to 30 in. wide. It is of a clear uniform yellowish colour, with few markings, and joiners use it for drawers, and, if allowed, for doors and many other purposes. It is not much used in England for carpentry, though in strength it is not so inferior to Baltic timber as might be supposed. It has little sapwood, and is said to have six times as many concentric circles, in a cross-section of the tree, as a similarly-sized specimen of pitch-pine. The sapwood of this tree, though small in quantity, is very objectionable, and should be entirely rejected, as it speedily decays. Yellow pine is imported both in logs and sawn into scantlings. That shipped from Quebec has the best reputation. Yellow pine contains little resin, and when exposed to damp is not durable. When used in carpentry, it is said to retain its form with a permanent load, whereas many kinds of timber, though not loaded beyond their strength, continue to deflect or sag for years. On no account should yellow pine be placed in a stove, as in its removal from a high temperature it is always liable to change its form. "Doated," or dotted, yellow pine should be vigorously rejected. This is covered with minute specks or dots, the result of disease. The best yellow pine is only satisfactory for joinery that is to be painted, and even then its extreme softness and liability to be indented make it speedily grow shabby.

4. *Pitch-pine*.—This is the wood of the American *Pinus resinosa*. It is heavy, strong, and durable, very free from knots, full of resin, and marked with a bold dark-red grain. By cutting the wood in particular directions much beauty and variety of figure may be given to it, and it is much in use for joinery which is to be finished without paint. The only drawback is the cost of working it, which, for mouldings and similar details, is usually considered to be 50 per cent. more than on yellow deal. Very old pitch-pine frequently has a rich purplish cast, effective in panels. Pitch-pine is an excellent material both for carpentry and joinery; but it should be well seasoned, and as it shrinks considerably after being worked, details made of it should be allowed to stand as long as possible before being

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fixed. It is subject to heart-shakes, and though it can be obtained in widths up to 16in. or more, is, for the joiner's purposes, best used in small or moderate scantlings. Pitch-pine comes chiefly from the ports of Georgia, Savannah, and Pensacola, in the United States.

5. *Oak* is of many species. The English kinds are *Quercus robur pedunculata* and *Quercus robur sessiliflora*; both common here, and both equally good. In the former the acorns hang on stalks; in the latter they are closely attached to the twigs. Good English oak is of greyish brown, with lighter and closer-grained markings. Foxy-red oak, and oak which, though new, is naturally very dark, are usually inferior and perishable. English oak is sold by the timber merchant in hewn logs and sawn planks. It is said to require a year's seasoning for every inch in thickness, and even oak which has remained in old buildings for hundreds of years will shrink if replanned. The best seasoned English oak will carry, before crushing, as much as 7,900lb. to the square inch; but other specimens have been found to carry no more than 4,500lb. to the inch before giving way. Oak from Brittany and Normandy is almost as good as English, and is classed at Lloyd's as equal to it for shipbuilding purposes. Dantzic oak makes excellent planks, being straight and clean in the grain. When boiled or steamed it is very suitable also for bending. Riga oak comes to England chiefly as wainscot logs, and is much used for furniture. Canadian or Quebec oak is used by cabinetmakers, but is very inferior both in strength and durability. American "white oak" is chiefly used for staves. Great quantities of oak are found in the forest of N.E. India and Burmah; but they do not seem to reach this country, and little is known here of their comparative value.

6. *Ash* (*Fraxinus excelsior*) is little used in the South of England. In the North it is, or was a few years ago, considered almost equal to oak, and about a third cheaper. In London, on the contrary, according to published price-lists, it is considerably dearer than oak. It makes excellent and durable gates; works well into mouldings and delicate details; can be polished, and is very suitable for handrails, small balusters, &c. The general tone of the wood is a yellowish-brown, with veins and markings of Vandyke brown. It stands rough wear and tear for a long period with little injury.

7. *Mahogany* (*Sweetenia mahoganii*).—This comes chiefly from Honduras, Central America, Mexico, Hayti, and Cuba. An African mahogany is also imported into this country. Honduras mahogany, being brought from the Bay of Honduras, is sometimes called "bay-wood." It has comparatively little "figure" or grain. Mexican mahogany is very similar to it. Tabasco mahogany is superior to it, and is almost equal to the very best. Cuba, or Spanish, mahogany has the highest reputation, and is the most expensive. It is beautifully figured, and may be known by the small white specks it contains. Hayti mahogany is little, if at all, inferior to Cuba. Honduras mahogany is the most easily worked; Cuba is the hardest, the labour on it being about three times as great as that on yellow deal. Honduras mahogany is pale, and is generally stained before polishing.

8. *Teak* (*Tectona grandis*).—This is a valuable and very durable wood which is coming more and more into use. It is hard and stringy. The colour varies from dark, rich brown to lighter, yellowish-brown. It is proof against worms of every sort, and is uninjured by alternate dampness and dryness. It appears to contain an essential oil which preserves it. If not worked with care it is liable to split lengthwise, the fibres being kept apart from each other by resinous matter. The same thing happens, to some extent, with other kinds of timber when creosoted, and from a similar cause. The best teak is found in the forests of North East India and Burmah. The tree once abounded also in the Malay Peninsula, but immense quantities have been exported to Holland for making sluices, flood-gates, &c., in the great embankments of that country. Teak is very suitable for sills to sashframes and for external work in half-timbered houses. It can be obtained up to a width of 2ft. or more. The cost of working teak is about twice that of labour on yellow deal. The so-called "African teak" is an inferior wood of quite a different kind. Malabar teak is excellent, but now seldom finds its way to this country. Teak is but little liable either to warp, shrink, or crack.

9. *American Walnut* is a hard and durable wood,

beautifully grained. Much of it comes from Baltimore. What is imported from Quebec is cheaper, paler, and softer. In hardness, the best American walnut is about equal to oak. It answers well externally in shop-fronts, &c.

10. *Padouk* is a hard Indian wood of bright red colour, with dark veins. It is used in flooring, and is handsome if polished, though rather heavy in colour unless relieved by lighter woods. It is slightly more expensive than wainscot.

11. *Jarrah* is the wood of a West Australian eucalyptus. It is very heavy; it is red in colour, and has a pretty wavy close grain. It sometimes comes over as ballast, and its cost in England is about 10 per cent. more than that of oak. It is tougher and stronger than that wood, and is said to be almost indestructible by wear or tear. It is in use for block floors, and has been adopted to a considerable extent for street pavings. Ordinary carpenter's tools will scarcely work it.

The list of Colonial and foreign timbers—many of them with highly valuable qualities—might be indefinitely extended. Some of the Tasmanian woods are said to be extremely beautiful in grain. New Zealand produces a kind (*Nauma*) which is lighter than cork, and another (*Ninau*) which is stated to be incombustible. The Kauri pine seems to be what is most valued there for general purposes. In Australia various kinds of eucalyptus wood abound, some of them stronger than oak, and obtainable in enormous sizes, and efforts are being made to bring them into European markets.

Weights of Timber.—

1c.ft. of poplar	weighs..	24lb.
1 " yellow pine	"	26lb.
1 " larch	"	33lb.
1 " Memel yellow deal ..	"	37lb. to 40lb.
1 " sycamore	"	38lb.
1 " birch	"	42lb.
1 " elm	"	42lb.
1 " teak	"	47lb.
1 " ash	"	52lb.
1 " English oak	"	53lb.
1 " box	"	57lb.
1 " ebony	"	63lb.
1 " Spanish mahogany ..	"	66lb.

Strength of Timber against Compression.—The following are the weights which it is commonly stated that a square inch of various timbers will bear before crushing:—

Yellow pine	2tons 8cwt.
Yellow deal	2 " 10 "
White deal	3 " 0 "
Dry elm	4 " 12 "
Mahogany	3 " 12 "
Dry English oak	4 " 18 "
" Dantzic oak	3 " 8 "

FACTORY CONSTRUCTION AND FACTORY ACTS.—VIII.

By GEORGE H. BIBBY, F.R.I.B.A.

FACTORY INSPECTION.

IT is difficult to discover any traces in any of the factory and workshop enactments (ancient or modern), with regard to structural requirements, of the experience of an architect or surveyor, and it would appear that no such person was at any time consulted when the clauses of the various Acts affecting his profession were prepared.

For an instance, the Factory and Workshop Act, 1891, section 1, requires that "every factory of which the construction is commenced after the first day of January, 1892, and in which more than forty persons are employed, shall be furnished with a certificate from the sanitary authority of the district in which the factory is situate that the factory is provided on the stories above the ground floor with such means of escape in case of fire for the persons employed therein as can be reasonably required." Had an architectural authority been consulted upon the subject, he might have suggested that few sanitary authorities have ever exhibited any evidence of experience upon this subject, and that it is purely a technical matter for the certificate of an architect experienced upon structures of the kind. Surely if a medical man can be intrusted to give certificates in reference to matters of life or death, and if an architect or surveyor be intrusted with the power of certifying in reference to the sanitary condition of buildings, it is not suggesting too much to say that a qualified architect (under proper legal restrictions) would have been the most suitable person

to certify as to the proper arrangement of a factory or workshop. Medical men do not often fail in their duty in reference to certificates, and there is no evidence, in my opinion, to show that architects in so serious a matter as factory inspection would be less observant of their duty to the State.

But even under existing circumstances, and with the sanitary authorities in their present position in the matter, it would appear desirable that these should have been included with the Acts of 1891 and 1895, a schedule of requirements giving the minimum width of staircases and the materials for their construction, regulations for the widths, positions, and direction for the opening of doors, and other regulations, varying with the size of factories and workshops, the numbers of persons employed therein, and the nature of the manufacture carried on. It would be impossible to draw up a perfect schedule of this description; but enough could be done in this direction to provide rules that would be useful in preventing unnecessary disputes with regard not only to new factories, but also in reference to the improvement of old factories under the provisions of sub-section 2 of section 7 of the Factory and Workshop Act, 1891.

Then again, if more than forty persons are engaged in a building, say as typewriters, and a corresponding number are engaged in other premises, as letterpress compositors and printers, the latter only would be employed in a building subject to the Factory and Workshop Acts, the former might occupy most undesirable and dangerous premises, yet the Factory and Workshop Acts of 1891 and 1895 could not be brought into operation in their case. These Acts would, in the former instance, be unavailable also in regard to the provisions therein with regard to sanitation, the general laws relating to public health being only available.

By the Factory and Workshop Act of 1891 it is provided that if the Secretary of State is satisfied that the provisions of the law relating to public health as to effluvia arising from any drain, privy, or other nuisance, or with respect to cleanliness, ventilation, overcrowding, or lime-washing are not observed in any workshops or laundries he may, by order, authorise and direct an inspector or inspectors under the Act of 1878 to take such steps as appear necessary or proper for enforcing such provisions, and an inspector so authorised would have for the purpose of his duties the same powers with respect to workshops and laundries as he has under the Act of 1878 with regard to factories; these powers, however, could not be used against the proprietors of typewriting-rooms or of apartments used by large numbers of clerks and others, and the inconsistency exists that two buildings may be planned in every respect to correspond, and be occupied by corresponding numbers of people, yet one is liable to be turned inside out by the sanitary authorities, while the other cannot be touched because it is not a factory or workshop according to the Acts of 1891 and 1895. Further than this, section 32 of the Factory and Workshop Act, 1895, would not apply in the latter case. This section provides that "in every factory and workshop adequate measures shall be taken for securing and maintaining a reasonable temperature in each room in which any person is employed." This clause should not be overlooked, for there does not appear to be any provision in any other factory Act, either for due warmth in winter, or sufficient cooling of the atmosphere in the summer. The warming of workrooms in some factories should certainly never be by means of open fires; and this is particularly important in the case of carpenter's and joiner's shops, or where light articles likely to take fire are manufactured, or also where spirits, oil varnishes, &c., have to be used.

Very many factories and workshops are heated in the winter by no other means than the heat from the lighted gas-jets after dusk, and the natural accumulation of warmth from the congregation of large numbers of people; and many factory owners have stated to me that they consider such means of warmth sufficient and satisfactory, an opinion not likely to be shared by either medical men or architects.

In apartments where it is always necessary to keep ready means for heating glue, melting or boiling, small gas-stoves, steam-heaters, or electrical boilers are provided (the latter means now coming into use occasionally where electrical lighting is also used). All these tend, of course, to raise the temperature of workrooms uncom-

each group of tenements. The group consists of four separate tenements—two of two rooms each and two of three rooms. Each tenement is complete in itself, having a living-room, one or two bedrooms, with scullery containing sink and boiler, also a water-closet, coal bunker, and ash-shoot. Each tenement is provided with a balcony at the rear, separated from that of the adjoining building by a brick division wall. A portion of the floor of each balcony is filled in with reflecting prismatic lights. The following advantages may be claimed for these tenements:—(1) The subdivision of tenements into groups by separate staircases. (2) The entrance to all tenements from the front street by well-lighted and well-ventilated stone staircases. (3) A separate balcony, forming a yard to each tenement. (4) A separate scullery, obviating the need of a common laundry. (5) Easy means of escape in case of fire or panic. (6) Each tenement is completely isolated, and contains all the accommodation of an ordinary cottage dwelling. In estimating the number of persons to be accommodated in this block of building, the same basis has been taken as that upon which the existing buildings (Oldham-road, Block No. 2) were calculated, but the basement and shops have been excluded from this calculation. The tenements consist of seven sets of three-roomed tenements and seven sets of two-roomed tenements on the first floor. The second floor contains a similar number of rooms. The total accommodation provided in this block, upon the basis before mentioned, is 154. The remaining block of buildings on this site consists of a lodging-house, with accommodation for 587 men. This block has a main frontage to George Leigh-street of 263ft., and frontages to Cornwall-street and Spittal-street of 166ft. each. The ground floor consists of large rooms for dining, smoking, and reading; superintendent's rooms and office, a shop, lodgers' kitchen, scullery, &c., with dormitories fronting Cornwall-street and Spittal-street, and a small dormitory in the centre. There is a basement under a portion of the building in which lavatories, lodgers' lockers, boiler-house, and other offices are provided. The building is three stories; the first and second stories are in every respect similar, therefore a description of one will suffice for both. They each consist of three blocks of dormitories, 166ft. long by 23ft. 6in. wide, connected in the centre by a building of like character. In designing these buildings special attention has been given to light and ventilation." He estimates the cost of these buildings at £47,000. The city surveyor explained his plans in reference to the Chester-street site. It is proposed to improve Hulme-street and Marsland-street, making them 18 yards and 12 yards in width respectively, also to set back certain portions of the existing frontages in Chester-street and Wilmott-street, making those streets 18 yards in width, and to provide a new 12-yard street leading from Hulme-street to Marsland-street, and abutting on the existing mill and cottages on the south-west side and the new lodging-house on the north-east side. He proposes to erect the new lodging-house for men on the area lying between Hulme-street and Marsland-street—the net building area would be 2,192 yards—and to set apart land between Marsland-street and Chester-street, having a net area of 2,112 yards, for the purposes of an open space for recreation. The buildings suggested for a lodging-house provide accommodation for 278 men. The building will be three stories in height, the dormitories being placed upon the first and second floors. The estimate of the cost is £19,500. As regards the Pott-street area—between Pott-street, Sandford-street, Caroline-street, and Wharf-street, intersected by Beatson-street—it is proposed to improve the surrounding streets, and to erect tenement dwellings two stories in height on the land to the north-east side of Beatson-street, providing the accommodation already described in the tenement dwellings over the shops on the Oldham-road site. In addition to providing the minimum area in accordance with the conditions of the corporation by-laws, a further space has been set apart between the yards of these tenements as a recreation ground. The tenements afford accommodation for 110 persons. It is proposed to erect a lodging-house for females on the area to the south-west of Beatson-street sufficient to accommodate 218 persons. The estimated cost of this building is £20,000. The committee recommended the council to approve of the building schemes described in their report, and to adopt resolutions applying to the Local Government Board for

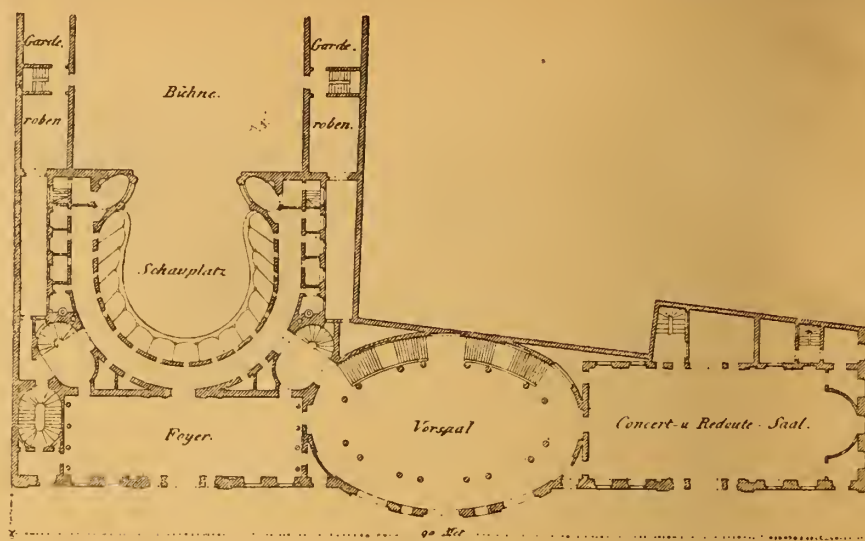


FIG. 1.

their approval of such schemes, and for their sanction to the borrowing of the sum of £60,000 for the erection of the proposed buildings in Oldham-road, Cornwall-street, George Leigh-street, and Spittal-street, and of the sum of £50,000 for the erection of the proposed buildings in Chester-street and Pott-street. The corporation adopted this report at their meeting on Wednesday, and decided to seek powers to borrow the sums of £60,000 and £50,000 for carrying out the scheme.

CONCERT-HALLS AND ASSEMBLY-ROOMS.—XXVIII.

By ERNEST A. E. WOODROW, A.R.I.B.A.

IN the present chapter I have to deal with a class of building not to be found in London, and the reason for this non-existence is primarily the stringent regulations under which theatres and concert-halls have to be built in the Metropolis. I refer to the public building which embraces a theatre and a concert-hall. We have

at a time when there is no performance proceeding in the theatre itself. At the time I am writing this article the foyer of the Empire Theatre, Leicester-square, is being used for the exhibition of the moving photography. The saloon of Drury Lane Theatre has long been well known as a place to hold functions in connection with theatrical charities and Masonic Festivals, and the saloon of the Lyceum Theatre is also frequently lent by Sir Henry Irving for meetings of his brother artists; yet it is quite the exception to find entertainments given in the saloon of a London playhouse. The majority of them, in fact, are quite inappropriate for such a purpose, and the chance appears to have been lost of utilising the space to the utmost extent, and buildings have been erected with foyers and saloons which are not designed in such a manner, with proper means of ingress and egress, so that they may even be used for an entertainment where the audience is limited in number.

In Figs. 1 and 2 are reproduced from an old print the plan and elevation of a theatre in Ghent, which shows that this arrangement of a theatre

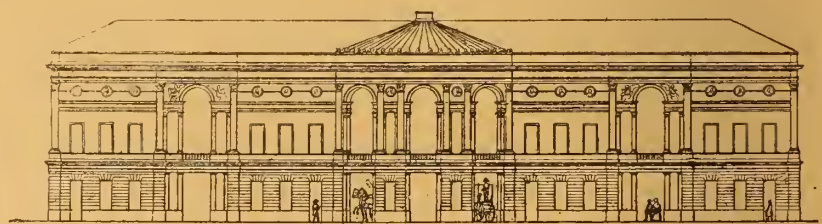


FIG. 2.

both German and French types of this building, and the example set by these countries has been followed in America. The type may be divided into two classes—the one where a concert-hall, although under the same roof, is entirely separate from the theatre, and the one where the concert-room is a part of the theatre, with the same approaches and exits.

It is probable that the origin of the attachment of a concert-hall to a theatre arose from the fact that in opera-houses large practice and chorus-rooms are necessary for the training of the choir as well as for the rehearsal of the orchestra. As these large rooms have to be provided, they have in many cases been so arranged as to serve another purpose besides that of a practice and rehearsal-room; that is to say, a concert-hall has been built in the front part of the house of sufficient size and architectural importance that concerts may be given therein apart from the performances which take place in the theatre. Operatic concerts, orchestral concerts by the band and artists of the opera-house, are frequent attractions for morning performances during the opera season, and there is no doubt that a more fitting location could not be found for such performances than in a concert-hall within the walls of the opera-house.

In large theatres the saloon and foyer are frequently used for separate entertainments, given

and concert hall in one building is of long standing on the Continent. In this example the vestibule forms the centre feature of the plan. The approaches to the concert hall are on the right of this, and those to the theatre on the left. Whatever merits this building may show as to economy of space, it is not an arrangement to be recommended as far as the safety of the audience is concerned, as the two bodies of people attending the concert-hall and the theatre at the same time would be in great danger of meeting in two crowds in the same vestibule, and this danger would still exist, even were other exits provided than those into the vestibule, because the greatest number of people will always leave by the way they have entered.

In the Theatre de Montpelier (Fig. 3), erected from the design of Mr. Cassien Bernard, we have a building of the composite class, of the French type. In this example the concert-hall, although a part of the same building with the theatre, is entirely disconnected by a solid mass of masonry—the back wall of the stage—and there is no opening connecting the theatre and concert-hall in any way.

The building as a whole stands upon an isolated site, and the entrances and exits to the concert-room are separate from those of the theatre, being in the rear of the building. The front is occupied by various entrances, as well as the vestibule of

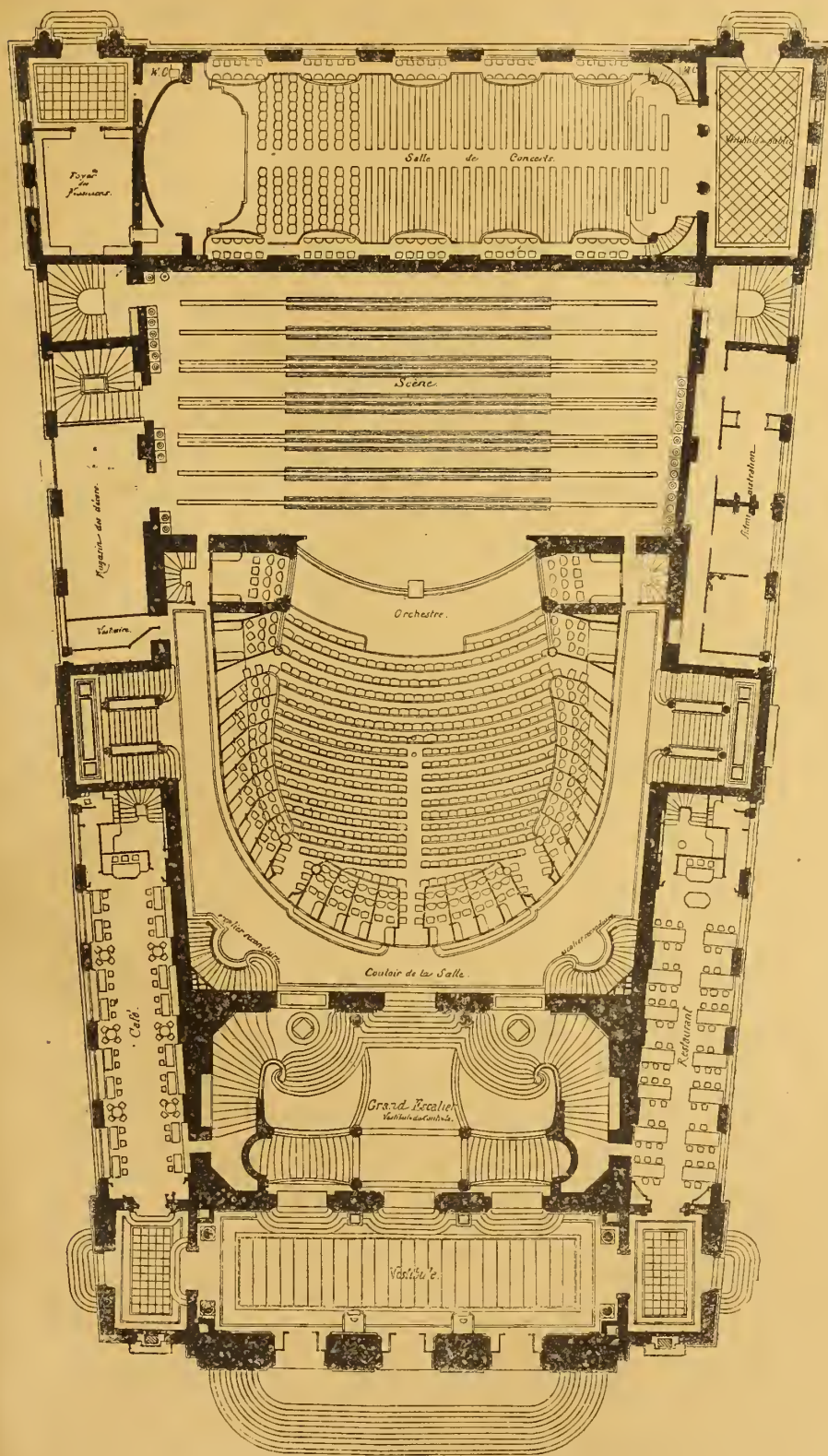


FIG. 3.

the theatre proper leading to the grand staircase, which is of elaborate design. A large portion of the sides of the building is taken up by a restaurant on the right and a café on the left of considerable dimensions. Unlike the concert-hall, there is a connection between these parts and the theatre by doorways which lead into the side vestibule. As a whole, this plan is an admirable solution of the difficulties which arise when an architect has to erect a building to serve the two purposes, for Mr. Cassien Bernard has in no way sacrificed the safety of the audiences by obstructing his exits, or by mixing the various streams of people which would flow from the concert-hall and from the theatre. There is no doubt, however, that the admirable site on which this building was erected went a long way towards solving these difficulties.

Another example of this class of building is

shown in Fig. 4—the Konigl. Schauspielhaus in Berlin, the architect of which was Schinkel. Here the concert-hall was placed at the side of the theatre, and was not in direct communication with the passages of the auditorium.

In many respects the exterior of the Royal Playhouse at Berlin is the most elaborate work which has been produced by this well-known German theatre specialist, Mr. Schinkel. The site of this building was previously occupied by the Royal National Theatre, which was destroyed by fire at the beginning of this century. Schinkel, who was intrusted with the erection of the new building in the year 1819, was, it is stated, seriously hampered by the conditions laid down, especially that which obliged him to use the old foundations. For this reason in its general dimensions the new theatre had to correspond with the old one, and it was divided into three

parts—the theatre proper and two wings, one of which is the concert-hall. The auditorium of the theatre has a holding capacity for 1,500 persons, and is semicircular in form. The galleries, which have been introduced to afford greater accommodation, are said to have materially injured the effect of the front part of the house.

The concert-hall lies to the south of the main building, and has a separate vestibule. The hall

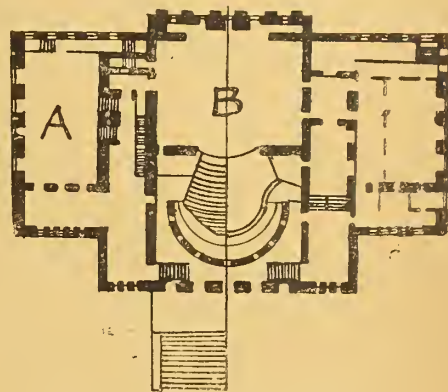


FIG. 4.—A, concert-hall; B, theatre.

measures 13·8 mètres broad, and is 13·5 mètres high, and is said to be, without doubt, the finest interior that has been executed by this architect. A double staircase, which rises from the hall itself, leads to the balcony and adjoining rooms. The hall is used for balls, fêtes, and concerts, and State functions.

The theatre is Hellenic in form, with elaborate plaster interior decoration, and an exterior chiefly carried out in sandstone. The total cost of the block was £95,000.

Fig. 5 is the Victoria Theatre in Berlin, the

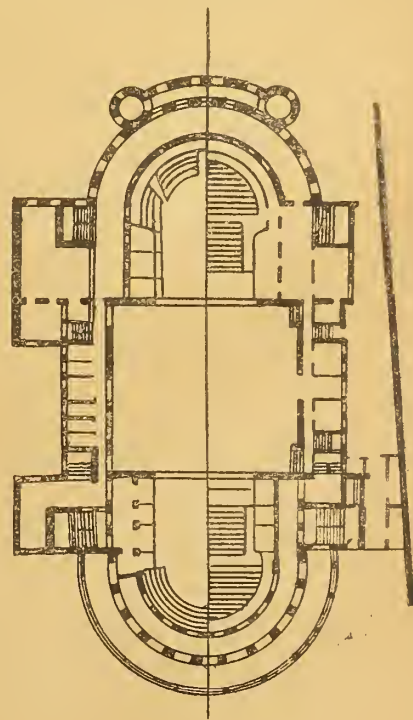


FIG. 5.

architects of which are C. F. Langhaus and Edward Silk, another building of the composite class, where the stage occupies the centre of the building with an auditorium on either side, forming a summer theatre on the one side, and a winter theatre on the other.

A TALL FIREPROOF BUILDING.

AN excellent example of a tall fireproof office building is that of the Harrison Building, Philadelphia, particulars and illustrations of which are given in the *Engineering Record*. It is of the steel cage type, and is constructed to resist wind pressure. The Harrison Building is a 13-story structure at the corner of Market and

Fifteenth-streets, Philadelphia. Special points are the deep webbed corner columns to give lateral stiffness, the use of deep plate girders in the walls, the vertical panels of stiff diagonal X bracing between beams and columns, the support of several lines of front upper-story columns from the ends of floor beams, cantilever girders overhanging the first-floor columns, and the steep roof supported on trussed rafters. These features are illustrated by plans and sections. Iron grillages are shown, which support the columns and distribute their coats upon concrete footings, which are 3ft thick, on hard clay. The framing shows deep wall girders and heavy web gussets, and the way that the terracotta belt course at the second and third stories is supported. The floors are 14ft. 6in. and 10ft. 10in. Deep vertical webs are attached to the inside of the exterior columns to resist flexure, and the gusset brackets prevent distortion of the panels. The building is vertically braced by two transverse partition walls on the vertical planes of the sets of columns, and which enable the panels to be braced with stiff diagonals, which arrangement makes two great vertical trusses, each of which utilises the column lines, floor-beams, &c. Those trusses are shown in the sections. Resistance to the wind is well secured by braced sections, though these are divided by reason of the corridor through the centre of building, the two inner sections being designed as two independent towers, one on each side of the corridor. It is stated that I-beam footings distribute the load on the concrete to 200lb. per square inch of bearing surface; these in turn distribute the load on the ground to 55lb. per square inch, or 8,000lb. per square foot. Four kinds of columns are used, an I-beam section in light weights for the upper stories, and reinforced by increasing its dimensions and adding more pieces of metal in the lower tiers, by which the cross-sectional area is proportioned to the greater strains by the increments of the dead load. These sectional areas vary from 37.5sq.in. in the upper tiers to 77.2sq.in. in the first tier. The floors are calculated for a gross load of 125lb. per square foot. Messrs. Cope and Stewardson, of Philadelphia, are the architects, and Mr. W. Copeland Furber, of that city, is the designing and constructing engineer.

THE TIMBERS OF AUSTRALASIA.—XIV.

By "J. G." ("DE LIBRA.")

THE SOFT WOODS: II.—THE NON-CONIFEROUS TIMBERS OF NEW ZEALAND.

BEFORE proceeding to notice the non-coniferous timbers of Australia, it is necessary to touch separately on those of New Zealand, which occupy a peculiar position among the Australasian products. Although New Zealand possesses no hardwoods proper—hardwoods, that is, in the sense in which the term is understood in Australia—she nevertheless produces several species of the genera *Metrosideros* and *Leptospermum*, both belonging to the same Natural Order as the *Eucalyptus*—viz., *Myrtaceae*—which are formidable rivals to the Australian *Eucalypts*—so much so, indeed, that in their native colony they are often preferred to the imported hardwoods, and a genuine New Zealander would probably be indignant at the assertion that these remarkable islands of the South Pacific produce no hardwoods. But as I am dealing with the subject from a catholically Australasian, and not simply a New Zealand point of view, I have advisedly adopted the present classification, in which, however, first mention must be made among the splendid non-coniferous woods of the Island Colony of the genera and species just referred to.

The Pohutukawa (*Metrosideros tomentosa*) is the "Christmas-tree" of the settlers, so called from its glorious appearance in December and January, when its 70ft. of branches are clothed from base to summit, on mountain slopes 4,000ft. in height, with huge and spreading clusters of blood-red flowers, which, contrasting with the rich green of the upper surface of the leaves and the silvery white of the obverse, all glittering in the mid-summer morning sun of cloudless sapphire skies, just broken by the distant gilded snow-peaks, afford a lesson in colour harmonies as splendid as phenomenal, and one which Medieval heralds would have worshipped. This timber is of deep red colour, excessively dense, heavy and compact, and of great strength and durability (though, strangely, I am unable to find any figures to quote). The spreading and tortuous habit of

growth of the tree renders the wood of the greatest value for shipbuilding, for which it has been used from the very early days of settlement; while for subaqueous work in general it possesses the additional advantage of great resistance to the *Teredo navalis*. For such purposes as dock-gates, &c., it is probably unsurpassed, and is considered more durable than English oak.

The Northern Rata (*M. robusta*) is one of the largest of the New Zealand timber trees, being commonly from 60ft. to 100ft. in height, and from 3ft. to 12ft. in trunk diameter, while diameters as great as 22ft. have been recorded. Logs from 20ft. to 50ft. long, and from 12in. by 12in. to 48in. by 48in., are readily obtainable. The wood is red, of varying depth, straight in the grain, hard, dense, heavy, and of great strength and durability. It ranks second only to Pohutukawa for ships' timbers, and is of great value for sleepers and the heavy framework of railway waggons, &c.; while for bridges, wharves, and other constructional works, it is preferred in New Zealand to even many of the Australian eucalypts. It is likewise an excellent timber for wheelwrights' work. Its specific gravity is .963, its weight 60.08lb. per cubic foot, its breaking weight 217lb., and the weight carried with unimpaired elasticity 108lb.* The Rata often develops large burs, the wood of which is splendidly figured, and very valuable therefore for small decorative veneers or inlaying. The Sydney Technological Museum contains a fine example of such a burr.

The Southern Rata (*M. lucida*) is a smaller tree than its northern brother, and though not quite equal to it as a timber, possesses the same general characteristics, and is a very good substitute for Pohutukawa. It is largely used in shipbuilding, while for railway carriage and waggon frames it is only surpassed by Puriri. The southern Rata is somewhat heavier than the northern, but not quite so strong; and as the tree in exposed situations is often gnarled and contorted, the grain is, in consequence, frequently twisted and uneven.

The Manuka-Rauriki (*Lepospermum ericoides*) attains a maximum height of 60ft., and a trunk diameter of 3ft., affording a dense, heavy, straight-grained timber of great strength and durability, tough and elastic, and of a red colour varying in depth according to the age of the tree. It is largely used for house blocks, marine piles, &c., and is highly resistant to the *teredo*; while for many wheelwrights' purposes it is scarcely surpassed by any timber.

The Manuka itself (*L. scoparium*) is the commonest arborescent plant in the colony, taking the place occupied by furze in the British Islands. When, however, it attains a height of 30ft., with a 2ft. trunk diameter, it furnishes a deep red wood, very straight in the grain, even, compact, strong and elastic, and much valued by cabinet-makers, especially for inlaying, as figured specimens are often met with.

The Puriri (*Vitex littoralis*—Nat. Or. *Verbenaceae*), sometimes called by the settlers "New Zealand oak" (though "New Zealand teak" would be a more suitable appellation), is a noble tree, from 40ft. to 60ft. high, with a 2ft. to 5ft. trunk, affording a dark brown wood, excessively hard, dense and heavy, of extreme strength and durability; but, as a rule, difficult to work on account of the interlaced and crossed arrangement of the fibres. It is the strongest and most durable of all the New Zealand timbers; but its exact strength does not appear to have ever been properly and scientifically determined. It is largely used for house blocks, piles, railway sleepers, culverts, bridges, wharves, and engineering and constructive works of all descriptions, and has long enjoyed the completeness of satisfaction.

The Maire-Rau-Nui, or black maire (*Olea Cunninghamhamii*—Nat. Or. *Jasminaceae*), frequently attains a height of 70ft., with a trunk diameter of from 3ft. to 6ft. Next to Puriri, it is the strongest of this colony's timbers, and is of exceptional value. It is of a deep brown colour, very heavy, dense, compact, straight and even in the grain, extremely durable, easily marked, and taking a good finish. The heartwood is often highly ornamental. Balfour gives the following mean as the result of his experiments:—Specific

gravity, 1.159; weight per cubic foot, 72.29lb.; breaking weight, 314.2lb.; weight carried with unimpaired elasticity, 273lb. Curiously enough, this splendid timber is far less known than many of inferior value, though it has been extensively used for the framing of railway carriages and waggons with the best results. Yet it is even more suitable for heavy constructive works, such as wharves and bridges, though it is little used for these purposes. It forms an excellent substitute for metal bearings for heavy shafts, and is well adapted for millwright's work and ship's blocks. Old specimens are often beautifully streaked, and should admirably serve the purposes of the cabinet-maker, either in the solid or as veneers. The wood might well compete with the European olive for the manufacture of many small articles; indeed, it is closely allied to that tree, and is sometimes called the "large olive."

The Maire (*Fusanus Cunninghamhamii*—Nat. Or. *Santalaceae*). The Maori name of "maire" is applied to several trees, but belongs most properly to that under present notice, which is known to the settlers as "New Zealand sandal-wood." The wood is of a deep and rich brown colour, with darker streaks and markings, and possesses the agreeable odour peculiar to sandal wood. It is even and compact in grain, heavy, and of great strength and durability; but as the trunk rarely exceeds 9in. in diameter, it is only useful in cabinet-making and for small articles of ornamental turnery, &c. Were its value for such purposes, both as to beauty and perfume, more generally known, it would probably be very largely utilised.

The Tawhai-Rau-Nui (*Fagus fusca*—Nat. Or. *Cupulifera*) is one of the New Zealand beeches—properly the "tooth-leaved beech"—which the bushmen persist in calling "birches," the present species being most generally known to them as the "black birch," and in some cases the "red birch." It is a very fine tree, sometimes over 100ft. high, and with a trunk from 2ft. to 10ft. in diameter. The wood is red, straight, even and compact in the grain, of great strength and toughness, and of unquestionable durability. Balfour gives the mean specific gravity as only .626, and the weight per cubic foot as 38.99lb.; while Mr. W. N. Blair, M.I.C.E., records, as the results of 99 tests, a mean breaking weight of 156.86lb., the maximum being 262.10lb., and the minimum 105lb.* The timber is of the highest value, not only for heavy constructive works, such as sleepers, piles, wharves, and bridges, but for many house-building purposes, such as flooring joists, and framing, while the ease with which it works should well adapt it for many kinds of joinery.

The Tawhai-Rau-Riki (*F. Solandri*) is the "entire-leaved beech," to which also the settlers have given the name of "birch," with at least half-a-dozen different colour prefixes. It is a smaller tree than the preceding, and the wood is of a pale red or greyish colour often streaked with black, heavy, strong, and tough. When obtained from trees just in maturity and felled at precisely the right season of the year, the timber is of high value, and its durability is well established; but the difficulties of insuring these conditions (especially at a great distance) are such that, as regards the extra-Australasian market, at all events, mere mention of the timber is sufficient.

The Towhai, or Kamahi (*Weinmannia racemosa*—Nat. Or. *Saxifragaceae*) attains a height of from 90ft. to 100ft., with a diameter of from 12in. to 4ft., and yields a deep red wood. The heartwood (which closely resembles the sapwood) should alone be used. It is hard, strong, even, and firm, but will not stand exposure to the external air and sun, though when entirely covered, whether by soil, water, or otherwise, it exhibits great durability, especially in damp situations where other timbers quickly decay. For sleepers, house-blocks, piles, &c., as well as for beams and framing when under cover, Towhai is superior to many timbers. Blair gives its mean weight per cubic foot as 38.71lb., and its breaking weight as 314.7lb. It is often of an ornamental character, with a small "silver grain," which makes it well suited to the purposes of the cabinet-maker.

The Kowhai (*Sophora tetraptera*—Nat. Or. *Leguminosae*) occasionally reaches a height of 30ft. to 50ft. and a 36in. diameter. The wood is pale brown, and in New Zealand is considered to resemble laburnum-wood, though the specimen in the Sydney Technological Museum is much more like Italian walnut. The timber is compact,

* J. M. Balfour, C.E., "Experiments on the Strength of New Zealand and other Colonial Timbers."—D. L.

+ The specimen of this timber in the Sydney Technological Museum is labelled "Wairangape"; but from a consensus of New Zealand expert testimony, I gather that "Maire-rau-nui" is the more rightful appellation.—D. L.

* Blair, "Building Materials of Otago."—D. L.

dense, heavy, and of great strength, toughness, and elasticity. Its mean specific gravity is .884, weight per cubic foot, 55.12lb., breaking weight 183.5, and unimpaired elasticity 78lb. It is of great durability, but logs of large dimensions are rarely obtainable. It is extremely valuable, however, for small piles and bracing in the construction of wharves, and also for the bearing shafts for machinery, &c., as well as for cabinet work and ornamental turnery.

The Mangeao, or Tangeao (*Litsea calicaris*—Nat. Or. *Laurineæ*) seldom grows above 30ft. to 40ft. high, with a trunk diameter of 18in. to 30in. The wood is white, firm, strong, and of great elasticity, and therefore suitable for a variety of purposes where those qualities are required in conjunction with a light weight, the weight of this timber being only 38.70lb. per cubic foot. It is largely employed for coach-panels, shafts, and wheelwrights' bent stuff generally, and is extensively used in the manufacture of ships' blocks, for which it is considered superior to English ash.

The Rewarewa (*Knightsia excelsa*—Nat. Or. *Protacææ*) reaches a height of from 70ft. to 100ft., with a trunk diameter of 18in. to 30in. It is an ornamental timber weighing 48.92lb. per cubic foot, of great strength, though not durable when exposed. It is usually of a deep red colour, straight in the grain, and beautifully mottled, the "silver grain" varying remarkably in size and distribution. It is extremely well adapted for cabinet furniture and decorative fittings, and Professor Kirk asserts that it would find a ready sale in the English market. It is a timber extremely difficult to burn, for which reason, probably, it is often wastefully used in New Zealand for the rougher purposes of building.

The Papauma (*Griselinia littoralis*—Nat. Or. *Cornacææ*) never attains a greater height than about 60ft.; but the trunk, which is crooked and gnarled, is often 4ft. in diameter. The wood is of reddish colour, dense, firm, compact, and of great strength and durability, though somewhat brittle, and shrinking slightly. The crooked habit and limited height of the tree detract from the value of the timber for many purposes, but render it specially serviceable for shipbuilding. For boat-timbers, sleepers, and various building operations it is largely employed.

The Tawhiwhi (*Pittosporum tenuifolium*—Nat. Or. *Pittosporacææ*) is a small tree, often less than 30ft. in height, and rarely more than 15in. in trunk diameter; but the wood, which is brownish white, very firm, straight-grained, and of even texture, has an average specific gravity of .965, and an average weight per cubic foot of 60lb., and is nearly twice as strong as English oak. It is not durable when in contact with the ground, but is very valuable for inside work requiring great strength and elasticity, in positions which do not admit of the use of larger scantlings.

The Pukatea (*Laurelia Novæ Zelandiæ*—Nat. Or. *Monimiacææ*) grows sometimes 150ft. high, but more commonly from 90ft. to 120ft., with a trunk diameter from 3ft. to 6ft. The wood is pale brown with a slight tinge of yellow, cloudy, streaky, and often very ornamental. Though rather soft, it is of great strength, extreme hardness, and difficult to burn. Pukatea has been greatly and very unjustly neglected, even in its native colony, through not being durable in the ground. But in other positions it is extremely valuable, and is much prized (where known) for boat-building, as nails can be driven into it in any direction without causing it to split. For many kinds of furniture and ornamental work it is likewise an excellent timber.

The Inaka (*Dacrydium longifolium*—Nat. Or. *Eupacridææ*), though in most parts of New Zealand scarcely more than a shrub a few feet high, becomes in Stewart Island one of the singular "grass-trees," reaching a height of 30ft. or 35ft. The wood is light brown in colour, with a fine, even grain and satiny lustre, and a minute "silver grain." It possesses a special beauty in its oblique, wavy markings, which occasionally exhibit a feathery appearance. It takes a very high finish, and is suitable for all kinds of ornamental work.

The Hinau (*Eleocharpus dentatus*—Nat. Or. *Tiliacææ*) grows to a height of 50ft. or 60ft., with a 12in. to 36in. stem diameter. It is a light, dull-brown timber, tough, strong, extremely durable, and suitable for bridges, culverts, sleepers, piles, and other constructive works.

The Tupari (*Olearia Colensoi*—Nat. Or. *Compositææ*) attains an extreme height of 40ft. and a diameter of 24in. The wood is light brown in colour, firm, hard, and compact, with a silky

sheen and usually a small "silver grain," and often streaked or cloudy. It is well adapted for many kinds of ornamental work.

The Kohchohe (*Dysoxylon spectabile*—Nat. Or. *Meliacææ*) grows from 20ft. to 50ft. high, with a 12in. to 4ft. trunk diameter. The wood is pale red, straight and even in the grain, strong, and fairly durable, though rather soft. It is useful for many purposes where heavy timbers are ineligible, while its curved and heavy figurings, which are of great beauty, make it a specially valuable wood to the cabinet-maker.

The above comprise the most commercially important of the fine New Zealand timbers, though there are many others of considerable value.

SANITARY CONGRESS AT NEWCASTLE.

THE fifteenth annual congress of the Sanitary Institute is being held at Newcastle-on-Tyne, the meetings being held in the buildings of the University of Durham College of Medicine in Northumberland-road. The proceedings were inaugurated on Wednesday afternoon, by a reception of the members by the Mayor of the city, and will be continued until Tuesday next, some of the excursions being arranged for the following day. After the reception on Wednesday, which was largely attended, a public luncheon was held at the Grand Hotel. The exhibition of sanitary appliances was opened in the afternoon by the Duke of Cambridge, the President of the Institute, and in the evening an address was given to the members by Earl Percy.

Lord Percy remarked that Northumberland consisted to a large extent of rural districts with a steadily decreasing population—a phenomenon observable not only throughout the United Kingdom, but in most civilised communities of the world. They had in the south of Northumberland, however, dense centres of population, and they had to face there and elsewhere problems in sanitation presented by crowded areas on the one hand, and isolated dwellings on the other. So far as the sanitation of houses in thickly-populated quarters was concerned, experts had approached very closely to a knowledge of the arrangements universally demanded for securing an absolutely healthy state of things, though the practical obstacles to carrying them out were often very great. But there were so many competing systems of sewage disposal that local authorities frequently delayed beginning reforms urgently needed, and it was much to be desired that the principles and practice of sewage disposal should attain more to the status of an exact science than they yet appeared to have done. Perhaps the problems connected with water supply were even more important and pressing, especially as the population continued to concentrate itself in certain districts. In spite of the wise vigilance constantly exercised by Parliament there appeared to be a certain want of system which might lead to disastrous results. Parliament had from time to time sanctioned the abstraction of the water supply of one basin for the necessities of another, provided enough was left for the present or probable future wants of the basin tapped. It might be doubted, however, whether some more regular effort should not be made to map out the watersheds of England and to define the area which each centre of population might reckon as its own. Great caution was necessary both in deciding the area to be drawn upon and the nature, extent, and permanence of the means employed for drawing upon it. It might be that by the increased use of bicycles traffic on the old main roads might soon be largely increased, and the old inns, towns, and villages that lay upon them might regain some of the importance they enjoyed in the days of the mail coach. If so, a fresh distribution of the population would assuredly follow, demanding the renewed attention of those whose duty it was to provide for the health of the people, and it was of the highest importance that in striving to meet existing conditions nothing calculated seriously to impede us in adapting ourselves to altered circumstances should be attempted. He next asked for an answer to the question whether the greater use of the electric light was prejudicial to vision and general health, and regarding the greater use of wood-paving, said that while the gain in some respects, as in quietness, was enormous, especially in London, it appeared under the present system of watering and cleansing to load the atmosphere with a very large amount of undesirable

material, probably including microbes. It was pre-eminently the part of scientific experience to advise on such matters. It was his belief that for some little time to come we should look in vain to Parliament for any very conspicuous sanitary activity, although he did not know that they need very much regret any ebb in the flow of public legislation. The law placed many drastic obligations on local bodies, who delayed sometimes to carry them out, not only because of the ratepayer, but owing to many competing plans. Sanitary experts might be of use in obtaining more uniformity, but it might be worth considering whether greater powers might not usefully be intrusted to the Imperial authority. The time had not come to remit exertions in sanitary reform, but real and steady progress was being made.

Yesterday (Thursday) the conferences commenced, no fewer than five sectional meetings being opened in as many rooms at the college—the port sanitary authorities meeting under the presidency of Mr. Arthur Holt Barber, of London, the medical officers of health, with Dr. Alfred Hill as president; the municipal and county engineers having Mr. Francis J. C. May in the chair; the sanitary inspectors, over whom Dr. George Reid presided; and the section of Domestic Hygiene, with the mayoress of the city as titular head.

To-day (Friday) an address will be given in Section I., "Sanitary Science and Preventive Medicine," by Professor W. H. Corfield, and papers will be afterwards read and discussed. A garden-party will be given in the afternoon in Jesmond Dene, and in the evening a lecture on "The Isolation of the Infectious Sick in Hospitals," illustrated by lantern views, will be given by Mr. A. Wynter Blyth, F.R.C.S. and barrister, of London, the chairman of the council of the Sanitary Institute. The papers and discussions in this section will be continued to-morrow (Saturday), and on Monday morning the opening address in Section II., "Engineering and Architecture," will be delivered by Sir Andrew Noble, F.R.S., and will be followed by papers and discussions. Section III., "Chemistry, Meteorology, and Geology," will be inaugurated on Tuesday by a presidential address by Mr. W. H. Dines, and in the evening Sir Charles A. Cameron, M.D., will give a popular lecture on "Why, What, and When We Eat."

As usual, a large number of excursions has been arranged to enliven and vary the congress proceedings. Yesterday (Thursday) afternoon the Municipal and County Engineers left the Grand Hotel, Barras Bridge, in brakes (provided by Mr. S. H. Adams, of the firm of Messrs. Adams and Co., of York), to visit the sewage disposal works at Croniwell (where Adams' sewage lift is in operation), and the new bridge over the River Derwent. They afterwards proceeded to Chopwell to see a reservoir in course of construction by the Consett Company, and having inspected a new mineral railway in course of construction between Chopwell and Blaydon Haughs for the Consett Company, returned to Newcastle, arriving about 7 p.m. For the port sanitary authorities an excursion was arranged on the same afternoon to visit Messrs. Palmer's Engine and Shipbuilding Yard at Jarrow; and the sanitary inspectors visited at the same time the sewage disposal works of the Penshaw, Hetton-le-Hole, and Houghton-le-Spring District Councils, of which Mr. D. Balfour, C.E., Newcastle, is the engineer. A separate excursion to Blaydon was also arranged for the same day to visit Messrs. Harriman and Co.'s Sanitary Pipe Works, and Messrs. Smith, Patterson, and Co.'s Sanitary Engineering Works. Those members interested in the Engineering and Architecture section inspected the new filter-beds of the Newcastle and Gateshead Water Company, near Harlow Hill, on the same afternoon. No excursions are arranged for to-day; but to-morrow (Saturday) there are a large number, including a trip by steamer down the River Tyne to Tynemouth Pier, a visit by rail to Warkworth and Alnwick Castles, and another to Lord Armstrong's seat at Craigside, near Rothbury; while on Monday the fever hospital at Wallen Gate, on Tuesday Messrs. Armstrong's works at Elswick, and on Wednesday Wynyard Park, Lord Londonderry's seat, are to be visited.

WOOD FIBRE AS A BUILDING MATERIAL.

AT the exposition of manufactures at Strasburg, Germany, were exhibited samples of building material of wood fibre. The materials were in-

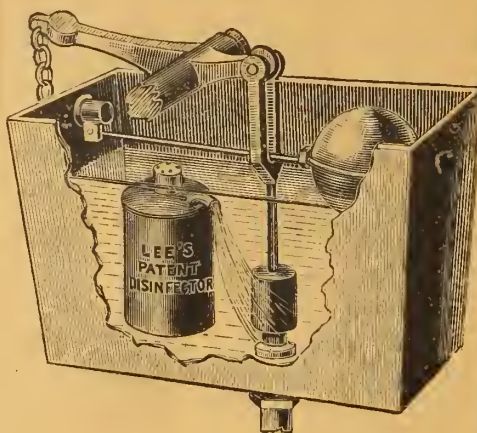
vented by Otto Henry Schwartz, an architect, of Munich, Germany, and manufactured for Alsatia and Lorraine and the grand duchies of Baden and Hesse by M. Heydt, a contractor who has the license for those countries. The new building materials are made of wood fibre impregnated antiseptically in combination with a mortar stucco, manufactured according to a new patented process, or in combination with a mortar of Roman cement. This partition material of wood fibre is especially useful in modern buildings for the middle partitions, which ought to be light, insensible to the influence of atmosphere, able to be worked by saw and chisel, and fixed with nails, screws, and clasps, and, finally, be bad conductors of heat, cold, and sound. That they are incombustible, it is said, was proved by an experiment which took place at Strasburg, Aug. 9, 1895, before a company of experts. The necessary machines for manufacturing this new composition are already being constructed at Flensburg, Germany.—*L'Echo Forestier*.

CONDUCTIVITY OF CEMENT AND CONCRETE.

IT has been stated on the authority of Dr. Lindeck that the "electric resistance of cement blocks and those made of cement and sand or gravel when in an air-dry condition is relatively small; it is lowest of all in the case of pure cement, and becomes higher as more sand or gravel is used with the cement." From which it is shown that the arrangement of the road-bed of electric lines must be very favourable to leakage, especially when the concrete on which the rails rest is covered with a layer of asphalt, which latter prevents a good drying of the concrete. We cannot give here all the results of the experiments made by Dr. Lindeck to determine the conductivity of pure cement and concrete blocks; but it appears probable that by "using asphalt concrete the rails could be permanently insulated from earth to such an extent that leakage currents of any importance could not occur. The asphalt concrete should be laid in a thin layer over the cement concrete." These remarks are made in the *Engineering Magazine*, from an abstract from a paper which is given in the *Electrician*. Electricians have long been trying to diminish the leakage from the rails, and to introduce a material to increase the resistance between rail and earth. These experiments tend towards the solution of the problem.

BOOKS RECEIVED.

The Agricultural Rates Act, 1896, by SIDNEY WRIGHT, M.A., of the Middle Temple, barrister-at-law. (London: *Estates Gazette* Office, Bride-street, E.C.)—This little handbook is a useful epitome of the new Act, the object and scope of which it explains. One of the main provisions of the Agricultural Rates Act is to give a partial exemption from certain rates to certain occupiers during a period of five years; and another object is to provide for the payment of an annual grant out of the Revenue to meet the exempted rates. Mr. Wright's little book epitomises these provisions, and the notes and introduction which accompany the text of the Act will be found very serviceable by all interested in landed property. The rates to which the Act applies includes poor rates, county rates, county police rates, borough rates, watch rates, highway rates, &c.; but they will not include general district rates, made under sect. 211 of the Public Health Act, 1875, nor separate rates for special expenses of rural district councils, nor Metropolitan sewer rates, and other rates are also excluded, in respect of which the occupier of agricultural land enjoys an exemption already, as compared with the occupiers of buildings, of one-half or less. These and other provisions are fully explained, also how the amount of annual grant is to be ascertained by the Local Government Board. The Agricultural Rates Order and Regulations made by that Board are also given. The notes given in the Act itself will be found useful, and we can recommend the book to all interested in agricultural property.—From Messrs. Orell, Füssli, and Co., Zurich, we have received the two latest issues of *Europe Illustrated*—No. 167, an account of "The Hungarian Southern Railway," by Edmund Steinasker, which contains sixteen woodcuts and a map; and Nos. 168-9, "The Baths of St. Moritz," written in dialogue form by Pastor Camille Hoffmann, and illustrated by J. Weber.



LEE'S PATENT AUTOMATIC DISINFECTOR.

THIS is one of the simplest automatic disinfectors, and the cheapest we have seen for w.c. pans and drains. It is made by the Auto-Disinfecting Company, 93, Northumberland-street, Liverpool, and only costs 3s., ready for use, with 1,500 charges of permanganate of potash included.

The sketch shows the mode of application. All that has to be done is to place the disinfecter in the cistern in the position indicated. The section, which is exactly half the real size of the apparatus, shows the action, which is simple and certain. There is no leakage or waste between flushes, and a measured quantity of disinfectant is served out to every flush of water.

CHIPS.

With reference to a recent paragraph referring to the parish church, Gosberton, Mr. William Wade, builder, of St. Neot's, Hunts, writes that the work of restoration was carried out by him. Gosberton is one of the finest churches in Lincolnshire, being of considerable antiquity, as shown by extensive Norman foundations revealed during the re-flooring, some of which Mr. Wade has made accessible by traps in the flooring. The church contains several recumbent figures and brasses.

The Lords of the Committee of Council on Education have appointed Mr. A. J. R. Trendell, C.M.G., to be assistant secretary of the Department of Science and Art, in succession to Mr. G. F. Duncombe, retired. Mr. Edward Belshaw succeeds Mr. Trendell as the chief clerk.

Mr. John Sykes, senior partner in the old-established firm of Messrs. B. Sykes and Son, joiners and builders, Park-street, Brighouse, died suddenly on Friday, aged 62 years.

The town council of Chatham have adopted plans for a new town-hall prepared by Mr. G. E. Bond, of Rochester, and have instructed Mr. Bond to prepare specifications and quantities preparatory to the invitation of tenders from builders. The estimated outlay is about £18,000. The town council has also decided to erect public baths, at a cost not to exceed £8,000.

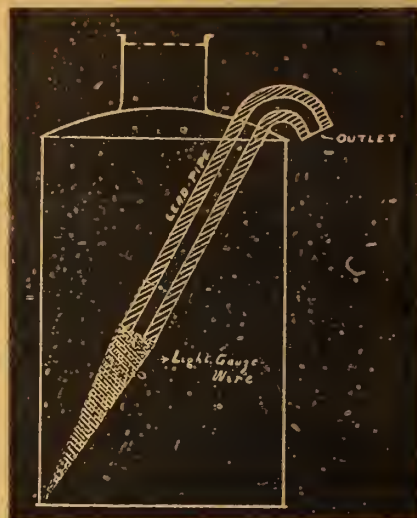
The Burns statue, in the Fountains Gardens at Glasgow, will be unveiled by the Earl of Rosebery on Saturday, the 26th inst.

The International Congress of Archaeologists has chosen Kieff as the meeting place of the next Congress.

A Celtic memorial cross is about to be erected over the grave of the late W. J. O'Neill Daunt (1807-94), of Kileascan, County Cork, whose diary, under the title of "A Life Spent in Ireland," was published in the early part of this year. The cross is of white Sicilian marble, resting on an Irish limestone die stone, the base of the same material. Mr. J. O'Connell, of Cork, is the sculptor.

At Liverpool a new Central Fire Brigade Station and administrative police buildings are being erected for the corporation in Hatton-garden at a cost of about £30,000.

An ice-factory in Queen-street, Chester, was opened last week. The machinery has been supplied by the Pulsometer Engineering Co.; the contractor is Mr. J. Mayers; the architect, Mr. Boden, also of Chester. The Howe Electrical Engineering Co. have supplied the electric lighting, and Mr. S. Parry has provided the abattoir and chill-room fittings.



COMPETITIONS.

EDINBURGH.—In response to invitations from the town council for competitive plans from architects for the reconstruction of North Bridge-street, a dozen designs have been lodged. These have been sealed up, and are at present in the custody of the town clerk. At an early meeting of the Lord Provost's committee the question of the appointment of an assessor to assist the town council in coming to a decision as to which plans shall be awarded the premiums offered will be considered. After the assessor has gone over them and made his award, it is proposed to hang the plans in the large saloon of M'Laren's late establishment in the High-street, now in the possession of the town council, and there the public will have an opportunity of seeing them.

A brass tablet has been placed on the wall near the entrance to the Convalescent Home at Perranporth, bearing the following inscription:—"This building was erected, furnished, and endowed by Mr. J. Passmore Edwards, of London, in memory of his mother, Mrs. Susannah Edwards, formerly of Blackwater, in the county. This tablet was provided by personal friends of Mrs. Edwards, at Blackwater, in grateful remembrance of her worth, and in appreciation of Mr. Edwards's acts of public benefaction."

Colonel Robert W. Edis, F.S.A., surveyor to the syndicate who have purchased Trafford Park, visited Manchester on Friday, and, in company with Mr. Bennison, the surveyor to the Royal Agricultural Society, went over the intended show-ground and discussed the details of the approach roads, water supply, &c. The scheme for the laying-out of the park estate is sufficiently far advanced to lead the local committee to hope that some expense might be saved to them by portions of their work being carried out in conjunction with that scheme. The local subscription list has now reached £8,400 towards the £10,000 aimed at.

Frederick Henry Mitchener, late surveyor of the Cuckfield Rural District Council, who had been remanded on a charge for embezzling £8 lls. of the council's money, was charged on Friday at Hayward's Heath with forgery, the indictment having been altered to that offence. Workmen were called to prove that they had not received the wages appearing on various dates in the accused's book, nor were they employed, as the entries alleged, at such times as the Lindfield Sewage Farm. The accused was committed for trial at the next Sussex Assizes.

The inhabitants of Southowram, which is situated on the lofty hill on the south side of Halifax, have had another great improvement added to their village church by the placing of a large turret clock, showing the time upon three external dials, 6ft. each in diameter, and striking the Great St. Mary's, of Cambridge, musical quarter-chimes, in the tower, the gift of Mrs. Leppington, of Torquay. The work has been executed by Messrs. W. Potts and Sons, Leeds and Newcastle, who are now erecting chime-clocks in Heaton Norris Church, Stockport, and Ashwell Church, Herts.

The oak screen in the parish church of Dodbrooke, near Kingsbridge, has just been restored and provided with a central rood, the work having been executed by Messrs. Harry Hems and Sons, of Exeter. The east window in the same church has been filled with stained glass representing the Crucifixion, the work of Messrs. Fouracre and Son, of Stonehouse, Plymouth.

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ILLUSTRATIONS.

THE HALL OF THE VINTNERS' COMPANY.—CHURCH OF ST. HELEN AT CLIFFE, HOO.—MR. T. E. COLLCUTT'S DESIGN FOR THE LIVERPOOL MUSEUM AND SCIENCE SCHOOLS.—THE BROOK HOSPITAL, SHOOTER'S HILL.—DINING-ROOM FITMENTS.—DOORWAY IN A BERLIN HOUSE.

Our Illustrations.

CITY GUILDS: NO. XXVI.—THE HALL OF THE VINTNERS' COMPANY.—THE COURT ROOM.

CONTINUING our series of illustrations of the buildings belonging to the Great London Guilds, we give to-day a view of the ornately carved chimney-piece in the Court-room of the Vintners' Company in Upper Thames-street, one of the most important, and undoubtedly one of the most ancient, of the City Corporations. The Hall, rebuilt after the Great Fire, was designed by Sir Christopher Wren, in 1671; but the interior has been refronted and wainscoted in parts with much rich elaboration during the last fifty years. The staircase, in the style of the court-room chimney-piece, is a very interesting example of the English Renaissance. This and the old carving in the hall is attributed to Grinling Gibbons. The Master's Chair to the left of the fireplace seen in our plate is an exceptionally graceful and delicately-designed piece of furniture, ornamented with the vine in skilful conventionality, the work certainly of a masterly hand. The arms of the Vintners' Company occur in the cartouche at the head of the chair. We illustrated the famous pall belonging to this Guild in our issue for July 17th last, and on Sept. 6th, 1895, we printed some sketches of furniture from this same Hall. The trade of the Vintners in the 12th century became of great consequence commercially in this country, and Gascony, as claret was then called, was at that time largely imported by the *Vinetarii*, who were known as "The Merchant Wine Turners of Gascony." The *tabernarii* were a subordinate class of retailers, and the Company of Vintners exercised jurisdiction over the entire trade and sold wine by the quart to taverns, severely punishing those who were caught adulterating their liquors. An instance of this is recorded by Stow, the historian, who, with gusto, relates how John Ranwell, Mayor of London in the sixth year of the reign of Henry VI., served the Lombards when the knowledge reached him of their having corrupted their sweet wines. He gave orders that the heads of the butts and other vessels should be driven in or broken open in the public streets in various parts of the Metropolis, "so that the liquor running forth passed through the City in the sight of all people, like a stream of rain-water, from which arose a most loathsome savour." The vintry near London Bridge was the landing stage for all wines coming to the Port of London, "so that the King's bottlers and gaugers may there take custom." The Vintners were incorporated as wine-turners by Henry VI. in 1437, Edward III. having granted them in 1365 a charter for the exclusive importation of wines from Gascony. The freemen or "free-vintners" of the Company have the privilege of retailing wine without a license, and of

old they were called the "Great Bordeaux Merchants of French Wines." In Edward III.'s days Gascony wines were sold in London at 4d., and Rhenish wines at 6d. per gallon. The "Three Cranes Lane" derived its name from the implements with which the Vintners "craned their wines out of lighters and other vessels." The old Vintry, which stood where the Vintners' Hall is now built, as well as Queen Street-place, was so magnificent a building that Henry Picard, vintner and mayor in 1356, entertained therein the Kings of England, Scotland, France, and Cyprus in 1363. The charity trusts of this Company produce a vast income, which is applied, amongst other purposes, to the maintenance of the Vintners' Almshouses in Mile End-road, which were rebuilt after the Great Fire. There are likewise also many annuities and gifts to the poor granted every year by this body, one of the twelve Great Companies of the City of London.

CHURCH OF ST. HELEN, CLIFFE-AT-HOO, KENT.

LAST week we gave a double-page illustrating the perspective view and details of this typical Kentish church. To-day we complete the series of our plates, from Mr. Arthur Vercoe's admirable drawings, by giving the plans and elevations, accompanying which are copious notes furnishing many items of information descriptive of the work represented, and further elucidating the history and characteristics of the building.

EXTENSION OF THE MUSEUM BUILDINGS AND NEW TECHNICAL SCHOOLS, LIVERPOOL.

ON August 14th we published the selected design for this extensive undertaking, by Mr. E. W. Mountford. To-day we illustrate the design prepared for the same work by Mr. T. E. Colcutt in conjunction with Mr. Andrew N. Prentice as joint architects. The plans given with the view clearly display the ingenious arrangements which are so contrived as to group round the circular lecture theatre, seated to accommodate 452 persons. The upper floors are occupied by museum galleries ranging with those in the existing buildings, leaving a large central court in which the dome of the lecture theatre is located, and from whence light is chiefly obtained.

THE BROOK HOSPITAL, SHOOTER'S HILL.

THIS building has just been completed, and was thrown open a week or two since for public inspection by the Metropolitan Asylums Board, for whom the hospital has been built. The institution is situated on high ground. It is constructed to hold 488 patients and a staff of 325 persons, and consists of a series of two-storied pavilions built in terraces on the slope of the hill, and connected by roofed but open gangways. The buildings with their appurtenances and connections cover 21 acres; but the site contains eight additional acres, which could be used for temporary purposes during severe epidemics. There are 12 men's ward pavilions, each two stories in height, with an open space beneath the ground floor. The eight wards for scarlet fever each contain 20 beds, and are 120ft. long; while the four other wards for enteric cases contain 12 beds, and are 120ft. in length. All the wards are 13ft. in height and 26ft. in breadth. The floors are of teak, and the walls are plastered with Keene's cement. All internal angles are rounded, and the internal faces of the window frames are flush with the face of wall. The ward windows consist of double-hung sashes to three-fourths the height, the remaining portion being a hopper-hung fanlight, hung to open inwards, with hopper cheeks going up to ceiling. These windows extend from 2ft. 6in. above the floor up to close under the ceiling. The lower sashes are glazed with plate-glass, and the upper ones are double glazed with sheet-glass. The ward furniture is of solid birch throughout, except the table-tops, which are of American maple-wood. There are six isolation pavilions, two containing four single-bed wards each, and four having each one ward for four beds. The building contractors employed upon the works were Mr. C. Wall, of Chelsea (who had five-sixths of the whole); Messrs. H. Wall and Co., of Kentish Town; and Messrs. Shillitoe and Son, of Bury St. Edmund's. The wiring and fittings are by Messrs. Julius Sax and Co. Mr. Thomas W. Aldwinckle, F.R.I.B.A., is the architect. Mr. E. T. Larkin has acted as chief clerk of works.

MODERN GERMAN INTERIOR WOODWORK.

The examples which we are enabled to illustrate to-day from the designs of Messrs. Kayser and

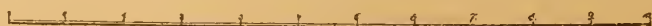
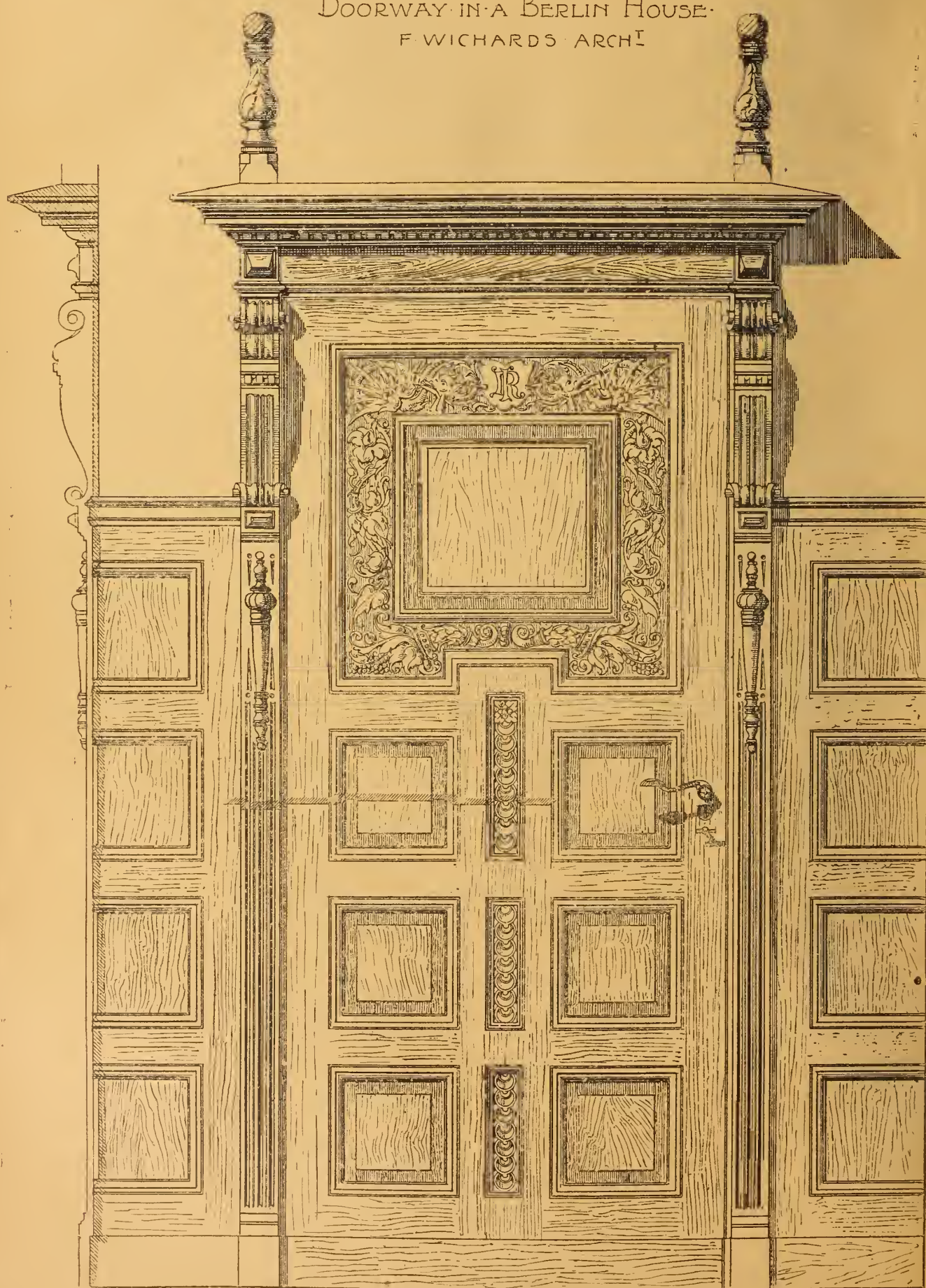
Von Groszheim, architects, and by Mr. F. Wichard, of Berlin, are both suggestive and typical of the best kind of treatments adopted in houses of the superior class in Germany at the present time. The interchange of national methods and ideas cannot fail to prove useful, and without inappropriately appropriating either one or the other, no one's knowledge is so complete that fresh notions cannot be gathered by a study of new work as well as old, and that, too, even when the actual design of such specimens may not precisely commend itself to English taste and manners. The dining-room fitments shown by our first sheet comprise a buffet, having a buttery or service hatch contrived at the rear from the pantry, a wall-basin lavatory, with towel-bracket or rack by the side; and a door to the apartment balancing the composition on the other side of the same end of the room. There is a breadth and boldness in this work, and without lack of richness the features are well defined and simply managed. The arrangement of the ceiling is scarcely so satisfactory, and, of course, in this as in any work, much must depend upon the way in which the actual craftsmanship is executed. The artificer alone can in the majority of cases prevent a design from being hard-looking and mechanical; the designer, in fact, is helpless in the hands of an inartistic and unsympathetic executant. Much modern work, both at home and abroad, of course, fails for this reason, and a mere machine-like accuracy of finish utterly fails to furnish an adequate substitute for the interest which alone comes from individuality. German work is not infrequently blamed for this reason, and, therefore, in calling attention to contemporary productions, such as those shown herewith, it seems but reasonable to call to mind conditions which, in the ordinary way, are by no means really under the control of the architect. Mr. Ernest Wasmuth has during the past few years been publishing a most comprehensive series of details of every sort of internal woodwork and joinery under the title of "Der Innere Ausbau," contributed by a large number of Berlin and other architects. This book* has now been completed, and it certainly furnishes a wonderful assemblage of designs and drawings, besides some fine permanent ink photo. prints, giving views of staircases, vestibules, restaurants, parlours, and other apartments in various styles adapted to the requirements of German taste. The samples which, with the publisher's permission, we have reproduced to-day have been chosen from among the detail sheets, of which they are fairly representative. The doorway from a house in the Jaeger-Strasse, Berlin, was executed by Mr. F. Ehrenreich and Messrs. G. and H. Schuetze from Mr. F. Wichard's designs. At an early date we intend to print some enlarged details of the already mentioned dining-room fitments, which are from the private house of Mr. C. von Groszheim, one of the firm of architects who designed the building. Messrs. Max Schulz and Co. made this furniture, working to the designer's carefully-prepared full sizes, which are elaborated with the utmost care and clearness. The plates in the two large folios which form Mr. Wasmuth's big book, measure 19in. by 12½in., and there are about 200 sheets, some being printed in colour.

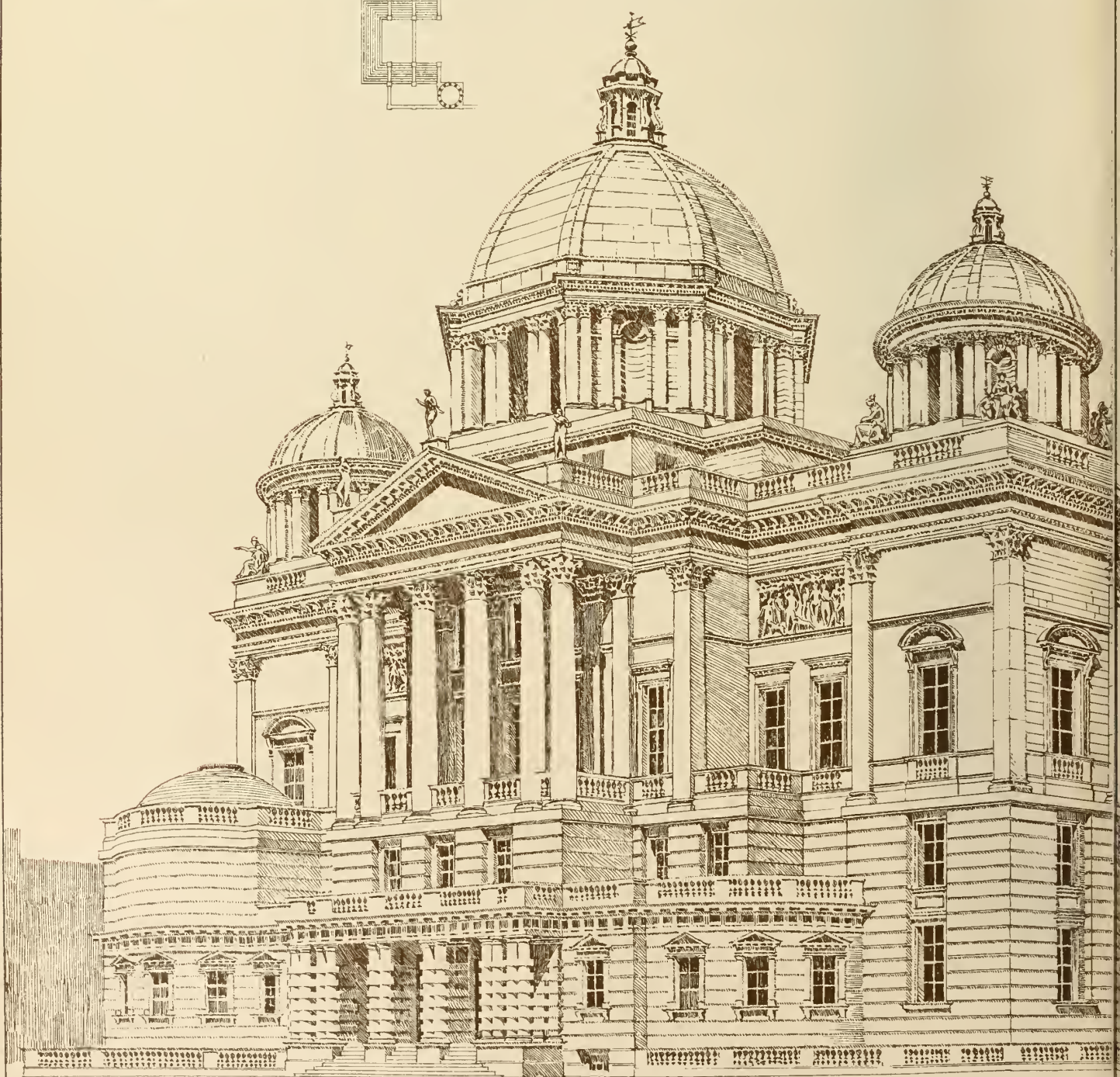
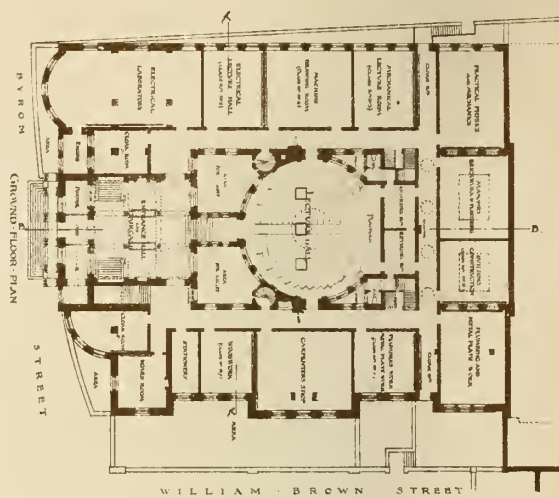
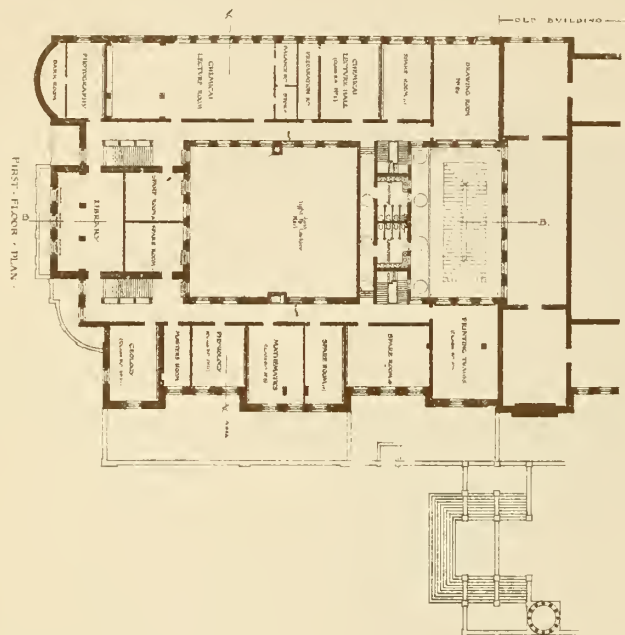
Work is being commenced by the Right Hon. Alderman Meade, P.C., builder, of Dublin, in removing the debris in Mercer-street, Rathmines, preparatory to building the new town-hall for that district.

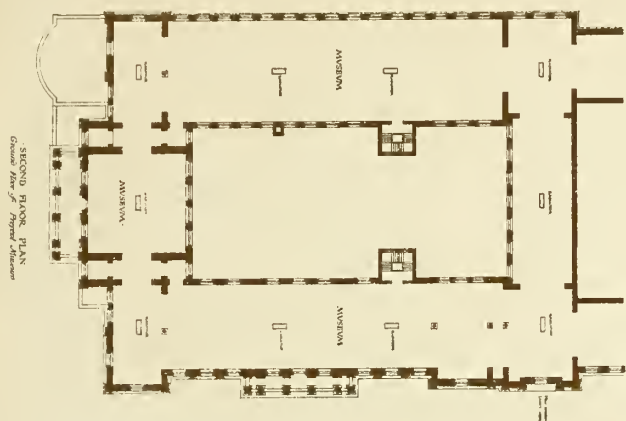
During the excavations which are being made in Shoreditch in connection with the electric-lighting installation which the vestry of that district are about to establish, one of the uavries struck his pick on Friday into the earth concealing an old well, which proved to be 20ft. deep and 3ft. in diameter, and to contain 7ft. of water. There were found in the well the elm-wood barrel and suction-pipe of a pump. The brickwork was perfect, compact and mortared towards the top, but loose towards the bottom to allow the water to percolate into the well. The well was under the pathway in the High-street, a few yards from the entrance to the Standard Theatre, close to the end of Holywell-lane. It probably belonged to the Benedictine Priory which formerly existed there. Unfortunately, the works department of Shoreditch Vestry decided to fill in the well at once; but the remains were photographed before being again covered in.

* Der Innere Ausbau. Sammlung Ausgefuehrter Arbeiten aus Allen Zweigen des Baugewerbes. Herausgegeben von Cremer und Wolfenstein. Berlin: Von Ernst Wasmuth, 35, Markgrafen Strasse.

DOORWAY IN A BERLIN HOUSE.
F. WICHARDS ARCHT







EXTENSION OF MUSEUM BUILDINGS:

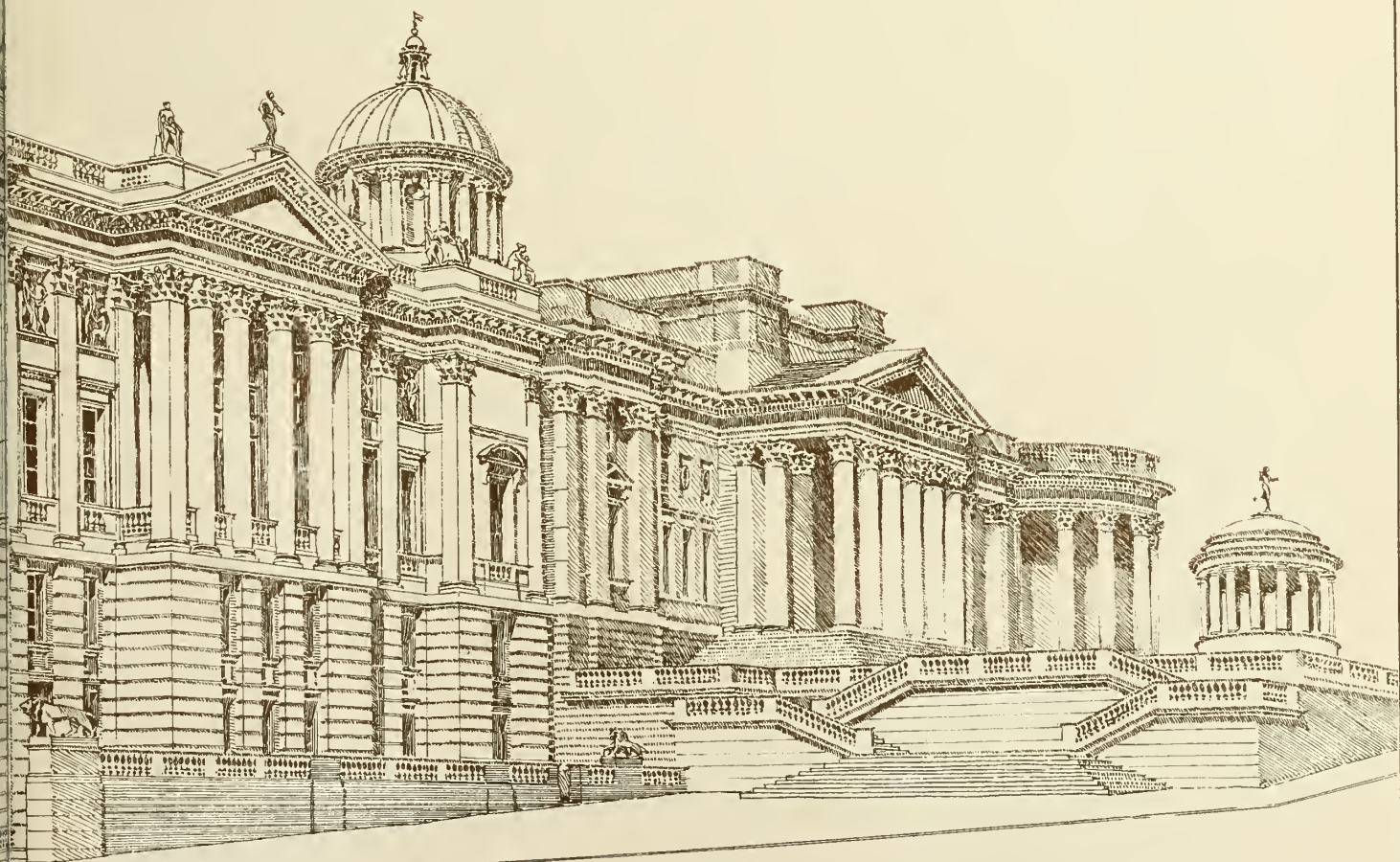
& NEW TECHNICAL SCHOOLS:

CITY OF LIVERPOOL:

T. E. COLLICUTT.

A. N. PRENTICE.

JOINT ARCHITECTS





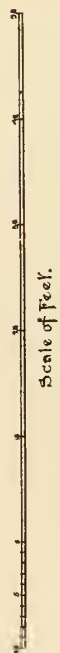
The Brook Hospital.
Shooter's Hill.
Thos W. Aldwinckle Archt.
1 Victoria Street, S.W.

H. Hand Oates

SEPT 4, 1896.

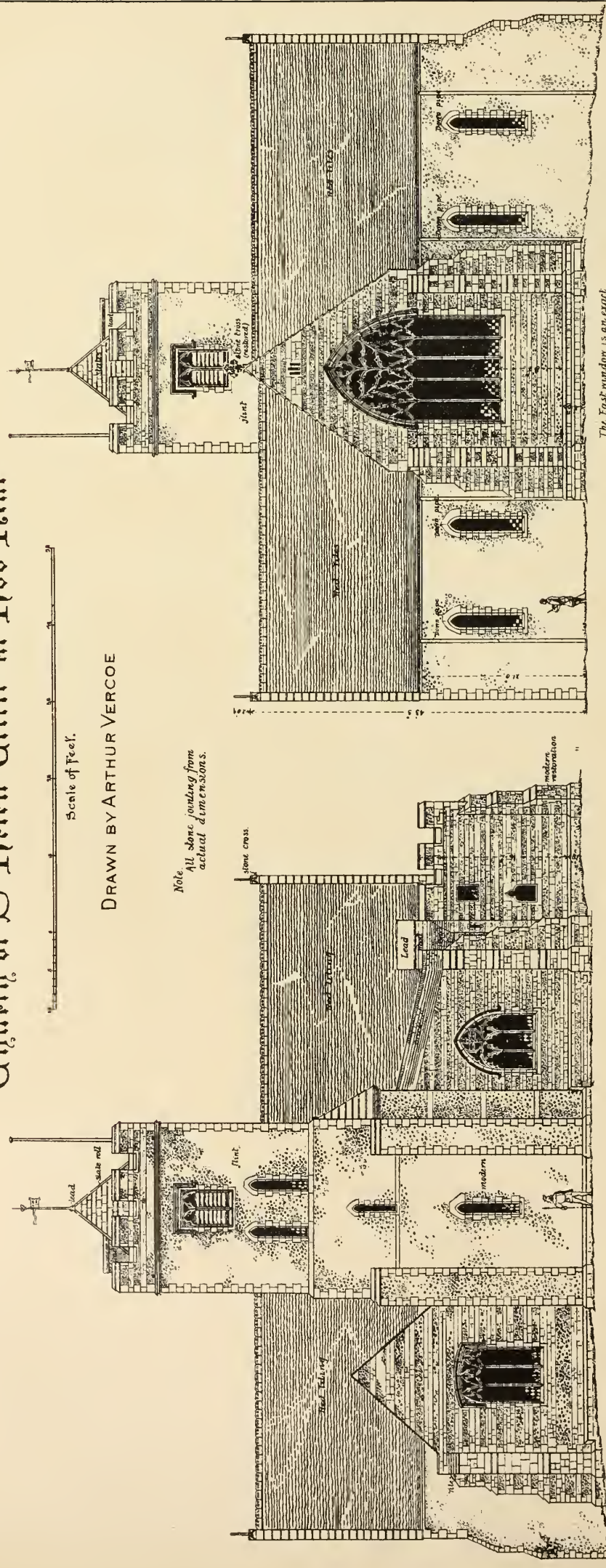


Church of S. Helen·Aliffe·at·Hoo·Kent·



DRAWN BY ARTHUR VERCOC

Note. All stone jointing from actual dimensions.



West Elevation.

East Elevation.

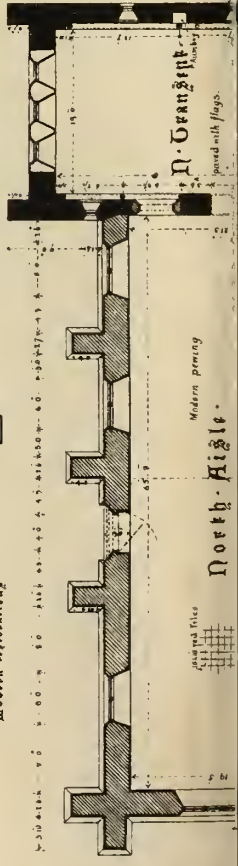
The walls are of flint with bands of Kentish Ragstone. The details are principally of Caen stone. The roofs are tiled with iron tiles of lower, which is covered with large, thick slates.

The East window is an exact reproduction of the original fourteenth century one.

Roof and floor 1260 ghyon the 2 :

1260	1310	1370	1430
1260	1310	1370	1430
1260	1310	1370	1430
1260	1310	1370	1430

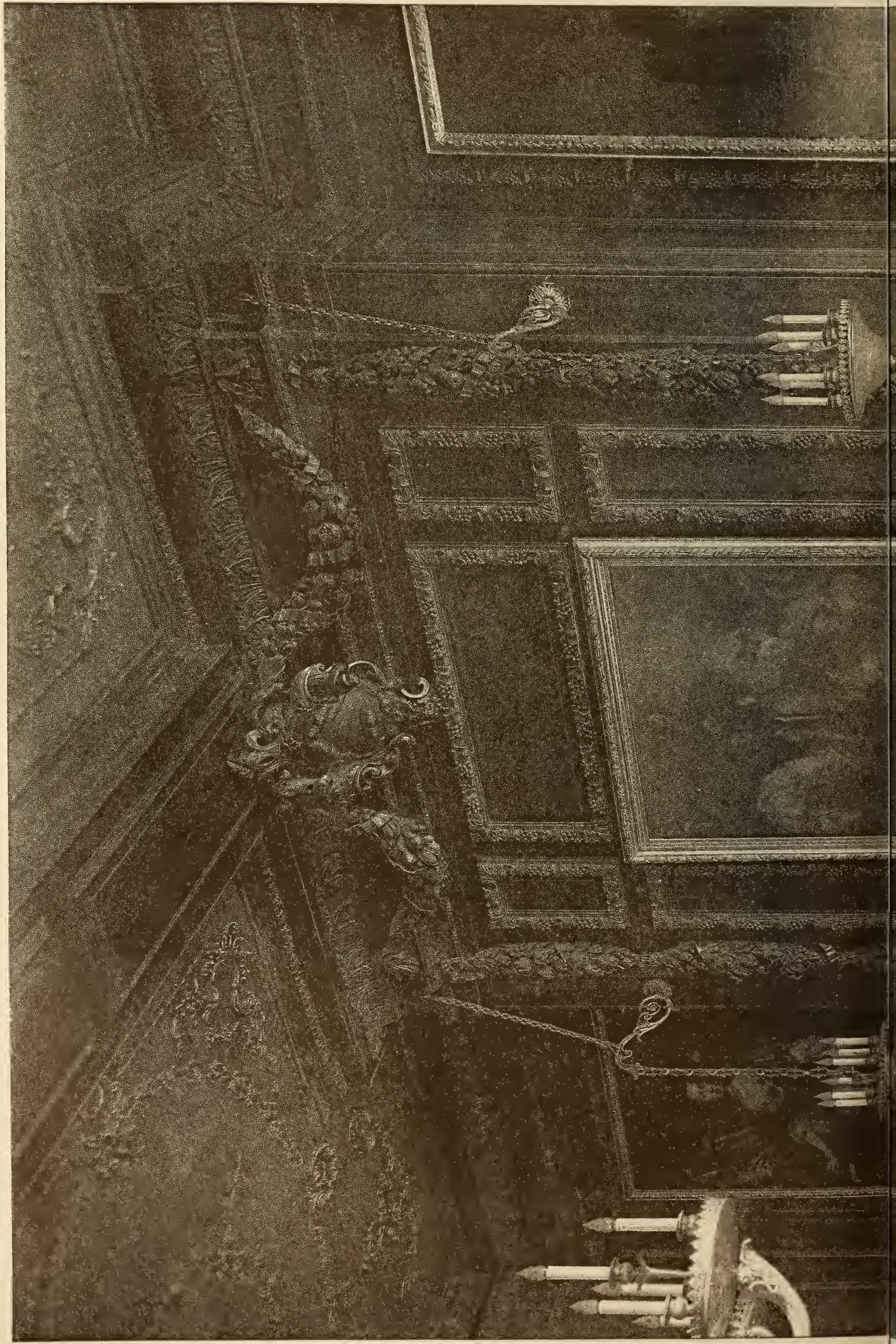
Modern adaptations

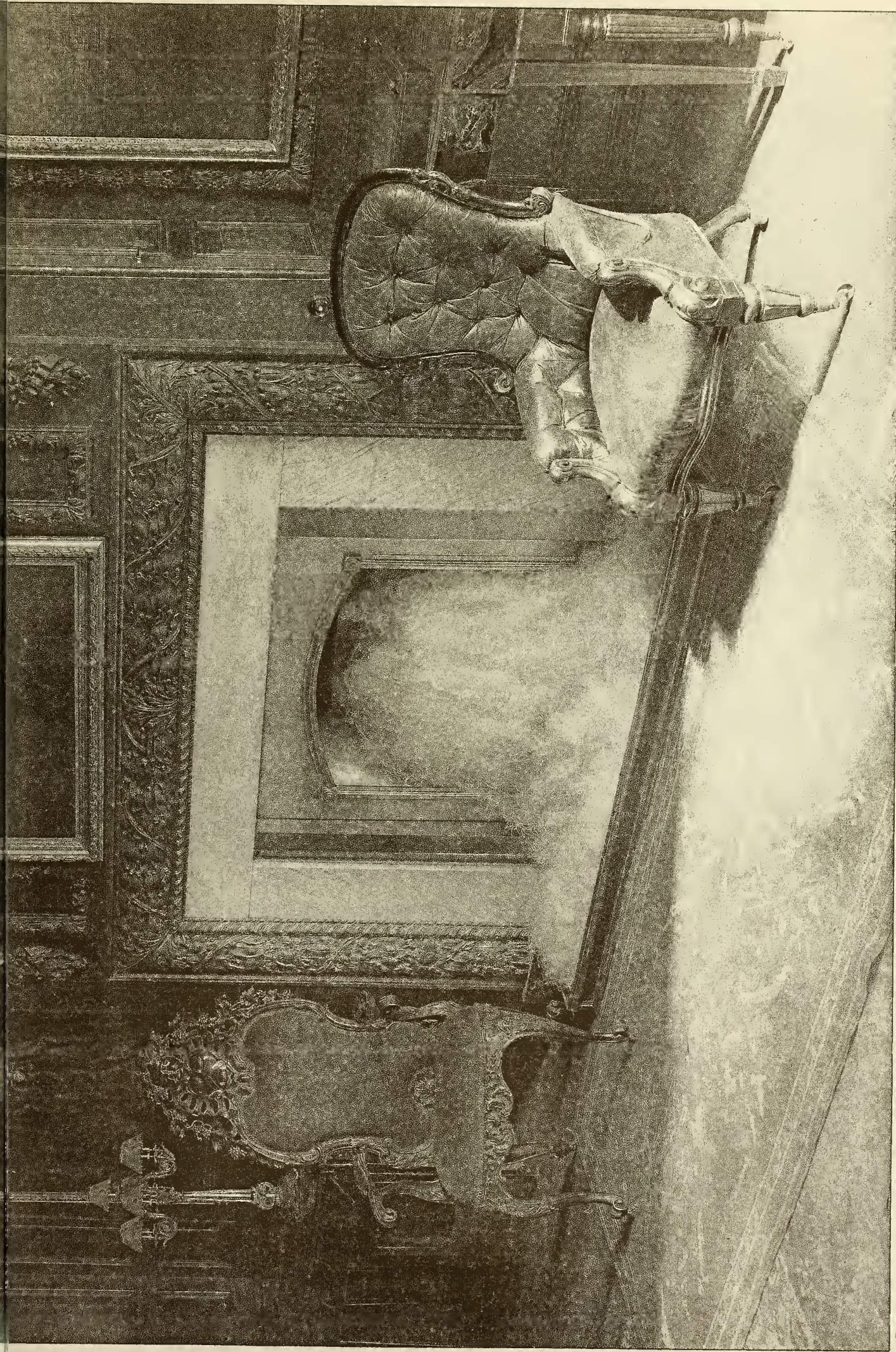


North·Hille.

The walls are of flint with bands of stone work (Kentish Rag) and dressings of Caen stone. Internally they are plastered with old stock brick. The roofs are covered with red tiles, mostly modern, except the S. aisle which has a lead flat laid in 1873. The nave roof was originally of very much flatter pitch (laid on with lead) and was altered on the tower wall and was covered with lead.

The stone marked X in Nave has the following inscription:—
"Dne de la alme snt merc"
There is a brass of Y to Thomas Ylme 1609 and two more, with three children below each. There is also the print of a priest under a canopy on stone Z in Chancel.



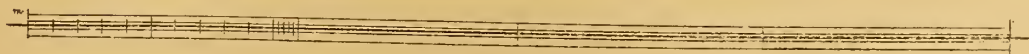
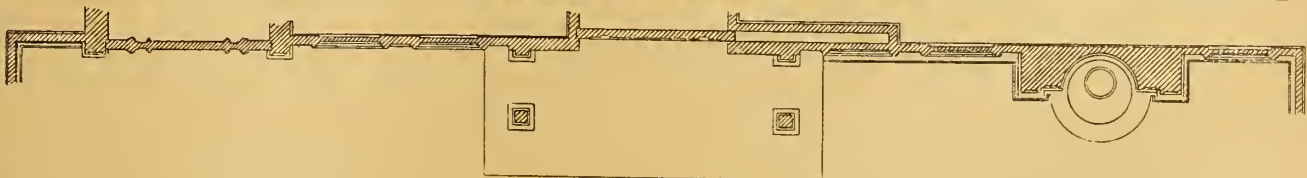
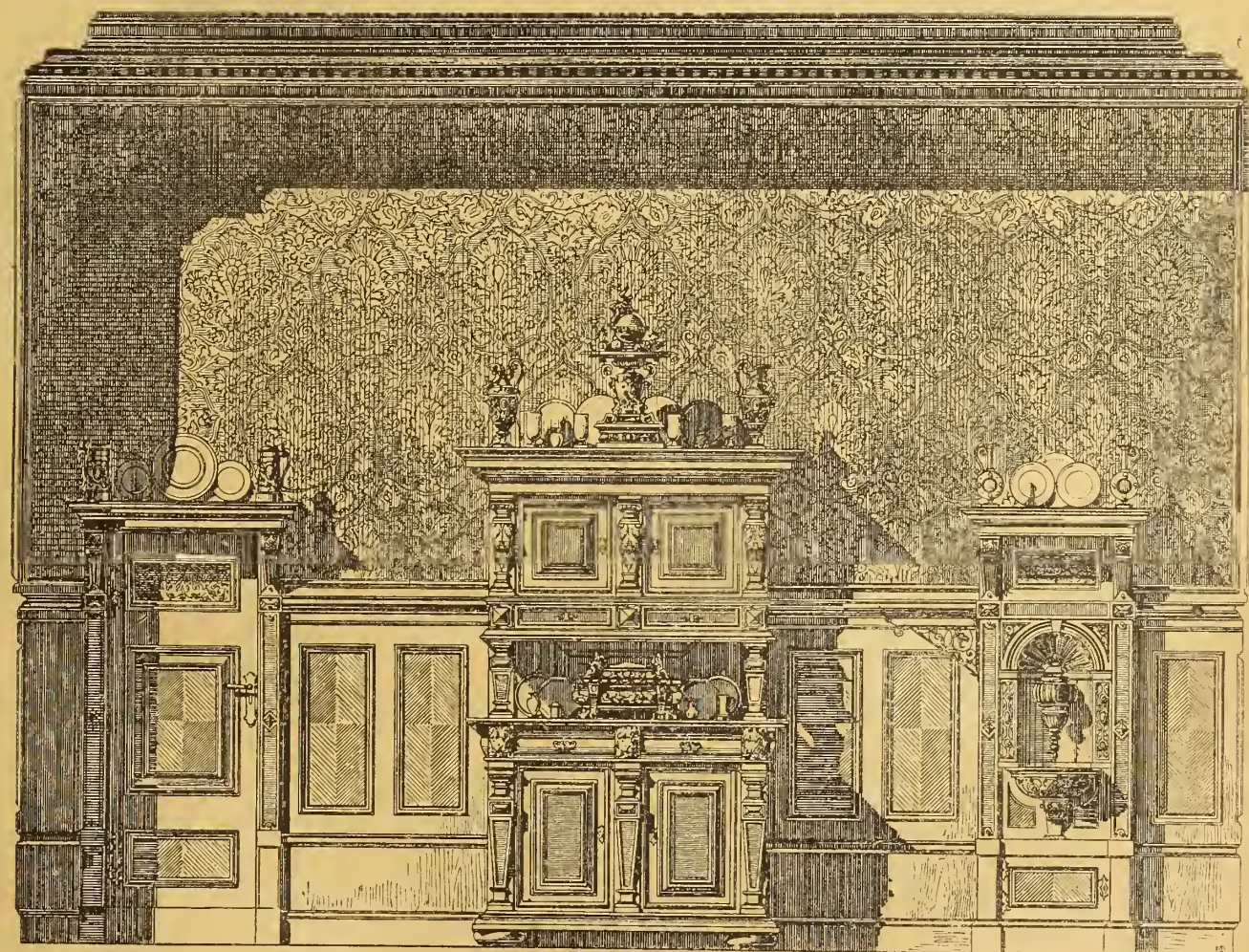
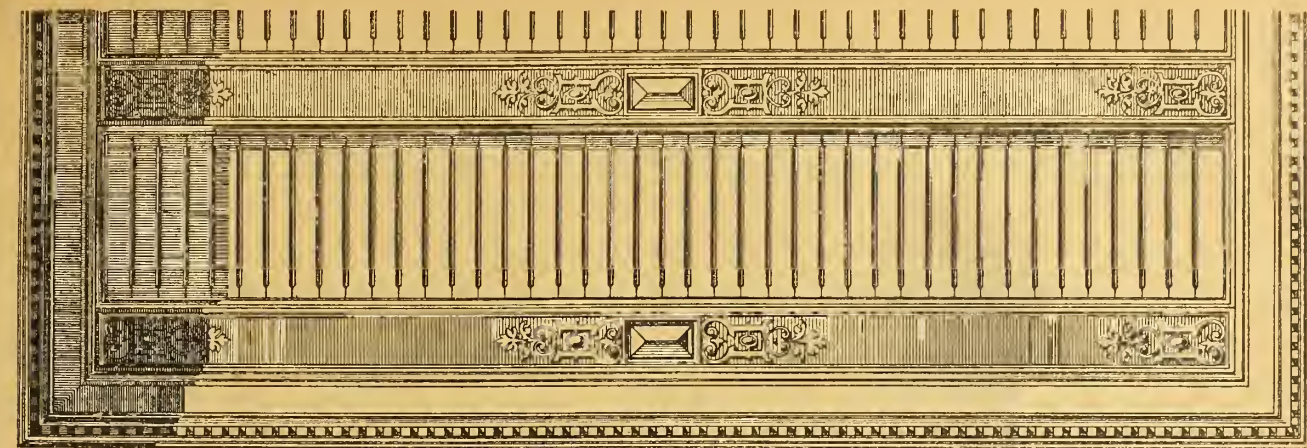


PHOTOGRAPHED WITH A SANDELL PLATE

"PHOTO-TINT" by James Akerman 3 Queen Square London W.C

THE CITY GUILDS · NO 26 · THE HALL OF THE VINTNERS' COMPANY

THE COURT ROOM



DINING ROOM FITMENTS
MESSRS KAYSER & VON GROSZHEIM ARCHTS

Building Intelligence.

THE NEW ADMIRALTY BUILDINGS.—Contracts are on the point of being signed for the new north block of the Admiralty buildings at Spring Gardens. The ground has been cleared for some time past, and it is probable that operations will be actually commenced before the middle of the present month. This new pile will be just about as large as the section already built looking out upon St. James' Park, but is expected to cost rather less, as some of the ornamental features of the first building are to be omitted, and the rooms to be comprised in it will be all of them, or nearly all of them, large. It will be occupied almost entirely by the clerks of the department, and for efficiency of oversight it is now usual to have the clerical staff massed in large rooms. The largest apartment in the new building will accommodate somewhere about 400 clerks, constituting the staff of the Accountant-General. The other rooms will vary in size, but they are all to be comparatively large. Altogether, there will be over a hundred of them in the building. Messrs. Leeming and Leeming, the architects of the whole scheme, are also carrying out this section.

BELFAST.—The design for the proposed Protestant cathedral, prepared by Messrs. Thomas Drew, of Dublin, and W. H. Lynn, of Belfast, who, as we announced in our issue of April 17 last, have been appointed joint architects for the building, is now on view at the Free Library. The building, it is suggested, shall consist of a nave and choir, both with aisles, north and south transepts, also with aisles, and a central tower, with octagonal turrets and a spire. The style adopted is Early Perpendicular, and the treatment is simple, ornament being sparingly introduced. The nave will be 115ft. in length and 70ft. wide across the aisles, and 63ft. in height from pavement to central rib of groining. The west front will have flanking stone turrets, a baptistery, 15ft. square, being planned to the north and a Galilee porch to the south of central doorway. The choir, which is to be separated from the nave by a low septum with equilateral chancel arch above, will be 50ft. in depth, and will have four rows of stalls on either side; the aisled transepts will have a total width of 125ft. Beneath the greater portion of the building will be a crypt. Both nave and aisles are to be groined in stone. The site for the cathedral is that now occupied by St. Anne's parish church in Donegall-street. The work will be carried out in sections as funds come in, it being suggested that the first instalment shall be executed at an outlay of, say, £30,000. Eventually a chapter-house and vestries will be added at the angle of the nave and south transept, on a site at the corner of Donegall-street and Talbot-street, now occupied by St. Anne's rectory.

BOTHWELL, N.B.—A meeting of the heritors of Bothwell was held in the parish church recently, to take into consideration the question of the restoration of the old church. Plans which had been prepared by Dr. Rowand Anderson, of Edinburgh, were exhibited. They included (1) the lowering of the roof of the sacristy to its original height; (2) restoring the stone mullions on the east and south windows; (3) replacing the broken-off stone carvings connected with the sedilia and piscina; (4) lowering the ground round the church and the floor to its original level; (5) repairing the walls and roof; (6) heating, furnishing, and slating the church. It was stated that the estimates which have been taken for the restoration of the work amount to £1,700, and promises have been received of subscriptions amounting to £967 10s. It has also been intimated that, if the work was carried out, a window, executed by one of the best artists in painted glass at the present time, will be presented to the church. After full consideration, it was agreed to approve of the plans and to appoint a committee to carry them out. It was also agreed to accept the gift of the windows for the church.

HARROGATE.—Two new board schools—one in Cold Bath-road, to accommodate 910 children, and another in Grove-road for 1,200 children—both designed by Mr. Marshall, of Princes-street, Harrogate, are approaching completion. The Grove-road Board School is a three-storied pile, which, with the usual adjuncts, is estimated to cost over £14,000. The main gable will be

flanked on either side by projecting wings containing the staircases, lavatories, and cloakroom, with a similar arrangement at the south front. The ground floor contains a central hall, 78ft. by 32ft., with three classrooms, 25ft. by 24ft., on either side, separated from the central hall by glazed wood screens. The other floors are similar to this, all being lighted by large windows opening into the end gable, and by side lights. Accommodation has been found for the masters and teachers and for book-stores in the mezzanine floors, entered from the staircases. White salt-glazed bricks have been extensively used for facing purposes throughout. The floors are fire-proof; steel joists and girders carry the floors, which have been covered with wood blocks bedded in asphalt composition. The buildings will be heated by hot water on the low-pressure system. The school board is advertising for tenders for the works required in the erection of a laundry, cookery, and manual instruction centre to supplement the other buildings in connection with Grove-road board school. This section will cost between £1,500 and £2,000. The manual instruction section will be provided with a small joinery plant.

OSSETT.—The town council of Ossett have decided to erect a town hall, so as to concentrate the municipal offices in one building. The plans have been prepared by Messrs. Holtom and Fox, architects, of Dewsbury, who estimate the cost of erecting and furnishing at £11,000. Fronting to Bank-street, the town hall will be Classic in style, with square and circular-headed windows; the front and return elevations to be in ashlar, and the remainder in pitch-faced delph stone. At the front there will be a rustic basement with columns and pediment over, and with extensions on either side for the staircases to the large hall. Two stories in height, the ground floor (above the basement) will be elevated some 4ft. or 5ft. above the ground level, and will comprise the municipal offices, borough court, and a council-chamber. Above will be an assembly-hall, with a gallery and balcony. The principal entrance to the municipal offices will be in Bank-street, approached by a short flight of steps. On the right side are to be the town clerk's private office, general office, strong-room, rates office, mayor's-room, and council-chamber. On the left the surveyor's room, borough court, magistrates' retiring-room, waiting-room, and committee-room. The whole of these rooms are to be 13ft. high, with the exception of the council-chamber and court, which will be 16ft. The entrances to the assembly-hall are to be in the wings on either side of the main building. Over 100ft. long and 54ft. wide, there will be seating accommodation in the area of the hall for 860 persons, whilst in the balcony and gallery there is to be accommodation for another 300. The platform will be large enough to accommodate a band and chorus of 150. Ante-rooms for performers are also to be provided. In the basement will be offices for the water inspector and the weights and measures inspector; also three other offices or store-rooms, a prisoners' waiting-room, and police-room, as well as kitchen, heating-chamber, and coal-cellars.

ROCHDALE.—The building trade in this town has, says the *Rochdale Observer*, been exceptionally brisk this year, and the prospects are bright for some time to come. The weather has been favourable to the fulfilment of the contracts which master builders have had put into their hands, and work has not been hindered by any disputes between employer and employed. The new buildings completed and opened in the town during the year include the new offices at the bottom of Yorkshire-street for the Lancashire and Yorkshire Banking Company and the Oldham Joint Stock Banking Company. A new board school has been built at Castlemere, and plans for a large number of new houses, several new public buildings and business premises have lately been passed by the building committee of the corporation. The house property is to be erected more particularly at Heybrook, and on the Castleton side of the town. The two co-operative societies are contemplating large extensions. The plans of additions proposed by the Pioneers at their central premises in Toad-lane have already been submitted to the building committee for approval. The Provident Society contemplate the erection of large new central stores and offices in Lord-street, but plans for these have not yet been sent in. The firm of James Duckworth, Limited, is converting buildings in

Oldham-road into a jam factory, bakery, and slaughter-house. The Spotland Free Methodists are having a new chapel built at Spotland Fold, and a Liberal Club is nearly completed in the same village; and the Castlemere Wesleyans are erecting new Sunday-schools. The Newbold and Halifax-road board schools are being enlarged, and extensive alterations are to be made at the National School, Redcross-street. Altogether the season has been a busy one.

STRATFORD, E.—The new Borough Theatre, built from designs by Mr. Frank Matcham, was opened on Monday night. The site faces the High-street and Stratford Market Station. The theatre is built on the cantilever principle without internal columns, and is seated for 3,500 persons. The exterior is Elizabethan in style, and is carried out in dark red bricks with stone dressings. The stalls will seat 72 persons, the pit-stalls 200, the dress-circle about 170, the upper circle between 600 and 700, the pit 800, and the gallery, which is said to be the largest in London, 1,400. The stage is 45ft. by 35ft., with a clear width at the footlights of 30ft., and dressing-rooms, six boxes, refreshment buffets, and a crush-room are also provided. Messrs. Perry and Co., of Bow, the builders, have carried out the work, under the superintendence of the clerk of the works, Mr. Cropper. The decorations were executed by Messrs. De Jong and Co., of Camden Town. The electric-light installation has been the work of Messrs. Sharp and Kent, of Westminster; the fire appliances have been supplied by Messrs. Buckley and Beach, of Chelsea; Messrs. Dean and Co., of Birmingham, have upholstered the building; and Messrs. Harper and Broadbridge have supplied the chairs.

STYAL, CHORLTON.—The foundation-stone of new cottage homes now in course of erection by the guardians of the Chorlton Union was laid at Styal on Monday by Mr. A. J. Balfour, M.P. The proposed buildings and grounds will cover an area of some 50 acres, and accommodation is to be provided in the first instance for 308 children in 12 homes of 20 beds each, and four smaller homes containing 10 beds each. Each home will contain a dayroom and dining-room on the ground floor, and the usual offices, with bedrooms and bathrooms above. Sitting-rooms and bedrooms are also provided for the foster parent. Near to the entrance is placed the probationers' home, which will also be utilised as a general lodge. A house is provided for the superintendent, near to which is the boardroom. Within the curtilage of the village a small kindergarten school for infants is to be built; the general school, which will be attended by the elder children (planned so as to admit of extension to accommodate 500 children), is to be placed some distance away. Extensive workshops will also be constructed, wherein the rudiments of handicrafts will be taught. In connection with these workshops will be the bakery, swimming-bath, stables, and fire-station. A small cottage hospital, containing 16 beds, with dayrooms and accommodation for the nursing staff, will be built on an isolated spot near to the homes, but separated from them by a small clough. The buildings will be of bricks made on the site, with facing of red Ruabon terracotta, and roofed with red and brindled tile. They will be of simple design, general outline and grouping being relied on for effect rather than elaborate and expensive details. The contract, amounting to £50,310, is being carried out by Mr. C. H. Normanton, from plans by Mr. J. Broadbent, of Manchester, and is expected to be completed towards the end of the year.

The Mayor of Peterborough, Mr. John Thompson, J.P., the well-known church restorer, gave his annual excursion to his employés and their wives on Saturday week at Hunstanton. The party, numbering about 350, left Peterborough by train, and arrived at Hunstanton at 10.45. The pier and sailing boats were placed at their disposal without charge. Dinner was served in the new council hall, and the large company included Mr. and Mrs. Thompson and family.

The old Cornish cross at Crane, near Camborne, discovered by Mr. J. Holman, a member of the Camborne Students' Association, has been placed in Camborne parish churchyard. It was for a time used as a gate-post, the head being buried in the soil, and had since served to cover in a well. It has a circular head broken at one side, but otherwise in fair preservation, and carved with a cross. The stone is 7ft. in length, over 1ft. in width, and nearly 1ft. in depth.

Engineering Notes.

GLASGOW.—The District Subway is about to be opened. It is a double railway, with carriages each having longitudinal seats for 40 passengers, the method of propulsion being by stationary engines and steel cables. The inner and outer lines are in separate tunnels, which run parallel, and open into each other only at the stations. Great engineering difficulties were met with during construction, and one contractor gave up the work as impossible, after he had made considerable headway with it. Starting at St. Enoch-square, the tunnels run northwards directly under Buchanan-street till the junction with Cowcaddens is made, and thence they go in a westerly direction *via* Cowcaddens, New City-road, and Great Western-road to Kelvin Bridge. Here they pass under the river Kelvin, and strike obliquely through Hillhead district on to Partick. Turning south, the tunnels next pass under the Clyde into Govan. They then assume an easterly direction, and pass close to the new docks at Cessnock. They next intersect the districts of Plantation and Kinning Park, and follow the line of West Scotland-street along the south side of Glasgow. Rounding into Bridge-street the tunnels take a sharp turn northward, and again passing under the Clyde, enter St. Enoch-square and complete the circle. The total length of the subway is about $6\frac{1}{2}$ miles. There are fifteen stations, the average distance apart being less than half a mile. The principal station is at St. Enoch-square, in the centre of which, above ground, there are erected the head offices. The stations are all of the island platform type, and they are, on the average, about 150ft. long by 28ft. wide. For the most part they are small shops converted into offices, through which there are both entrance and exit for the passengers. Broad staircases connect with the platforms, which are at a depth below varying from 18ft. to 32ft. Each of the two tunnels forming the subway is 11ft. in diameter. The tunnels under the Clyde and New Bridge-street passed through silt, and had to be executed with the shield under air pressure; but at the crossing of the river between Govan and Partick, the tunnelling was less difficult. On the north side of the river the tunnelling was chiefly through sandstone rock, while on the south side, where the soil was low-lying and of an alluvial nature, the cut-and-cover system was chiefly employed. At Kelvin Bridge, on the Hillhead side, serious difficulty was also encountered, and some old pit workings had to be pumped dry and a lot of filling up done before progress could be made. Each train will ordinarily consist of two carriages. No tickets will be issued, a uniform penny fare being charged for any distance. Messrs. Simpson and Wilson, Glasgow, have been the engineers of the work throughout.

LEEDS.—The Great Northern Railway Company are inviting tenders for the construction of a new double line of railway from Beeston to Hunslet—a distance of about four miles. Commencing by a junction with the Leeds and Wakefield main line, at Beeston Junction, about one mile south of Beeston Station, the course of the railway runs in an easterly direction on slight embankments and in shallow cuttings. Near the Leeds Steel Works, the Midland Railway is to be crossed by a bridge of three spans, and the River Aire will be bridged in two spans of 170ft. and 60ft. respectively. The railway will terminate at the south side of the Suspension Bridge in South Accommodation-road, and there a terminal goods station is to be constructed, on a site covering about 30 acres of land, with siding accommodation, coal-drops, stone-wharf, cattle-pens, stables, offices, and goods warehouse. The works will be carried out in accordance with plans prepared by Mr. W. B. Myers-Beswick, the engineer for this branch. The North-Eastern Railway Company are also constructing a new line from Neville Hill to Hunslet, with a goods station alongside that of the Great Northern Company.

OSTEND.—This autumn the Belgian Government, in conjunction with the Chamber of Commerce authorities at Ostend, will commence work upon a very extensive and important system of docks, which are estimated to cost three millions sterling, and which will entirely sweep away the present unsightly quays which form the old harbour. According to the official plans, the docks will extend inland between one and two miles. All the houses along the line of the canal which the docks will follow have been purchased by the

Government, and considerably over one hundred have already been demolished. Spacious warehouses on the model of those at Antwerp, with promenades on the top, are to be erected on the quays, round which the railway system is to be carried, and powerful hydraulic cranes will be placed at intervals round the quays. Dry docks are to be constructed on the north-east side of the port, on the principle of those at Tilbury. The absence of this accommodation has been found a very great inconvenience at Ostend, vessels having frequently to be taken round to the Scheldt, or across to the Thames. The old dock now in front of the railway-station is to be filled in, and, at the suggestion of the King, a park and ornamental gardens will be laid out in its place. A further improvement as part of this scheme, which will quite alter the appearance of the old portion of the town of Ostend, is the construction of a boulevard in a direct line from the railway-station to the Kursaal, which will involve the demolition of one or two hundred more houses. The docks will be completed in five years.

CHIPS.

Colonel J. D. Marsh, R.E., held a Local Government Board inquiry at the Town Hall, Machynlleth, on Tuesday week, into an application by the urban council to borrow the sum of £4,700 for the construction of a reservoir in the neighbouring hills, in accordance with a scheme prepared by Messrs. Kirby and Son, of Newport, Mon.

The guardians of Chester-le-Street Union have adopted plans by Mr. R. G. Cowe, of that town, for an isolation hospital and the engine-house to be added to their workhouse buildings.

The new post-office at East Grinstead will be opened by the Duke of Norfolk on Wednesday, the 16th inst.

The New South Wales Legislature have advanced another step in the proposal to institute a competition for designs for new Houses of Parliament, having appointed a strong committee to confer with the Minister of Works, and to collate and determine the particulars and conditions to be furnished to competitors for the premiums to be offered.

A new Wesleyan chapel is about to be built at Crowborough, near Tunbridge Wells, from plans by Mr. Boreham, of Finsbury-pavement, E.C.

The school board for Tynemouth adopted, on Friday, plans by Messrs. Marshall and Dick, architects, of Newcastle-on-Tyne, for new schools for 510 children, to be built in Coach-lane, North Shields. The buildings will be faced with brick, with a sparing use of stone and terracotta for dressings, and will be heated by low-pressure steam and open fires. We illustrated the selected designs, which were chosen in limited competition, Mr. E. R. Robson being the assessor, in our issue of May 15 of the present year.

A memorial of the late Right Hon. Sir R. W. Duff, formerly Governor of New South Wales, was unveiled on Sunday in St. James's Episcopal Church, Stonehaven, Kincardineshire. The memorial is a tablet of a grey trachyte from Sydney, and represents in miniature the main window of Government House in that city; it is executed from the design of Mr. H. C. Kent, architect, of Sydney, and was subscribed for by a large number of the women of New South Wales.

At the South-Western Police-court on Saturday, W. J. Richman, builder, of Rosebery Villa, Gartmore-gardeus, Southfields, was fined 40s. and 2s. costs for assailing Allen Bellamy, auctioneer and surveyor, of the firm of Barber and Bellamy, Putney. Defendant was the vendor and complainant the auctioneer of certain property at Putney, and after the sale defendant expressed dissatisfaction with the mode in which it had been conducted, following it up by striking him in the face before a number of people.

The memorial-stone of a Roman Catholic church and school was laid on Saturday in Burley-road, Leeds. The new building is practically an extension of the church and school which were built on the site some four years ago at a cost of about £4,000. The work is being carried out from designs by Mr. J. Kelly, architect, of London and Leeds, at a cost of £2,500, the church being known as that of the Sacred Heart. The builders are Messrs. Wade Brothers, of Leeds.

In the case of the bankruptcy of Joseph Woolford and Joseph William Woolford (trading as Woolford and Sons), High-row, Silver-street, Kensington, W., builders, the discharge has been suspended until Dec. 24, 1896. The public examination was concluded on May 6, 1896.

A new board school for 530 children is about to be erected at East Ham, from plans by Mr. R. L. Curtis, of London Wall.

ARCHITECTURAL & ARCHÆOLOGICAL SOCIETIES.

THE ARCHITECTURAL ASSOCIATION.—The following is the list of papers to be read before the Association, at 9, Conduit-street, W., during the ensuing session. The meetings are, it will be remembered, held on alternate Friday evenings at 7.30 p.m. :—

- Oct. 9, 1896.—Annual General Meeting.—The President's Address, by Mr. Beresford Pite.
- Nov. 6. { Roof Coverings—
"Lead, Copper, and Zinc," by Mr. G. Ewart.
"Tiles," by Mr. F. Walker.
"Slating."
- " 20.—"Garden Design," by Mr. F. Inigo Thomas.
- Dec. 4.—"Street Architecture," by Mr. H. H. Statham, F.R.I.B.A.
- " 18.—"An Unwritten Chapter of English Architectural History," by Mr. A. S. Flower, A.R.I.B.A.
- Jan. 15, 1897.—"Decorative Plaster Work" (with models), by Mr. E. Trioleau Warren.
- Feb. 5.—"A Plea for the Application to Architectural Design of Natural Forms as revealed by the Microscope" (with illustrations), by Mr. W. H. Seth-Smith, F.R.I.B.A.
- " 19.—"The Architect and the Public," by Mr. W. H. Bidlake, A.R.I.B.A.
- Mar. 5.—"Greek Sculpture and Greek Legends" (with Lantern illustrations), by Mr. F. S. Grainger, D.Litt.-London.
- " 19.—"15th-Century Work," by Mr. J. A. Gotch, F.R.I.B.A.
- April 2.—"Architecture in Relation to the Crafts," by Mr. T. G. Jackson, A.R.A.
- " 30.—"The Classic Cornice," by Mr. Hugh Stannus, F.R.I.B.A.
- May 21.—"Plumbing and Sanitary Work" (with demonstrations), by Mr. S. S. Hellyer.

THE GLASGOW ARCHITECTURAL ASSOCIATION.—A meeting of the above association was held at the rooms 187, Pitt-street, on Tuesday evening, the 1st inst. Mr. McGibbon, the honorary president, gave a paper entitled a "Review of Recent Glasgow Architecture." The works done during the past decade have been influenced by their purpose, and by the materials employed. Gothic to-day was dormant, if not dead, unless for church work. Buildings might be classified according to their purpose, such as ecclesiastical, domestic, civic, commercial, &c.; or we may take materials, say of stone, plaster, metal, glass, tiles, &c. Delicacy has lost favour, such as the work we have in the Faculty Hall and the new clubs. Referring to church work, the essayist pointed out, the only Classic building recently executed was that at Langside. Our schools were altogether of a substantial description, well provided with all the essentials, handsomely paired, well lit, &c. Insurance companies within the last few years had been perhaps the most generous patrons of public architecture. In the Equitable, the fact of its being an English office is fittingly expressed in an Englishman's design in English brickwork. Banks with us are the most sumptuous of our domestic buildings. The work of the Corporation is more varied than it used to be. In all their work there is a commendable absence of pretentiousness. The baths, in the essayist's opinion, should be arranged more as places of public resort. The tenements generally were of a commonplace description; but one or two instances were given of a really superior class of building. Our bridge and chimney stacks were referred to, and the people of Glasgow were to be commended in allowing such interesting and worthy landmarks to remain as the Tron Church, St. Mary's Church, &c. This very interesting paper was brought to a close by a hearty vote of thanks to the essayist.

The foundation-stone of a new church school was laid at Mollington, Cheshire, on Friday. The building is to accommodate 70 children, and will be faced with Ruabon bricks. Mr. H. Beswick, Newgate-street, Chester, is the architect, and Mr. H. Hulse, of the same city, the builder.

The shareholders of the South-Eastern Railway Company, at a special meeting on Friday, approved a scheme submitted by the directors for enlarging and improving Folkestone Harbour. The object is to establish an afternoon service to Boulogne. The works will be carried out by a distinct company, known as the Folkestone Harbour Undertaking, and will have a capital of £400,000, which the railway company has Parliamentary sanction to raise.

The new sewage disposal system at Morpeth is to be carried out according to designs submitted by Mr. David Balfour, M.Inst.C.E., of Newcastle-on-Tyne, who proposes to carry the sewage through pipes to the sea five miles away. In Mr. Balfour's report submitted to the borough authorities, it was shown that the land filtration system, owing to the necessity of pumping the sewage to a higher level before treating it for purification, would be about 50 per cent. more costly for Morpeth than discharge into the sea even at so considerable a distance.

TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. All communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondents.]

It is particularly requested that all drawings and all communications respecting illustrations or literary matter should be addressed to the EDITOR of the BUILDING NEWS, 332, Strand, W.C., and not to members of the staff by name. Delay is not infrequently otherwise caused. All drawings and other communications are sent at contributors' risks, and the Editor will not undertake to pay for, or be liable for, unsought contributions.

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The charge for advertisements for "Situations Vacant" or "Situations Wanted" is ONE SHILLING FOR TWENTY-FOUR WORDS, and Sixpence for every eight words after. All Situation Advertisements must be prepaid.

NOTICE.

Bound copies of Vol. LXIX. are now ready, and should be ordered early (price Twelve Shillings each), as only a limited number are done up. A few bound volumes of Vols. XXXIX., XL., XLI., XLVI., XLIX., LI., LIII., LIV., LVIII., LIX., LX., LXI., LXII., LXIII., LXIV., LXV., LXVI., LXVII., LXVIII. may still be had, price Twelve Shillings; all the other bound volumes are out of print. Most of the back numbers of former volumes are, however, to be had singly. Subscribers requiring any back numbers to complete volume just ended should order at once, as many of them soon run out of print.

RECEIVED.—F. G. Browne.—Architect.—F. Howard.—D. H. B.—J. E. (Cambridge).—S. B. and Co.—W. A.

Correspondence.

GLASS BRICKS.

To the Editor of the BUILDING NEWS.

SIR,—I noticed in your issue of Aug. 7 your article on the glass bricks which I have invented. Kindly correct, in your next issue, the error committed by your correspondent in referring to me as Mr. Falconnier, architect, of Lyons, my native town being Nyon, Switzerland, and not Lyons, France.

You may also mention that specimens of these blown-glass bricks may be seen in London at Messrs. Wilson and Co.'s, engineers, 24, Harrison-street, Gray's Inn-road, London. My Continental agent nearest to London is Mr. Viennot, engineer, 146, Rue Lafayette, Paris, and he will be pleased to show various practical applications of the invention in Paris to persons interested in the same.—I am, &c.,

(G. FALCONNIER.)

Nyon, Switzerland, Aug 17.

Mr. Henry F. Armstrong, of Murton-street, Sunderland, has been appointed to the art faculty in the McGill University, Montreal. The office carries with it the title of Professor, and a salary of 1,500 dollars per annum.

Mr. E. J. Poynter, R.A., as hon. secretary of the Society for the Preservation of the Monuments of Ancient Egypt, appeals for pecuniary aid in protecting the remains of the funerary temple recently discovered at Deir-el-Bahari. The cost of such a work has been estimated roughly as from £200 to £300, and Mr. Somers Clarke, F.S.A., has offered to superintend its construction during the ensuing winter free of expense to the Society.

Intercommunication.

QUESTIONS.

[11545].—**Yellow Pine.**—Why has yellow-pine shelving, 24in. by 5ft. long, 3in. stuff, clamped at ends, and fixed to 12in. brackets, and used to protect mantles, &c., from dust, and also to answer as a shelf for light articles, warped so considerably that they are almost useless, and most unsightly in the space of about four months? Would it be that the wood was green when put up, or the stuff not thick enough?—**WARPED.**

[11546].—**Schools.**—Will anybody tell me of a good book on school buildings, the constructional part, and also the heating and ventilation?—**ENQUIRER.**

[11547].—**Hospitals.**—Will a brother reader inform me of a book or articles written on hospitals or infirmary buildings?—**CWM.**

REPLIES.

[11540].—**Levels.**—Mr. Johnson's engineer did all that was necessary in taking the first readings. I can see no object in starting from an Ordnance bench-mark. In one sense a temporary bench-mark has been used, for a temporary bench-mark may be any point one pleases—on the ground, the top of a post, or the sill of a sewer. I gather from the question that the matter in dispute is the difference in the level of the sewer at A and that at B. Assuming the level set up in front of No. 13 as stated, the readings of the staff at A and B give the distances of the sill of the sewer at A and B respectively below a horizontal plane, and the difference of those readings must be the difference in level of the two points, the lesser reading being at the higher point. As this operation requires but two observations, checking should be unnecessary. A bricklayer would, by means of a straightedge and ordinary spirit-level, arrive at approximately the same result, though probably knowing nothing about Ordnance bench-marks; an engineer's finely-adjusted instrument is certainly capable of as much. Were it required to know the height above Ordnance datum of these sewers for any purpose, the nearest Ordnance bench-mark would be utilised; but there is no such requirement in the present instance. This deals with question 1. With reference to question 2, readings taken with the staff at any considerable distance, from glass of bad quality, might by refraction be slightly incorrect; but considering the object in view, an inaccuracy of '02 or '03 of a foot would even then be unimportant, I imagine. In regard to question 3, the second set of readings undoubtedly check the first set, and if correctly taken will show the same variation in level between A and B, on the same principle as before, though by a more circuitous operation; they also help to prove that the glass has not rendered inaccurate the observation taken through it. If though desirable, the sill of the sewer at A may be considered a temporary bench-mark of any assumed number of feet above an imaginary datum, then the difference of level between A and D added or subtracted (according as D is higher or lower than A) will give the height of D above the imaginary datum, and the difference of the readings of D and B treated in like manner will indicate the height of B above that datum; the variation in level of A and B can then be found by subtracting the lower height from the higher, the higher figure of course representing the higher point. To work from an Ordnance or other bench-mark brings in another unnecessary reading. One feels that Mr. Johnson has treated the engineer rather ungraciously in refusing to accept the readings, as he apparently has no intimate acquaintance with the subject himself.—**J. W. LEE.**

CHIPS.

The Earl of Lonsdale has just given a site to St. George's Church, Millom, for the erection of mission buildings, and Archdeacon Sinclair will lay the foundation-stone on Monday, the 28th inst.

A new recreation-ground in the Govanhill district, Glasgow, was opened on Monday. The park covers $\frac{1}{2}$ acres.

An adjudication in bankruptcy has been made in the case of Andrew Fernley and Thomas Osborne, trading as Feruley and Osborne, of Marriott-road, Tollington-park, contractors.

Mr. George H. Millar, assistant architect of the Capitol at Washington, has just died. Mr. Millar had been attached to the building for 44 years, only leaving it temporarily, in 1861, to enlist in its defence. He was actively engaged in supervising the erection of Walter's great dome, and was the last man to leave the scaffolding after its completion.

Mr. Rufus G. Russell, architect, of New Haven, New England, died on August 3, at the age of 73, having passed 30 years of his life in the practice of his profession in that quiet collegiate town. Besides the many houses, churches, and other buildings which Mr. Russell designed for New Haven, he also planned and built the Garfield Memorial Church at Washington, D.C.

A reredos has been placed in St. John's Church, Sparkhill, Birmingham, as a memorial of Miss Louisa Ryland. The reredos is the work of Messrs. Jones and Willis, the architects being Messrs. Martin and Chamberlain, of Birmingham. The reredos is of Caen stone, divided into four Gothic-headed panels by clustered polished alabaster columns, with moulded stone bases and moulded and enriched caps. The panelling is of alabaster, and is surmounted by three crocketed gables, having sunk moulded and enriched panels, the central ornament being the monogram "I. H. S." On the plinth of the reredos is an inscription.

LEGAL INTELLIGENCE.

IN RE W. GOULDING.—In the offices of the Manchester Official Receiver there was held, on Friday, a meeting of the creditors of William Goulding, contractor and brickmaker, residing at East Bank, 8, Marshall-road, Levenshulme, and formerly carrying on business at Henderson-street and Swallow-street, Levenshulme, and Abbey Hey, Gorton. The debtor's statement of affairs showed liabilities expected to rank for dividend amounting to £11,726 0s. 10d. The assets were estimated at £665 8s. 5d., leaving a deficiency of £11,070 12s. 5d. Mr. Lawton, chartered accountant, was appointed trustee of the estate, with a committee of inspection.

WHAT IS A BUILDING?—DISTRICT SURVEYOR'S FEES.—At the North London Police Court on Saturday, Mr. Frederick Meeson, one of the district surveyors of Hackney, whose payment is by fees and not by salary, summoned his principals (the London County Council) for 15s. alleged to be due to him as a fee, under section 49 of the old Metropolitan Building Act, of 1855, for surveying a "building" belonging to the County Council.—Mr. Geoghegan was counsel for the complainant, and Mr. T. Seager Berry represented the defendants.—The case for the complainant was that the County Council, when laying out Hackney Marshes as a public recreation ground, erected in 1894 a wooden structure for the use of the workmen. It was 12ft. long, 9ft. wide, and of the average height of 9ft. 6in., the height to eaves being 7ft. 4in. It was constructed of timber framing with a floor, the sides being weather-boarded, and the roof covered with felt, and there was both a door and a window. It was portable, and had since been moved as the work required. The district surveyor claimed fees upon this "building"; but Mr. Berry answered that he was not entitled to the fee—(1) because he had not earned it by doing the work the Act required of him, and (2) because it was not a "building." (3) If a building, it was a building exempt under section 6. (4) It was again exempt under the London Open Spaces Act, 1893. Mr. Paul Taylor: What is the definition of a "building"?—Mr. Geoghegan: It never has been clearly defined, I am pleased to say, or there would have been far less work for the lawyers (laughter). Counsel cited the cases of "Stevens v. Gourley," and "Richardson v. Brown," in support of the claim. Mr. Berry submitted that this was not a building. There was no such thing as a movable building. The 1855 Act, it was admitted, only gave fees on a "building," and that Act contemplated only permanent buildings (see "Stevens v. Gourley"), and only two classes of buildings—viz., (1) ordinary brick and mortar constructions; (2) special buildings under section 56; and he quoted sections 38 and 39, and Schedule I. Temporary and movable wooden structures come under section 13 of the amending Act of 1882, and required a license. No fee was due on such structures unless the Council put it under a district surveyor's supervision, by a condition in their license, as they usually did. "Richardson v. Brown" was a decision on a provincial Act, in which the word "structure" did not appear, and "building" had always been differently interpreted in the special Acts regulating London buildings. He argued that this shed was, if anything, under the 1882 Act, and he quoted "The County Council v. Pearce," which practically decided that these sheds did not come within the provisions of the Building Act, 1855. Mr. Taylor looked at this case, and said that certainly it appeared to put the present complainant out of court. Mr. Geoghegan said he was prepared to prove that magistrates had ordered fees to be paid in similar cases; but Mr. Taylor said that the cases could not have been argued fully. He thought the Council's contention was conclusive. Some discussion followed as to costs, but the Council in the end withdrew their application for them.

IN RE F. WALLY.—A meeting of the creditors of Mr. Frank Wally, Lindley-street, Burslem, builders, was held on August 18 at the offices of the Official Receiver (Mr. T. Bullock), Newcastle. From a summary of the statement of affairs prepared by the debtor, it appears that the gross liabilities amount to £1,633 9s. 4d., of which £526 7s. 9d. are expected to rank for dividend. The assets (which consist principally of estimated surplus from securities in the hands of creditors fully secured £240) are estimated to produce £251 18s. 5d. net, leaving a deficiency of £274 9s. 4d. Mr. Wally attributes his failure to bad trade, sickness of wife and family, and loss on property. The debtor states that he commenced business in September, 1895, in partnership with Mrs. E. R. Hoyer, at which time he had a capital of £50. Mrs. Hoyer also invested £50 in the business, which was carried on under the style of "Walley and Hoyer." The partnership was dissolved in February last, Mrs. Hoyer retiring and receiving £25, the debtor undertaking to pay the whole of the partnership liabilities. About £150 of these liabilities are still owing. The Official Receiver described it as an extraordinary case. The bankrupt seemed to have started, not a year ago, in partnership with the wife of an undischarged bankrupt. Some very

strong remarks were made by the creditors upon the conduct of the bankrupt. The case is a summary one, and the Official Receiver remains trustee.

CHIPS.

A Working-Class Tenants' Protection Society has been commenced in Newcastle-on-Tyne, and has already a membership of upwards of 150.

The Lancaster Town Council have received formal sanction from the Local Government Board for the purchase and laying out of the Dallas Place lands. The cost of purchase and the expenses connected therewith have amounted to £12,317, and the necessary works for making the land fit for building purposes amounted to £4,348.

The restoration of the tower of St. Thomas Church, Bristol, which has been intrusted to Messrs. Cowlin and Son, of that city, is proceeding. With other works, including some matters affecting the interior of the church, the total outlay is estimated at £1,800. Some parts of the upper portion of the tower were in a decayed condition, and it was absolutely necessary to demolish these, and to entirely rebuild them. The original tower was 14th-century work, but the upper portion was restored in the 17th century. The electric light has just been installed at the church, embracing 72 incandescent lamps, which were used for the first time last Sunday.

The formal opening of the foreign animals wharf, which the corporation of Manchester have constructed on the south bank of the Ship Canal, took place on Friday. The lairages are said to be the finest in the kingdom.

A scheme for a central technical college in Liverpool now awaits the sanction of the city council. The estimated cost, apart from the final equipment, amounts to £80,000.

A block of granite has recently been placed on the southern shore of the Lake of Sils, in the Engadine. It bears the following inscription:—"In memory of the illustrious English writer and naturalist, Thomas Henry Huxley, who spent many summers at the Kursaal Hotel, Maloja."

The plans of Mr. H. Norman, of Northampton, have been adopted in a limited competition for the rebuilding of the Rose and Punchbowl hotel in that town.

A new board school at Bishopbriggs, N.B., erected at a cost of £4,500, was opened last week. The architect is Mr. David Shurrock, of Bath-street, Glasgow. Mr. John Marshall was the contractor for masonry, and Messrs. Kemp and Sons for joinery.

The Johnstone Combination Hospital, Johnstone, N.B., is being warmed and ventilated by means of Shorland's patent Manchester grates, the same being supplied by Messrs. E. H. Shorland and Brother, of Manchester.

Messrs. Fambrini and Daniels, Architectural Concrete Works, Lincoln, have just completed their contract for supplying the whole of the stonework for a Roman Catholic church in Woodhall Spa. The above includes moulded sills, mullions, transoms, and heads for a series of windows, large modelled tympanum, various string-courses, double moulded gable copings, and modelled kneelers and apex-stones; pierced and traceried turret with pediments, and modelled finials, &c. Mr. Oliver Cromwell, of London, is the contractor; and Mr. R. A. Came, A.R.I.B.A., of Meeklenburgh-square, W.C., the architect.

The South-Eastern Railway Company have decided to make a great extension of their works at Ashford, Kent, spending between £8,000 and £9,000 on the work. The new buildings will be 320ft. in length by 106ft. wide, and will comprise carriage-building and fitters' shops, trimming-room, workshop stores, and engine-room.

The parish church of Inch, near Stranraer, was reopened for public worship on Sunday. The church was almost wholly destroyed by fire nearly two years ago, and only the old walls have been utilised in the erection of the new structure. Mr. Hamilton More Nesbitt, Edinburgh, was the architect, and the cost will exceed £2,500.

A license was granted on Monday by the Whitby bench of magistrates for a new hotel proposed to be built on the West Cliff Estate in that town. It will contain 120 beds, will be fitted with the electric light throughout, and will cost, including site, £27,000, with another £7,000 for furnishing. Mr. J. B. Cannon, of Leeds, is the architect.

The Cumberland County Council have erected a new bridge at Tyne Bank Ford, near Longtown. The bridge was built by Messrs. Murray, Royalty, Stapleton, contractors, in accordance with plans and specifications prepared by the county surveyor and bridge master. It cost £837. The bridge is a square span of 40ft., with an all-over width, including parapets of 20ft., leaving the roadway between the parapets 17ft. 6in.

WATER SUPPLY AND SANITARY MATTERS.

DUBLIN.—The dispute between the master builders and the labourers having terminated, a start has been made with the main drainage works. The scene of operations is Eden Quay, where two large openings have been made in the street, one close to O'Connell Bridge and the other opposite the end of Marlborough-street. The latter represents the initial operations in connection with the construction of the capacious siphon sewer which is to go underneath the Liffey and conduct the sewage from the intercepting sewer on the north to that on the south side of the river.

LANCASTER.—The construction of the new storage reservoir at Blea Tarn, near Lancaster, was begun on Wednesday in last week, when the mayor cut the first sod. The area of the new reservoir is about thirty-seven acres, and the top water surface will be 325ft. above Ordnance Datum. It will be 80ft. higher than the present service reservoir, and 50ft. above the highest house or works in the town. The greatest depth of water in the reservoir will be 50ft., and it is proposed to take out 30ft. of bog peat, and then a clay bottom will be obtained. The capacity of the reservoir will be 120,000,000 gallons, and it is estimated to cost £61,484. The work is to be carried out for the corporation under the superintendence of the borough surveyor, Mr. Cook. The water will be derived from springs on Wyresdale Fells.

WORTHING.—The new water supply for Worthing, drawn from a well at the foot of, and close to, the South Downs, is nearly ready to be taken over and used in the mains already laid. The works were commenced in 1894, after the severe typhoid fever epidemic in the town, and many delays have occurred, but a temporary supply has in the mean time been available from a site two miles west of the new works. The latter, about two miles north of the town, and the pumping-station and reservoir, cover about three and a half acres, the reservoir standing further northward, and on the downs, 12,000 loads of chalk having been excavated. The capacity of the tank is about two million gallons, and the present daily consumption in the town is 750,000 gallons. The dimensions of the tank are 150ft. diameter at the surface and 23ft. depth. The walls are built of layers of concrete, stock bricks, asphalt, and Tunbridge Wells hard bricks. The engines, to be used alternately are each of about 87H.P., and are of the horizontal compound differential condensing type, each working a pair of steel pumps and a pair of double-action forcing-pumps. Each engine and set of pumps is capable of raising a thousand gallons of water a minute to a height of 215ft. The shaft of 119ft. is cased with flanged iron shields in segments, the joints being made of pitch-pine vertically, and of yarn and Russian tallow horizontally. Headings to increase the supply are driven 150ft. in length, 6ft. high, and 4ft. wide.

As an illustration of the possible developments of the horseless carriage, an incident at Dover Town Council meeting is interesting. The use of motor cars in connection with street scavenging was under discussion, and it was decided to delay the erection of extensive stabling accommodation on land purchased for a scavenging depot pending further information.

The Baptist Chapel at Broadmead, Bristol, has just been redecorated and renovated. French grey, cream, and terracotta tints have been employed in the scheme of decoration in which the interior of the chapel and that of the school have shared. Apparatus for heating the chapel by hot water have been fixed, and the building has been re-roofed, Roman tiles and new leads being substituted for the old work. Mr. J. Searle, of Bristol, has carried out the work, the total cost of which has been about £600.

St. Benedict's Church, Norwich, has been widely known for a tree which (as a seedling) had rooted itself in the side of the tower, nearly at the summit. This curiosity was removed last week, as, in the course of repairing the tower, it was discovered that its continuance would probably endanger the whole structure.

On Sunday week the new Roman Catholic church at Nenagh was dedicated by the Bishop of Killaloe, the Archbishop of Cashel presiding. The consecration sermon was preached by the Bishop of Limerick. The church is Early English in style, and has a tower rising to a height of 200ft. It has been four years in course of erection, and the building materials, including the limestone, slating, and glassware, as far as possible, obtained in Ireland. Mr. W. Doolin, M.A., is the architect.

The Leeds City Council, at their meeting on Wednesday, raised the salary of Mr. T. A. Prince, highway surveyor, from £250 to £300 per annum; and that of Mr. George Fearnley Carter, assistant engineer of the insanitary areas engineering department, from £200 to £250 per annum.

STAINED GLASS.

EDINBURGH.—At St. Giles' Cathedral, Edinburgh, a commencement has been made upon the lower tier of memorial stained glass by the insertion of a compartment in memory of the late Lord Belhaven. The entire window, consisting of ten lights with tracery, situated behind the Royal pew, is intended to be commemorative of Lords High Commissioners who have held office during the reign of her Majesty, and this panel forms the sixth. The general design for the whole window, approved by the managing board, is illustrative of (1) St. Peter and St. John before the Council of the High Priests; (2) St. Peter discoursing to the Assembly of the Apostles at the Synod in Jerusalem. The tracery is filled by the arms of the several donors. The six Lords High Commissioners who are as yet commemorated are Belhaven, Bute, Airlie, Aberdeen, Hopetoun, and Breadalbane. The artists are Messrs. A. Ballantine and Gardner, Edinburgh.

The city corporation of Manchester have just purchased at £100 for the art gallery a large seascape by the late George Sheffield.

The new conservatory in Sefton Park, Liverpool, which has been presented to the city by Mr. H. Yates-Thompson, at a cost of £10,000, will be opened in the first week in October.

The Public Works Commission in New South Wales appointed to inquire into certain charges made by Mr. Varney Parkes, M.L.A., against various branches of the Public Works Department have brought to light the fact that the lowest tenderer for a certain work had been paid £1,500 to withdraw his tender. One of the members, Mr. John Carter, that paid this sum said the arrangement was that £750 in cash should be paid, contract or no contract, and if the contract was obtained a promissory note for another £750 was to be given.

Damage to the extent of over £2,000 was caused by fire on Thursday in last week at the sawmills in Tudor-road, Canterbury, belonging to Mr. C. H. Wilson, builder, of that city. The workmen's tools and other belongings also go to swell the losses. Mr. Wilson had in hand at the time a contract for building a vestry to Kippington Church (erected by him some 15 years ago), but the plans are all burnt, together with a fine wooden screen in course of construction for the same building, and the timber for the reseating of Upper Hardres Church has also been destroyed. The origin of the fire is unknown.

A scheme has been passed by the Charity Commissioners for amending the scheme of 1882, under which Dulwich College is governed. The endowment of the college has hitherto consisted of a sum of £1,000 paid annually by the Estates Governors. The new scheme provides for the payment of a further annual sum of £1,000 to the College Governors for the purposes of repairs, rates, taxes, and insurance of the buildings of the college. Various alterations on the estate are in progress at the present time, the most important of these being the removal of the Greyhound Inn at Dulwich, the site of which is to be let on building leases. It is calculated that in the course of the next five years this alteration will increase the income of the charity by about £1,200.

The Peterhead Harbour Trustees unanimously resolved on Saturday to reclaim about four and a quarter acres of foreshore along the north-west side of the south bay by using the excavations from Port Henry Harbour. The cost is estimated at about £12,000. When completed, Port Henry Harbour will give about 400 yards of additional quay space.

The new Theatre Royal, which has been erected in Walsall-street, West Bromwich, on the site of the building which was destroyed by fire in September, 1895, was opened on Friday. The theatre has cost between £6,000 and £7,000. The contractors were Messrs. Bradley and Lloyd, of Wolverhampton, and the decorations have been carried out by Messrs. A. R. Dean and Co., Birmingham. For the illumination of the stage and auditorium a special system of flash lighting has been introduced, this having been executed by Messrs. Tollerton and Co., Leeds. The architects were Messrs. Owen and Ward.

The trustees under the will of the late Sir Edwin Chadwick propose, in the month of January, 1899, to give a shield worth £100, to be called the Chadwick Shield, to that local authority, presiding over a population of not less than 50,000 inhabitants, which, having adopted the most complete application of the separate system of drainage, shall during the preceding five years show the best reduction of the death-rate in its district as indicated by its official statistics.

Colonel J. T. Marsh held an inquiry in the Guildhall, Oswestry, on Wednesday week, as to an application by the town council for a loan of £950 for the extension of the sewage works. The town clerk (Mr. J. P. Jones) explained that the land proposed to be bought was a field of about five acres in extent, adjoining the present sewage works.

Our Office Table.

THE architectural classes are now reopening for the autumn session. The committee of the Architectural Association have just issued their curriculum. The classes recommence in October, and the lecturers and instructors include Messrs. Henry Adams, P. Buckman, Max Clarke, A. O. Collard, J. E. Drower, F. R. Farrow, A. H. Hart, F. E. Hulme, W. B. G. Lewis, F. W. Pomeroy, H. B. Ransom, H. A. Sachell, R. Elsey Smith, and A. W. Weedon. An improvement has been effected over the arrangements of any previous session in insuring that every class meets regularly on the same day in each week throughout the session. The new term of the day and evening classes at King's College, Strand, under Professor Banister Fletcher, assisted by his sons and Messrs. Banister F. Fletcher and H. Phillips Fletcher, will be inaugurated by a *conversazione* and distribution of prizes by Mr. Jesse Jacob, Master of the Carpenters' Company, on Friday, October 2nd, when the Rev. Henry Ware, D.D., will preside. The syllabus of lectures to be given in the Engineering department of the City of London College, Moorfields, under Professor Henry Adams, has also just been published. Classes are held for the study of building and machine construction, civil and mechanical engineering, land and quantity surveying, valuation and the calculation of strains. The new term commences on Thursday, October 1st. The Architectural Section of the Glasgow Corporation School of Art (Mr. William J. Anderson, director) has reopened this week, considerably in advance of similar institutes south of the Tweed and Solway.

It is announced in the *A.A. Notes* that, with a view to extending the educational usefulness of the Art Workers' Guild to students of art not yet eligible for membership, a junior branch of the society has been formed, to be known as the Art Students' Guild. Candidates must be under 25 years of age, and will be elected by ballot. Membership of the Students' Guild will terminate after five years; but any member may be re-elected, provided that he ceases to be a member at the age of 30. Members of the Association will learn with regret, from the *Notes*, that Mr. H. D. Searles-Wood, F.R.I.B.A., has now definitely resigned the honorary secretaryship of the Excursion Sub-Committee. In the discharge of his arduous duties in this respect, the past president of the A.A. has ever displayed genial courtesy, indefatigable energy, and great tact. Mr. Searles-Wood's successor in the excursion arrangements is Mr. W. Talbot Brown, F.R.I.B.A., of Wellingborough, who has taken part in these enjoyable and instructive outings ever since they were started by the late Mr. Edmund Sharpe.

THE fourteenth autumn exhibition at the Manchester City Art Gallery opened on Wednesday, while smaller and less crowded than recent displays, was as regards quality one of the best selections of pictures yet hung in that city. In the Long Gallery the chief works are G. F. Watts's "Iris," a nymph floating in the rainbow; Sir E. Burne Jones's weird "Dream of Launcelot at the Chapel of the San Greal," J. W. Waterhouse's "Hylas and the Naiads," which has been purchased for the permanent collection of the Manchester Corporation; and Frank Dicksee's "Mirror," a dark-haired lady in a brocaded gown, seated in a chair, and looking in mirror in her left hand. In the next room landscapes and seascapes predominate, those of J. W. North, J. R. Reid, Clarence White, and Arthur Meade attracting attention; while the principal architectural work is as usual by T. Wyke Bayliss, the subject being the church of St. Peter at Bourges. The late Denover Adams's cattle piece, "The Glory of Dying Day," is also noteworthy. In the third room *genre* canvasses recently seen at Burlington House, Melton Fisher's "Clerkenwell Flower-Makers," and George Joy's "Bayswater Bus" will be popular; while James MacWhirter sends his vividly-painted "Bonnie Scotland." The best portraits are by W. P. Frith, J. J. Shannon, and Moutat Loudan.

THE autumn exhibition of the Royal Birmingham Society of Artists was also opened on Wednesday, and is beyond the average. In the Great Room, the place of honour is occupied by three works, by G. F. Watts, illustrating the story of Adam and Eve—"The Creation of Eve" in the centre, "Naked and not Ashamed," and "They

Knew that They were Naked." These are flanked by two small-sized portraits by Alma Tadema. Other works of interest are F. Dicksee's "Vision of Tannhauser," P. R. Morris's fanciful "Circling Hours," J. S. Sargent's portrait of Mr. Chamberlain, and H. La Thangue's "Man with the Scythe," the latter lent by the Chantry Trustees. In the Octagon Room, Wyke Bayliss shows an Interior of Lyons Cathedral, Glindoni "The Black Tribunal, 1648," and Frank Walton a glowing evening landscape. The chief pictures in the Long Gallery are by Adrian Stones ("Behind the Dunes"), Walter Langley ("The Bread Winners"), and William Logsdail ("The Piazzetti at Venice").

SCAFFOLDING is being erected in front of the central portion of Somerset House in the Strand, with the object of repairing the ornamental carving in Caen stone decorating the attic story. These details, comprising four emblematical figures of heroic size dividing the façade of this attic, and a large Georgian coat-of-arms, with figures of Fame and History used as supporters, above, were yielding to the effects of smoke and rain, and the proposal is to remove these, and replace them by fresh carvings. The repairs are being carried out by H.M. Board of Works.

By direction, and at the cost of the Marquis of Bute, the excavations of the foundations of the Grey Friars Monastery in the grounds of Cardiff Castle are being rapidly proceeded with under the superintendence of Mr. C. B. Fowler, F.R.I.B.A., of Cardiff. The outline of the church, which must have been an exceedingly fine one of 14th-century date, is now clearly to be traced. Several skeletons (no doubt of Cistercian monks, inhabitants of the monastery) have been found interred close to the walls, with the feet pointing towards the east. The foundations of the nave arcade piers are all exposed to view. They are about 5ft. square, and portions of the moulded arch stones and label mouldings have been found lying close to the masonry where they fell when the church was demolished at the Dissolution. A great portion of the masonry of the walling has been torn up, and was, no doubt, used in the buildings in the neighbourhood of Queen-street, Cardiff. The church is situated in the middle of the Marquis of Bute's garden, and was found after many months of excavation. The nave is about 112ft. in length by 65ft. in width, including the aisles, and the chancel is about 30ft. across.

HIGH building in the States is doomed. The Pavey Bill provides for the restriction in height, and the American Institute of Architects are all glad to see and approve of the proposed legislation. Many of those architects who have been large designers of tall buildings are enlisted on the same side. In Chicago, where the "tall building" first took root, laws have been passed restricting the height, and Boston and St. Louis are considering the matter. This restriction in height will, no doubt, be hailed with satisfaction by every citizen of the States. The area of business will be extended, so that suburban parts that are now occupied by warehouses and manufactories will be brought into requisition. The centralisation of business in Broadway has been the main cause of the demand for tall office buildings in New York; but with the extension of the city boundaries we may expect an improvement.

THE tale of unnecessary slaughter of the fine spruce trees still reaches us. The *North-Eastern Lumberman* regrets that some of the fine logs of this timber, sold in the lumber markets at less than cost, were not still standing in the forest, where they would increase in size and value. But the lumber operator does not see beyond his nose; he thinks not of to-morrow or how it will be in a time of depression, and cuts down every tree his means and conditions will permit, irrespective of the law of supply and demand. We hear also from another source of information of the tremendous cargoes of spruce which land in Liverpool, and are quickly disposed of every month, showing the large demand for lumber of this description. All this consumption of spruce cannot long continue. It has been said that more is burned than cut by the axe. It may be so; but owners of forest lands in the States ought to restrict the ruthless cutting down process, and prevent the spread of fire by every means in their power.

Dr. Bagshawe, Bishop of Nottingham, opened on Friday a new Roman Catholic church at Broadbottom, near Hyde, built at a cost of £2,500.

MEETINGS FOR THE ENSUING WEEK.

SATURDAY (TO-MORROW).—Devon and Exeter Architectural Society, Plymouth Branch. Excursion to St. German's Church. Train leaves G.W.R. Station, Devonport, 3.16 p.m.

MONDAY.—Sanitary Congress at Newcastle-on-Tyne. Address by Sir A. Noble, and papers and discussions on "Engineering and Architecture." 10.30 a.m.

TUESDAY.—Sanitary Congress at Newcastle-on-Tyne. Address by W. H. Dines, and papers and discussions on "Chemistry, Meteorology, and Geology." 10.30 a.m.

FRIDAY.—Archæological and Architectural Society of Durham and Northumberland. Meeting at Hutton Rudby and Yarn. Assemble at Potton Station at 11.24 a.m.

SATURDAY.—Architectural Association. Visit to Indian Exhibition, Earl's Court, conducted by Mr. A. O. Collard, architect to the London exhibitions. Assemble at Lillie Bridge entrance. 2 p.m. (Tickets, 2s. 6d.)

CHIPS.

Mr. William Woodhead, contractor for masonry to the corporation of Bury, Lancs., died on Thursday in last week, aged 35 years.

The rural district council of Truro have instructed Mr. Hansforth Worth, C.E., to prepare a scheme for the water supply of St. Agnes. The drainage of this village was recently carried out from Mr. Worth's plans.

A new organ, built by Messrs. Bishop and Son, of London, was opened in All Saints' Church, Salhouse, Norfolk, on Thursday in last week.

The parish church of St. Peter-at-Gowts, at Lincoln, is about to be enlarged from plans by Mr. C. Hodgson Fowler, of Durham.

The Right Rev. Dr. Archibald Scott, Moderator of the General Assembly, laid, on Monday, the foundation-stone of a new church, which is being erected in the Hill quarter of Inverness. The building occupies a site in Southside-road, and is to be known as St. Stephen's.

A Local Government inquiry was held, on Tuesday, at the Town Hall, Bootle, by Mr. W. O. E. Meade-King, M.I.C.E., for the purpose of considering an application by the Bootle Town Council to borrow £1,700 towards the provision of an open-air swimming-bath in Marsh-lane, and £2,724 for road improvements. Mr. Crowther, borough surveyor, explained the plans.

In addition to the important extension of Ostend, which is being carried out upon the late Colonel North's plan to the west of the town, a scheme has now been matured for developing about two miles of the sandhills to the east side of the port, where cheap villas are to be erected. The scheme has received the encouragement of the Government, which will provide a steam ferry across the mouth of the harbour. A few of these villas erected this summer as an experiment have proved a success.

A Local Government Board inquiry was held in Sheffield on Friday as to an application by the corporation to borrow a sum exceeding £200,000 for purposes of public works and improvements in the city.

At Westminster Police-court on Friday, Alexander Andrade, surveyor, of Hatton-garden, was committed for trial on a series of charges of obtaining sums of money by false pretences from tradespeople.

The tender of Mr. C. Garlick, amounting to £9,880, has been accepted for the erection of a new cycle factory at Gosford Bridge, Coventry. The architect is Mr. E. J. Punell, jun., of Bank Chambers, Little Park-street, Coventry. The buildings will occupy a site of 1½ acre in extent, and will have a frontage in the Renaissance style. Accommodation will be provided for the principals and clerical staff, and in the rear will be the factory, capable of giving work to 500 employes.

A Local Government Board inquiry has been held at Northampton by Major J. O. Hasted, R.E., an inspector, as to the application of the town council of that borough for sanction to borrow £12,000 for the purpose of widening Marefair and Fish-street. Mr. W. Ibbs Brown, the city surveyor, explained the plans.

A new reading-room and library for North Liverpool is far advanced towards completion. It is situated at the corner of St. Domingo-road and Heyworth-street, Everton, and is a triangular red brick and roofed building, surmounted with a tower, and having a basement, ground floor, and first floor. The building also comprises technical schools, workshops, and laboratories, which will be in the basement and on the first floor, whilst the reading-rooms and lending libraries will occupy the ground floor. The reading-room will be divided into three compartments, one being general, one for boys, and one for women and girls. Accommodation has been provided for 30,000 books, and the general reading-room will accommodate 150 readers.

LIST OF COMPETITIONS OPEN.

Torquay—Pavilion at Princess Pier (Assessor, Mr. Alex. Graham)	50gs., 20gs., 10gs.	F. S. Hex, Town Hall, Torquay	Sept. 8
Sheffield—Pupil Teachers' Centron Corner Site (local competn.)	£25, £10	J. F. Moss, School Board Offices, Sheffield	" 14
Newport, Shropshire—Agricultural School	£15, £25, £10	C. R. Liddle, Solicitor to Adams' Charity, Newport, Salop	" 25
Belfast—New City Hall (Assessors, Mr. Waterhouse and Mr. J. C. Bretland)	£300 divided	S. Black, Clerk to Corporation, Belfast	Oct. 25
Poplar—Coroner's Court, Mortuary	£30, £20	W. H. Farnfield, Clerk, 117, High-street, Poplar	Oct. 26
Malmo, Sweden—New Gasworks	3,000, 2,000, & 1,500 Swedish crowns	Corporation Gas Works Offices, Malmo, Sweden	Nov. 1
Newport, Mon.—Hospital	£100, £50	J. K. Stone, Secy., 39, High-street, Newport	Dec. 1

LIST OF TENDERS OPEN.

BUILDINGS.

Hoxton, N.—Public Baths, Pitfield-street	Shoreditch Commissioners	H. T. Hare, Architect, 1, York-buildings, Adelphi, W.C.	Sept. 7
Belfast—Goods Shed Extension, Spencer Dock	Harbour Commissioners	G. F. L. Giles, Engineer, Harbour Offices, Belfast	" 7
Ossett—Town Hall, Municipal Offices	Corporation	Holtom and Fox, Architects, Dewsbury	" 7
East Stanley—Chapel		S. Walton, Architect, 42, Fawcett-street, Sunderland	" 7
Swindon—Small-Fox Hospital	Swindon Hospital Board	W. Drew, Architect, 22, Victoria-street, Swindon	" 7
Durham—Alterations to Laundry, Leadgate Hospital		T. W. Roundthwaite, Archt., 13, Mosley-st., Newcastle-on-Tyne	" 7
Kensal Town—Baths	Commissioners	H. Wright, Clerk, 171, King's-road, Chelsea, S.W.	" 7
Keady, Armagh—Chapel at St. Clare's Abbey		W. H. Byrne, Architect, 20, Suffolk-street, Dublin	" 8
St. Alban's—Engine House, Sewage Farm	Corporation	Surveyor, Victoria-street, St. Alban's	" 8
South Wimbledon—Caretaker's Cottage	Urban District Council	W. H. Whitfield, Council Offices, Broadway, Wimbledon	" 8
Senghenydd, nr. Caerphilly—Cottages (70 to 80)	Senghenydd Building Club	Tb. Secretary, Building Club, Butchers' Arms Hotel, Pontypridd	" 9
Tolvenne Barton, Phillleigh, Cornwall—Cottages (2)		G. Gow, Tregotham Office, Truro	" 9
Kirton Skeldyke, Boston—Infant School	Kirton School Board	J. Sawyer, Architect, 63, Chancery-lane, W.C.	" 12
St. Austell, Cornwall—Bank Offices and Shops, Bull Ring		S. Treval, Architect, Truro	" 12
Kendal—Alterations to Cottage, Wildman-street	Mrs. Langhorn	G. L. Hogarth, Architect, Kendal	" 12
Weston, near Bath—Brewery	Bath Brewery, Limited	G. Adam and Sons, Engineers, Bristol	" 14
Belturbet, Ireland—Convent	Sisters of Mercy	W. H. Byrne, Architect, 20, Suffolk-street, Dublin	" 15
Devizes—Additions to Asylum		C. S. Adye, Surveyor, County Offices, Trowbridge	" 15
Windsor—Widening Viaduct	Great Western Railway Co.	G. K. Mills, Secretary, Paddington Station, W.	" 15
Liverpool—Westminster-road Baths	Corporation	H. E. Clare, Town Clerk, Liverpool	" 15
Whitstable—Coastguard Officers' House	Admiralty Works Department	Admiralty Office	" 15
Oldham—Extension of Electric Light Buildings	Corporation	A. Andrew, Gas and Water Offices, Oldham	" 15
Leeds—Works in City Square	Official	W. Bakewell, Architect, 38, Park-square, Leeds	" 17
Kensington—Enlargement of Post Office, Young-street	Hornsey Urban District Council	H. Tanner, 15, Whitehall-place, S.W.	" 18
Highgate and Hounsey, N.—Stables, Stores, and Sheds	West Riding County Council	E. J. Lovegrove, Engineer, Council Offices, Highgate, N.	" 21
West Riding—Asylums extension	Guardians of Holborn Union	J. Vickers Edwards, County Surveyor, Wakefield	" 21
Mitcham—Wards at Workhouse	Hampstead Vestry	C. E. Vaughan, Architect, 25, Lowther-arcade, Strand, W.C.	" 23
Hamstead—Finchley-road Baths	Corporation	A. F. Johnson, Vestry Clerk, Hampstead	" 24
East Hull—Baths	Commissioners of Sewers	A. E. White, Borough Engineer, Town Hall, Hull	" 25
Farringdon-street, E.C.—Underground Convenience	Guardians	H. Montague Bates, Guildhall, E.C.	" 29
Durham—Mortuary, County Hospital		C. H. Fowler, Architect, The College, Durham	" 29
Bethnal Green, E.—Infirmary		Giles, Gough, and Trollope, Archts., 28, Craven-st., Strand, W.C.	Oct. 6

ENGINEERING.

Dunmow, Essex—C. I. Tank and Fixing, Workhouse	Guardians	Master's Office, Union Workhouse, Great Dunmow	Sept. 7
Rishton, Lincs.—Press House and Sludge Tank	Urban District Council	J. J. Adams, Clerk, Rishton	" 7
Leeds—Retorts at Gas Works	Gas Committee	R. H. Townsley, Municipal Offices, Calverley-street, Leeds	" 8
Rishton, Lincs—Sludge-pressing Plant	Urban District Council	F. S. Button, Engineer, Blannel-street, Burnley	" 8
Kettering—Refuse Destructor	Urban District Council	T. R. Smith, Surveyor, Market-hill, Kettering	" 9
London, E.C.—Well Kerbs and Girder Bridges	Bengal-Nagpur Railway Co.	Company's Office, 132, Gresham-house, Old Broad-street, E.C.	" 9
Ashton-under-Lyne—Heating Workhouse	Guardians	Mr. Davey, Workhouse, Ashton-under-Lyne	" 9
Merton—Alterations to Sewage Works	Croydon Rural District Council	G. Catterton, Engineer, 46, Queen Anne's-gate, Westminster, S.W.	" 9
Port Tennant, Swansea—Timber Piling	Harbour Trustees	T. Strick, Clerk	" 10
Astrakhan—Dredging Admiralty Basin, Kutum River		Municipal Authorities of Astrakhan, Russia	" 10
Cheshunt—Waterworks	Urban District Council	S. Towson, Surveyor, Turner's-hill, Cheshunt	" 13
Southampton—Dredging Harbour	Harbour Board	A. H. Skelton, Harbour Board, Town Quay, Southampton	" 14
Chatham—Covered Service Reservoir	Brompton Waterworks Co.	J. Taylor, Sons, and Santo Crimp, 27, Gt. George-st., Wstmr, S.W.	" 14
Norwich—Work in connection with Drainage Works	Corporation	A. E. Collins, Engineer, Guildhall, Norwich	" 14
Windsor—Viaduct and Station Yard Widening	Great Western Railway Co.	G. K. Mills, Secretary, Paddington Station	" 15
Rugby—Pumping Engines, Avon Waterworks	Urban District Council	D. G. Macdonald, Engineer, Waterworks, Rugby	" 16
Southborough—Telescopic Gasholder, Gasworks	Urban District Council	C. Woodall, Palace Chambers, Bridge-street, Westminster, S.W.	" 16
Leeds—Conveniences and Excavations, City-square	Corporation	W. Bakewell, Architect, 38, Park-square, Leeds	" 17
Craiova—Waterworks		The Mairie	" 22
North Wales—Pumping out Slate Quarries		P. Parry Jones, Talysarn, North Wales	" 22
Edinburgh—Electric Lighting, Hoist and Hoppers	Corporation	T. Hunter, Town Clerk, Edinburgh	" 22
Malden and Coombe—Sewerage	Urban District Council	W. H. Hope, Engineer	" 22
Freswick, Caithness—Rock Excavation and Pier Construction	Caithness County Council	J. J. Cronin, Engineer, Wick	" 25
Farringdon-street, E.C.—Underground Convenience	Commissioners of Sewers	H. Montague Bates, Guildhall, E.C.	" 29
Hunslet, Leeds—Railway Works	Great Northern Railway	W. B. Myers-Beswick, Engineer, 31, Park-square, Leeds	Oct. 1
Crossness—Outfall, pipes and valves	L.C.C.	C. J. Steward, Clerk	" 6
Ditto	L.C.C.	Ditto	" 6
Havana—Floating Dock	Spanish Government	Commercial Department, Foreign Office, S.W.	" 7
Leamington—Bore, part steel lined	Corporation	E. de Mormanville, Engineer, Town Hall, Leamington	" 14
Naj Hamadi, Kinch Line, Upper Egypt—Metallic Bridges	Official	Col. Western, Broadway Chambers, Westminster, S.W.	" 30

PAINTING.

Twickenham—Painting and Fitting up Offices, Town Hall	Urban District Council	G. B. Laftan, Surveyor, 91, Queen's-road, Twickenham	Sept. 9
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ROADS.

Kingstown, Dublin—Materials	Commissioners	J. Donnelly, Clerk, Town Hall, Kingstown	" 7
Newton-in-Makerfield—Street Works	Urban District Council	R. Brierly, Surveyor, Town Hall, Earlestown	" 7
Romford—Granite (1,200 tons)	Urban District Council	G. Bailey, Clerk, South-street, Romford	" 7
New Barnet—Materials for year to September 29, 1897	Urban District Council	Hy. York, Surveyor, New Barnet	" 8
Plumstead—Paving and making-up Piedmont-road	Vestry	W. C. Gow, Surveyor, Vestry Hall, Maxey-road, Plumstead	" 9
Kingston-on-Thames—Levelling, Making, &c., Durlston-road	Corporation	Borough Surveyor, Clatter House, Kingston-on-Thames	" 9
London, E.—Granite, Hackney	Vestry	J. Lovegrove, Surveyor, Town Hall, Hackney	" 9
Frodingham, Lincs—Granite (400 tons)	Urban District Council	G. S. Sower, Clerk, Brigg	" 10
Arnold—Sewering, Metalling, &c., Morris-street	Urban District Council	W. H. Higginbottom, King John's Chambers, Nottingham	" 12
Arnold—Kerbing and Asphalted Footpath	Urban District Council	W. H. Higginbottom, King John's Chambers, Nottingham	" 12
Eastbourne—Portland Cement (600 tons)	Town Council	R. M. Gloyne, Surveyor, Council Offices, Eastbourne	" 12
Rochester—Street Works	Corporation	W. Banks, Surveyor, Guildhall, Rochester	" 15
Bexley Heath—Materials to September 30th, 1897	Urban District Council	E. R. Boulter, Surveyor, Bexley Heath	" 16
East Barnet—Materials to September 29, 1897	Urban District Council	H. York, Surveyor, Council Offices, Station-road, New Barnet	Oct. 8

SANITARY.

Bromsgrove—Pipe Sewers, Aston Fields District	Rural District Council	W. Fiddian, Engineer, Town Hall, Stourbridge	Sept. 7
Guildford—Sewers	Urban Sanitary Authority	F. T. Malthy, Surveyor, Tunsgate, Guildford	" 7
Pockington, Yorks—Sewage Works and Disposal Scheme	Urban District Council	D. Balfour, Engineer, 3, St. Nicholas, Newcastle-on-Tyne	" 8
Streatham Hill, S.W.—Sewer and Road, Telford Park	Urban District Council	F. H. Harvey, Surveyor, 183, Lavender-hill, S.W.	" 10
Cheshunt—Sewer, Lordship-road	Urban District Council	S. Towson, Engineer, Turner's-hill, Cheshunt	" 14
Pockington, Yorks—Sewerage Scheme and Disposal	Urban District Council	D. Balfour, Engrnr, 3, St. Nicholas-buildings, Newcastle-on-Tyne	" 18
Highgate, London, N.—Pipe Sewers, Manholes, &c.	Hornsey Urban District Council	E. J. Lovegrove, Engineer, Southwood-lane, Highgate, N.	" 21
The Maldens & Coombe, Surrey—Sewerage & Disposal Works	Urban District Council	W. H. Hope, Eng., Gate House, Portsmouth-rd., Kingston-on-Th.	" 22

STEEL AND IRON.

Hornsey, N.—Cast-iron Lamp Columns (200)	Urban District Council	E. J. Lovegrove, Engineer, Northwood-lane, Highgate, N.	" 21
Calcutta—Cast-iron Water Pipes (5,000 tons)	Corporation	H. S. King and Co., 65, Cornhill, E.C.	" 23
Alexandria—Bridge Works (Iron)	Administration of Railways	Chief Engineer to Administration Alexandria	Oct. 30
New South Wales, Australia—Steel Rails (150,000 tons)	Government of New South Wales	Sir Saul Samuel, 9, Victoria-street, S.W.	Dec. 30

Trade News.

WAGES MOVEMENTS.

NORTH WALES SLATE QUARRIES.—The quarrymen employed at Lord Penrhyn's extensive slate quarries held a mass meeting on Monday night to consider the reply to their more recent communication on questions affecting their work. By a large majority they passed a resolution to the effect that the quarrymen, having heard Lord Penrhyn's promise to investigate their grievances, and also the appeal of the North Wales Quarrymen's Union, resolved to continue work pending the result of the promised investigation.

DUBLIN.—A meeting of the Stonecutters' Society was held on Thursday night in last week, when the new rules were considered and affirmed. The slaters and plasterers have held meetings during this week, at which the terms of settlement have been formally ratified. The rules of the Stonecutters' Society provide for a working week of 54 hours, diminishing to 46½ hours in parts of November and January, and to 49½ hours for six weeks in the depth of winter. The rate of pay to be 8d. per hour with 10d. an hour for overtime, and 8½d. per hour for outside work.

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TENDERS.

*** Correspondents would in all cases oblige by giving
the addresses of the parties tendering—at any rate, of the
accepted tender: it adds to the value of the information.

BEXHILL-ON-SEA.—For the erection of business premises
and dwelling-house in St. Leonard's-road, Bexhill, Sussex,
for Mr. A. T. Gammon. Mr. William Cooper, M.S.A.,
21, Havelock-road, Hastings, architect:—

White, A. H.	£1,335 0 0
Cruttenden, H.	1,095 0 0
Padgham and Hutchinson	898 0 0
Eldridge and Cruttenden (accepted)	895 0 0

(All of St. Leonard's.)

BOSTON, LANCs.—For covering in the sewers, for the
rural district council:—

Langley, J., Kirtou	£42 0 0
Tyler, W., Swineshead (accepted)	15 10 0

BOURNEMOUTH.—For chapels and boundary wall at the
Bournemouth East Cemetery. Mr. F. W. Lacey, borough
engineer and surveyor:—

	A.	B.	C.	D.
George & Harding	£4,459	£200	£625	£5,284
McWilliam, J., & Son	4,390	129	595	5,114
Jones, W. B., & Son	4,328	154	588	5,080
Jenkins and Sons	4,269	250	513	5,032
Hoare, F., & Sons?	4,159	147	560	4,866

A.—Chapels. B.—Extra for spire in Portland stone.
C.—Boundary wall. D.—Total.

BOWES PARK.—For stables and depot at Bowes Park, N.,
for the London Parcels Delivery Co. Mr. H. Poston,
architect:—

Mowlem and Co.	£4,884 0 0
Brown and Sweetland	4,854 0 0
Burman and Son	4,400 0 0
Courtney and Fairbairn	4,279 0 0
Jarvis and Son	4,214 0 0
Bentley, J., and Son	4,065 0 0
Shurmer, W.	3,996 0 0
Kilby and Gayford	3,996 0 0
Todd, G. E.	3,777 0 0

Bow.—For partial restoration and enlargement of St.
Mary's Church, Bow-road. Messrs. W. A. Hills and Son,
architects:—

Brown, Son, and Blomfield	£3,209 0 0
Perry and Co.	3,053 0 0
Mowlem and Co.	2,946 0 0
Shurmer, W.	2,853 0 0
Woodward, J.	2,693 0 0

BROMLEY.—For detached residence, Widmore-road.
Mr. George Funnell, South-grove, Park-lane, Croydon,
architect. Quantities by the architect:—

Maides and Harper, Croydon	£1,729 0 0
Jerrard, S. J., and Sons, Lewisham	1,694 0 0
Bowyer, J. and C., Upper Norwood	1,646 0 0
Smith, J., and Sons, South Norwood	1,575 0 0
Arnold, J. C., and Son, Bromley	1,573 0 0
Crosley, T., and Son, Bromley	1,520 0 0
Lowe, R. A., Chislehurst (accepted)	1,485 0 0

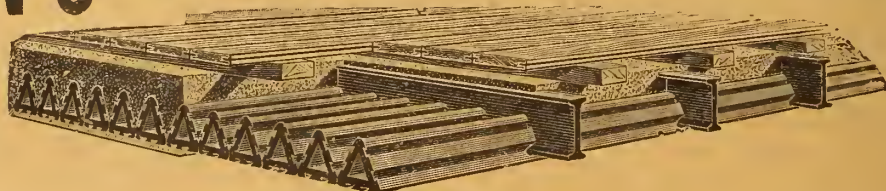
COVENTRY.—For the erection of a cycle factory at Gos-
ford Bridge, Coventry, for Messrs. Calcott Brothers. Mr.
E. J. Funnell, jun., Bank Chambers, Coventry, archi-
tect:—

Worwood, J.	£11,717 0 0
Hill, C. G.	11,000 0 0
Wincott, A. A.	10,900 0 0
Haywood, jun.	10,675 0 0
Golby, T. G.	10,233 0 0
Trentham and Co., Birmingham	9,985 0 0
Isaacs, J., Foleshill	9,980 0 0
Gowing and Ingram, Birmingham	9,973 0 0
Garlick, C. (accepted)	9,890 0 0

Rest of Coventry.

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THE BUILDING NEWS

AND ENGINEERING JOURNAL.

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FRIDAY, SEPTEMBER 11, 1896.

THE ENGINEER AND THE ARCHITECT.

WHETHER it is because our national temperament is fundamentally prosaic, or because we are apt to "take our pleasures sadly," there is certainly a strange contrast between our notions of utility and of beauty. Our matter-of-fact proclivities show themselves especially in our fondness for utilitarian objects—big railway-stations, colossal engineering structures, factories, and shops. We are inclined to emphasise our engineering and industrial enterprise. Our utilitarian progress shuts out all sentiment, and everything is apt to be intensely plain or exceedingly ornamental and lavish. And this apparent hostility between them makes it almost impossible to conceive or to design simple yet artistic buildings. Our railway structures, stations, and bridges are generally atrociously ugly, our houses and public buildings lavish in ornament or meaningless features, all because we do not perceive that we can make what is useful and fit also artistic. This national separation of the useful and artistic has partly, no doubt, been the cause of the independence of the professions of the engineer and the architect almost existing in hostile relation to each other, or so completely disjointed, that the two vocations are often seen in such disagreeable connection. The severance is of quite modern origin. The Roman and Mediaeval engineer and architect were united. All that constructive science could do was enlisted in the great viaducts, bridges, and fortresses of the Middle Ages. The "Pontifex Maximus" of the Roman is a title that reminds us of the union of the great bridge-builder and the artist. These structures were invested with a national and religious importance, for we find that the care of them was assigned to a fraternity of priests, pontifices, or bridge-builders, and the title itself was attached to the office of high priest or to the pope himself. During the Middle Ages the same union existed: we see on many bridges still remaining evidences of their use and connection with ceremonial observances; chapels were erected on them dedicated to some saint, as that of St. Anne on the bridge at Wakefield, and on a bridge at York over the Ouse. The well-known ruined bridge at Avignon, and that at Cahors, as well as the triangular Croyland example, to name no others, are sufficient to show in one branch of building that structures now classed as engineering were designed by the same men under one design and supervision. To our age it has been reserved to employ two sets of principles and men in works of this description. The utilitarian character of bridge-building has marked it out as the engineer's province, and art must take a second and subordinate place if it has any at all. The progress of constructive science has no doubt had something to do with this separation, and iron construction has developed into a speciality. But why should it be imagined that such a development implies any inability on the part of architecture to keep pace or adapt itself to new conditions? The new departure illustrates in a forcible manner how hard it is to reconcile the two notions of which we have spoken; it is another exemplification of that fundamental separation between the practical and the ideal, or the useful and the beautiful, so strongly characteristic of the English race. No doubt it is to the engineer's advantage to emphasise the distinction; his vocation would be considerably com-

promised if his work could be done as well or better by the architect. He sees also that it is more lucrative to make himself an expert in the design of certain structures—to confine himself strictly to the practical and utilitarian, and to leave art to the architect. This is how the distinction has become so marked, how the science of construction has passed more exclusively into one set of hands, and "artistic architecture" has been followed by another set of men, till both the professions have become agreed to the separate practice. What has the distinction done? The separation of these functions has been the means of covering our land with abortions and monstrosities. We need only pass through any of our great towns to see what the unaided engineer has done in the way of railway-station roofs and iron railway bridges across our streets. Take any of those iron structures which cross Blackfriars or Waterloo or York roads. We see a hideous plate-girder structure like a huge trunk crossing the road. It runs askew, and its floor beams are therefore all oblique with the line of thoroughfare. These consist of iron girders whose ends are all cut off as if in section, and are hung up or suspended by the large plate girders which form the sides or parapets of the bridge. We can hardly imagine anything so ugly and crude as these exposed girder ends, as if they were supported on nothing, and the huge tank-like appearance of the bridge itself. No effort is made to make the side girders pleasing—even an open lattice form is not so bad. We naturally inquire why this form of bridge is tolerated when an arched bridge of masonry could be built, and be not only more agreeable, but less noisy when trains are passing over it. We do not ask for ornament, but only architectural common sense. No, the iron fiend has triumphed; practical utility of unmitigated crudeness and barbarity has been asserted. The iron bridge-builder is amenable to no laws except those of cheapness and expediency, and the saving of so many tons of iron. When he attempts to conform to public taste he hides the structure with cast-iron work; he simply conceals his ugly creation by sham parapets, as he has done on Ludgate Hill, or the iron masks which disguise the long open-braced girders of Charing Cross railway viaduct, or he erects a great gable end to stop his huge iron station roof. Things are not made much better when the architect is called in to advise and suggest an architectural treatment, simply because his hands are tied; he is not allowed to interfere with the engineer's work, to alter the shape of his iron ribs or girders. All he is instructed to do is to prepare elevations of the structure that are seen, to encase the ironwork with brick, or design façades that will disguise the real design. He may probably prepare details for the iron columns in the form of capitals and bases, introduce ornamental spandrels in the roof, panel the large plate girders, and introduce cast-iron decoration. Our best iron roofs, like St. Pancras or the York station, exhibit the most conspicuous results of this collaboration of the engineer and architect. We cannot call them successful, for each of these individuals have combined to produce a compromise which cannot be called art. Ornamented or decorated construction is worse, if possible, than "constructed ornament," for we may make beautiful forms subserve the wants of practical utility, and in so doing approach the conditions of true art. But on no possible grounds can we make crude ill-conceived construction beautiful, though we smother it with ornament or conceal it with the most elaborate screens. To take so simple and utilitarian a thing as a lift, such as we see in our warehouses, shops, and hotels. We doubt whether it is not less objectionable, and, in truth, better art, to inclose it with the simplest railings of vertical wood or iron than to conceal it within

a casing of elaborate iron grilles which only conceals a very useful contrivance without adding one iota to its meaning, whereas upright bar work is both more natural and more useful. And, for a like reason, it seems more rational to boldly make the iron plate girder presentable, or simply encase it in plaster, than to try to make it assume what it is not by ornamental disguises. If we ornament it, let the ornament be appropriate and expressive;—but we digress.

The collaboration of architect and engineer, although a step in the right direction, is often too one-sided an arrangement to insure success. One of the commissioners of the new East River Bridge, New York, suggested the appointment of an architect to collaborate with the chief engineer with a view to secure a more artistic result in the finished structure, which, it is thought, will be received with favour by the architectural profession. Commissioner Salem H. Wales said, according to the *Scientific American*:—"In this country this portion of the work has been neglected on almost all the great bridges that have been built." Usually the subject is considered of so little importance that it has been put into the hands of a draughtsman or some one of little artistic ability. Our contemporary considers the question as important, as it is "becoming a serious and pressing matter in this day of widespread engineering activity. Architecture and engineering are not separated by so clear a line of demarcation as formerly." Certainly not, nor have they ever been, till engineering became a special profession. The American bridge-builder, stimulated by a more cultivated public opinion, is beginning to see that engineering and art can no longer be separated. The public, who build and use these structures, demand that they shall not only be safe and of good construction, but pleasing in their outlines and details. The desire is creditable at least to their sense. Again, the introduction of high-grade steel has also led to the endeavour to compensate for the tenuity of that material by using stone in combination with it, and the architect has been called in to design the masonry. This seems to be the ground of his appointment. He is employed to collaborate with the engineer in endeavouring to make the metallic structure pleasing: to disguise it in some way—to make it look more massive and architectural than it is. We can infer this intention in the language of those who write on the subject. Thus, one writer remarks: "If a structure be correctly designed, it will have a beauty of its own which would be spoiled by 'added decoration.'" The addition of something, forsooth, as if added decoration made a structure architectural! These are the views, we fear, of many committees and employers who propose to employ an architect to collaborate with the engineer. We do not deny the wish is a step in the right direction. The desire for artistic structures precedes the attainment of the true motive.

As long as people are satisfied with the semblance of art instead of the reality, the collaboration of the architect with the engineer in the manner described will be tolerated. But how are the two professions brought together? Generally, the engineer is first appointed: he prepares the design single-handed in all its essential features, and then the authorities, or committee, suggest that an architect should be consulted to associate himself with the engineer, and to overhaul the design, with the object of giving it an "artistic character." The architect takes in this case a subsidiary position—his work is done after the main masses and proportions of the structure have been dealt with, and what little he does is simply to suggest a few decorative details. The engineer is really the architect; the latter assumes the part of a draughtsman. And it is not much better when both are simul-

taneously appointed. In the case of a large station or bridge, the engineer first sets to work, and after the main scheme has been worked out, the strain sheets calculated, and the general plans and sections made, the architect is consulted to prepare elevations and the ornamental details of the work. If it is a great roof or a bridge girder, the utmost regard for utility will preside over every other thought. That form of roof or girder will be chosen that will give a maximum amount of strength for a minimum amount of material, and these forms will be massed together with a view to the work they will have to do, and to their rapidity of erection. The strictest utility will govern the whole design with regard to its main form and lines, and at this stage, instead of before, the architect will be called in to aid the engineer. The consequence is that the former's work is limited; he has no voice in the general design, which is not architecture, but a sort of decorated construction. Hence we get an engineer's bridge structure of iron or steel, with approaches and parapets from an architect's design. The utilitarian and the monumental are joined together by the loosest of bonds; the distinction, indeed, may be necessary, but in no sense antagonistic. Attempts, indeed, to combine the two so as to seriously compromise the integrity of each is fatal. A true relation can exist only when the architect is called in to join the engineer from the beginning.

Engineering, in a constructional sense, is a part of every structure. Every step in a building is a working out on some statical principle of certain pressures and forces, and the architect's design is a harmonised study of the equilibrium of those forces. He instinctively adjusts and regulates his masses and voids; but in all this he has no need for the aid of the engineer. And yet we hear a good deal about engineering being a distinct thing from architecture, as if it existed apart from it, and that the latter was a mere clothing or ornamentation of construction. Sometimes it would almost appear as if one overlapped the other, that a part was the engineer's work and a part the architect's. No doubt there are some buildings where the two are brought into painful and disagreeable juxtaposition, as when an engineer of a railway company designs and carries out the iron roof of a station, and the architect is called in afterwards to tack on a row of booking-offices, or an hotel in front. We cannot call the result architecture—it is a jumble. The two duties have been independently taken by individuals who had no concerted plan, each having striven to produce something to his own liking. There is a want of unity of conception and harmony between them; the result is a discord. We observe the same awkward combination in our commercial buildings, where the two professions have worked side by side instead of hand in hand. The engineer flaunts his iron girders or his skeleton framework, and close by the side of it the architect, with a simpering disregard, erects a front full of tame platitudes. A single and definite purpose must form the basis of any real relation. Either the architect must design the scheme and arrange the masses and main lines, and the engineer take up the idea and work it out, or he should be called in at the initial stage of conception, and work hand in hand with the engineer. The most successful of the high office buildings in the United States have been those in which the steel skeleton framework has been arranged purposely by the architect, instead of handed over to him to do the best he can with afterwards. As a building implies all the mechanical agencies employed in its erection—the scaffolding, so to speak—so architecture embraces all the work of the engineer, and under no other conditions can it exist.

NOTES FROM FOLKESTONE.

A CHARACTERISTIC "note" of the architecture of the South Coast is the employment of brick in its varied forms in lieu of the old stucco work which previously reigned supreme in our towns and watering-places. The new era of red brick and its accompaniments of "rough-cast," tile-hanging, half-timber work which have marked the last decade or two, is seen at its best in the modern Folkestone, where the style is fast supplanting the cement stucco exterior. Not only are these materials introduced in nearly all the modern villas, boarding-houses, and new business premises, but modern styles of the Late Domestic or Gothic type have been adopted. These are spreading westward in the Sandgate direction. Along the Sandgate-road Lord Radnor has built a new residence of dark-brown-toned brick with warm-coloured terracotta dressings. "The Manor House," as it is called, is of the usual villa type with gabled front, filled in in the gables with half-timbering and plaster. One of the end gables is made to "sail" over the bay window by deep stepped corbellings, so that the upper part of gabled front is about straight with the front of bay window. The other end gable is built up vertically from the ground, and has a large rectangular-shaped bay projecting from it. We cannot say very much for this variation, except that it gives a piquant flavour to the design which somewhat redeems it from monotony; a want of coherence and simplicity is the result. On the whole, however, "The Manor House" is a good example of modern brick building, in which the colours of the red brickwork and the terracotta have been made to harmonise. The corbellings at the corners of the chimney-stack make a bold feature in the return west side, also a circular bay window at the extreme corner, which is crowned by a conical roof. The least satisfactory adjunct is the conservatory on the west side, which is meagre, and has a "stuck-on" look about it. Behind, and in the immediate neighbourhood, are several mansions and residences, some in red brick and tile-work, others half-timbered, and these have been designed evidently as part of the development of the West Cliff estate in the Earl's-avenue. Further on in the picturesque Sandgate-road a large hotel on the "monster" scale is being completed—"The Metropole." The façade is retired from the main road with spacious grounds in front, and consists of a centre and end wings with pavilion roofs; the central part has a square domical roof and lantern, covered with copper. A nice brownish toned red facing brick is used in the fronts, relieved by a basement, columns, and dressings of warm terracotta. Balconies on the main floors are features. The hotel is a very commodious one, and will compare with other similar undertakings at Brighton and elsewhere. The Grosvenor Hotel and boarding establishment at Sandgate, now approaching completion, affords evidence of the growth of that resort, which will soon become a rival to many other resorts on this part of the coast. It will comprise a large number of rooms and a handsome entrance hall, besides large dining and drawing rooms and smoking rooms.

In the town of Folkestone, as well as in the outskirts of the town on the western side, the architectural character of the buildings has been maintained. We have evidences of this in the artistically treated red brick and stone buildings now completed for the school of art in connection with the Public Library and Museum. This building has been designed by Mr. Frank Newman, architect. The high French-tile roof and flèche, and the broad stone frieze and bold architrave members, make a pleasing ensemble. In Guildhall-street the Roman Catholic Church is also conceived in a broad

and picturesque manner, and in the other streets of the town we notice several commercial buildings, as for example in Sandgate-street. The western suburbs contain rows of well-built red brick villas, some with half-timbered work in the upper stories and gables with plaster between; others are tile-hung. The dormers and tile-roofs impart a pleasant and picturesque character to these villas as they are seen against the green slopes of the downs. Everywhere, in fact, the artistically-designed house is displacing the stucco street house and the pretentious Gothic villa of 30 years since. At other seaside resorts, like Eastbourne, Hastings, Herne Bay, we notice the development of a better style of residence, in which the "properties" of the speculative and cottage ornée builder are being substituted by a more honest reliance on materials and methods of treatment that have been the products of a better art and a truer motive.

CONSTRUCTION OF STEEL SPIRES AND STEEPLES.—V.

HAVING obtained in our previous articles the combined maximum stresses resulting from the static loading, and the pressure of the wind, which is equivalent to a moving load, or for all practical purposes is assumed to be so, we may now proceed to complete the design for the steel spire. Commencing with the sloping rafter, the first point to determine is what form, or, as it is generally termed, what section of steel should it consist of. There is a large choice to select from, although some sections are preferable, for various reasons, to others. The nature and amount of the stresses to be provided for will to some extent indicate a suitable section. In the present instance, summing up the maximum stresses upon the lowest panel length of the half principal, and neglecting decimals of a ton, we find that a total stress of 20 tons has to be met and adequately resisted. Consequently, making A equal to the net area of metal required, and employing the units already specified, we obtain—

$$A = \frac{20}{6.5} = 3\text{sq.in.} \dots\dots\dots (1)$$

A very suitable section for this amount of material will be found in a T-iron with its several dimensions commensurably proportioned, or in a couple of angle-irons of the same sectional area together as the single T-iron. The T-iron has the advantage of being in one solid piece, while the pair of angle-irons must be riveted together at close intervals longitudinally the whole of their length, which in the instance before us is at least 100ft. In addition to this needless waste of skilled labour, there is another disadvantage, which is that the riveting entails the punching or drilling of holes in both angle-irons, and thus at once seriously reduces the net sectional area of the pair. In the T-iron, if A be equal as before to the net sectional area in square inches, and A_1 to the gross, then the general equation holds in which $A = A_1$. This equation will not hold for the pair of angle-irons riveted longitudinally *dos-à-dos*, as the following example will point out: In Fig. 1, a part of a pair of angle-irons is shown riveted together as the occasion would require. Let each angle-iron have the scantling of $(3\frac{1}{2}\text{in.} + 3\text{in.}) \times \frac{1}{2}\text{in.}$, then their gross sectional area would be given by the formula—

$$A_1 = 2(3\frac{1}{2}\text{in.} + 3\text{in.}) \times \frac{1}{2}\text{in.} = 6\text{sq.in.} \dots (2)$$

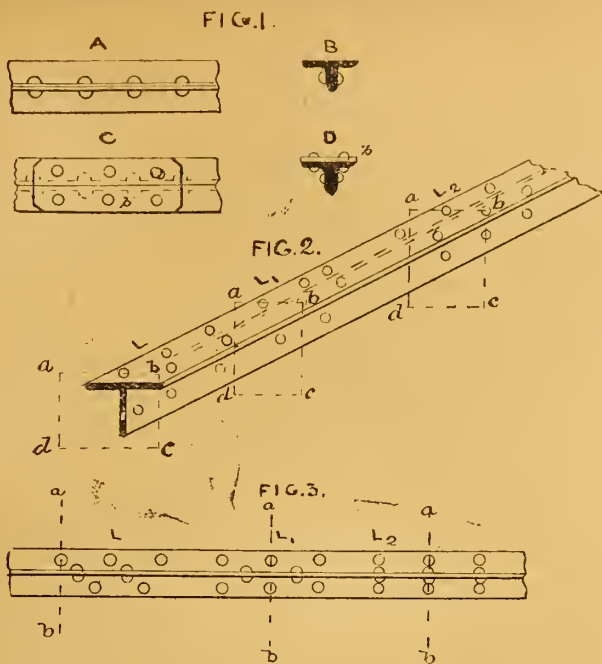
To find the value of A , let the diameter of the rivets be 0.75in., then if we suppose each angle-iron to be developed upon a horizontal plane, or, so to speak, unrolled, it is clear that a lineal measurement of 0.75in. must be subtracted from the total breadth of the developed surface of each angle-iron. This calculation will give the value of the net sectional area of the pair; or,

$$A = 2[3 + (3 - 0.75)] \times 0.5,$$

from which we have

$$A = 5.25\text{sq.in.}$$

So that in using a pair of angle-irons one-eighth of the gross sectional area is rendered useless. No doubt further reductions and diminutions for riveting the various component members of the truss together will have to be made, whatever section of steel may be used; but these are common to all, and do not affect the principle enunciated. We shall, therefore, give the preference to the



T-iron, which according to equation (1) must have a net sectional area of 3in. : What ought to be its gross sectional area to allow for the loss of section which will be due to the holes drilled in it, to admit of putting the ironwork together? Let Fig. 2 represent an elevation of part of the T-iron, in which F is the horizontal flange or table portion, and F₁ the vertical part or rib. For the purpose of building up the truss, it is evident that riveted attachments must be made in both these parts of the T-iron, or, as it should strictly be termed, T-steel. The most favourable position for the three holes would be as shown in the distance marked L. In this case, as the holes are not situated in the same plane—that is, they break joint—it would be necessary to deduct only one rivet-hole in the entire breadth of the developed steel section. But it would be impossible to practically arrange the riveting so that the rivet-holes should be always at a certain recognised distance apart, so that it must be conceded that two rivet-holes will come in one and the same plane, as shown in the distance marked L¹ in Fig. 2. But even this allowance is not quite sufficient in the design under consideration, which, it must be borne in mind, is an exceedingly complicated example of built-up ironwork, braced, strutted, and tied together inside and outside, in almost every possible direction. To be perfectly on the safe side, it will be taken for granted that it is possible that three rivet-holes may be all ranged in the same plane, as shown in the length marked L₂ in Fig. 2.

There is no reason for departing from the ordinary dimension of the rivet used in moderate-sized steel constructions—that is, ½in. diameter, which will be adhered to throughout the whole design, unless otherwise specified. It would not be advisable to have the table part of the T-section less than 5in., nor the thickness, which is to be uniform, less than ¾in. To find the dimension of the vertical rib put it equal to x, and we have—

$$(5 + x - 2.25) \times 0.375 = 3.$$

Simplifying and reducing—

$$x = 5.25\text{in.}$$

It will be preferable to increase the thickness—at least, in the two lowest bays—to ½in., and as a corresponding equivalent, or nearly, on the other side, the depth of the rib may be reduced to 4in., which will make the section 6in. by 4in. by ½in. It must be remembered that it is at the lowest panels that the tendency to overturn the structure, or, in other words, the leverage with which the wind-pressure acts, is a maximum, so that it is practically advisable not to adhere too stringently to mere theoretical data. Before deciding finally upon the form for the sloping rafter of the half-truss there is one more point to which some attention must be given. In its actual position the rafter closely resembles a nearly vertical post or strut, and is in consequence subject to the laws which govern all vertical or

slightly inclined compression members. Referring for a moment to Figs. 1 and 2, it will be observed that, as shown at B and C, a pair of angle-irons, although riveted together through one of their flanges, have the disadvantage of presenting an uncovered longitudinal joint from one end to the other. It would, therefore, if they were used, be absolutely necessary to cover the joint at intervals of some 8ft. or 9ft. with wrappers or cover-plates, b, as shown at C and D in Fig. 1. On the other hand, the T-section in Fig. 2 requires no cover-plates. In order to more fully exemplify the statements made respecting the loss of sectional area that must to some extent occur in the construction of all steel bridges, girders, roof trusses, and other structures of every description, and may take place in the most unfavourable manner, some further attention may be given to the diagrams in Fig. 2 represented by the dotted lines. In effect, let a series of ideal planes, a, b, c, d, be drawn through any one rivet-hole in the parts L₁ and L₂ of the length of the T-section in Fig. 2. It will be seen that the plane in the part L passes through only one rivet-hole, and consequently the gross sectional area of the rafter is diminished simply by the amount of material punched or drilled out. But the plane at L₁ passes through two rivet-holes with a correspondingly increased reduction of area, and at L₂ through three holes, which is the maximum necessary to allow for. The three cases are represented in plan in Fig. 3, the plane lines being shown by the dotted lines a, b, and the illustration requires no further comment.

It is laid down as a general and, in the main, a very safe rule that no strut, column, or other member of a structure subject to stresses of compression should have its smallest side or lateral dimension less than one-fortieth of its unsupported length. In connection with this part of our subject, it cannot be too carefully borne in mind that the equations and formulæ for determining the strength and resistance of wrought-iron columns, pillars, and struts do not apply to similar examples when they are constructed of steel. Very recently some up-to-date formulæ have been deduced from tests and experiments on the modern material which has nearly altogether ousted the older, which are deserving of attention and recognition by both architects, engineers, and all those concerned in designing structures of steel. The formulæ are intended to meet the three particular cases in which external forces can act upon bridges and roofs exposed to their influence. These are (1) dead or static loading, (2) live or movable loading, and (3) wind pressure. The difference between bridges and roofs, with respect to the various descriptions of loading, is that, while the former are subjected to the action of the whole three, the latter are affected only by the first and third. The data for using the recent rules are as follows:—Let W equal the safe working load in tons, L the length in feet, and R the radius of gyration in inches, which will vary with every section of steel cm-

ployed. Then for a static load the equation becomes—

$$W = \frac{R \times 18,000 - 120 \times L}{R \times 2,240} \dots\dots(3)$$

For a live load we have—

$$W = \frac{R \times 9,000 - 60 L}{R \times 2,240} \dots\dots\dots(4)$$

The stresses due to the wind pressure occupy an intermediate position between those occasioned by the other two forces, for the equation is—

$$W = \frac{R \times 14,000 - 90 L}{R \times 2,240} \dots\dots\dots(5)$$

It may be useful to some of our younger readers to define what is meant by the term "radius of gyration," as similarly to the "moment of inertia," of which it is a function, it frequently embarrasses students and beginners. In both instances an axis must be selected as a datum for the determination of the quantities required. When possible, the geometrical axis of the example should be chosen. The radius of gyration of any body about the given axis is a distance the second power of which is equal to the mean of all the distances, raised also to the second power, of all the centres of gravity of the infinitely small areas of the body from the given axis. It will be seen that all the three formulæ adduced contain the radius of gyration as a factor. When the section is rectangular or circular R becomes a simple function of the diameter or depth, but not otherwise. It would be outside the purpose of these articles to investigate mathematically the calculations necessary to obtain either the radius of gyration or the moment of inertia of a T-steel 6in. by 4in. by ½in. The methods usually adopted will be found in the proper treatises devoted to such subjects. It may be mentioned that when the moment of inertia has been obtained, the value of R is easily deduced from it. Let M I equal the moment of inertia and A equal the area of the section, which may be considered a known quantity, then we have—

$$R = \sqrt{\frac{I}{A}}$$

As a practical example for the value of the radius of gyration of a plain triangle about one of its sides, selected as its axis, the base for instance—

$$R = \sqrt{\frac{H^3}{6}} = \frac{H}{\sqrt{6}}$$

in which equation H equals the height of the triangle. It is worth observing that while ties are in a state of stable equilibrium, struts are not. If ties, from one cause or another, are deflected or otherwise shifted from their normal position, the forces acting upon them play the part of a "couple," and tend to restore it to its original lines. It is otherwise with a strut, for if its original angular position be altered, the forces acting upon it, which are opposed to one another in direction, constitute a couple tending, not to restore it to its primitive situation, but on the contrary to remove it still farther from it. In our next article, after having ascertained if the T-section selected fulfils the ratio of length to least lateral dimension prescribed for the members of trusses in compression, we shall proceed with the remaining practical details of the construction of the spire.

CONCERT-HALLS AND ASSEMBLY-ROOMS.—XXIX.

By ERNEST A. E. WOODROW, A.R.I.B.A.

IN the last chapter I referred to one of the reasons for the concert-hall and theatre being in one building, stating that it was a matter of convenience for operatic recitals. On the Continent, however, one may look to another cause for the foyers and saloons becoming separate places of public—more especially where they form part of the Court Theatres and of the latest development, the People's Theatre—assembly. In Court Theatres the accessories are designed to a lavish scale: they are peculiarly the luxury established and maintained at the expense of reigning monarchs. In modern times all classes are usually at liberty to enjoy the entertainments given at these playhouses, subject, of course, to such restrictions as to the number of spectators or the charge for admission, as may seem good to the Royal owner, as whose guests they are in reality admitted. The money received thus con-

tributes to defray the cost of the entertainment, and in this way the public are permitted to witness the performance at a smaller outlay than would be required of them were the institution managed merely with a view to gain. Court officials and officers of the army and navy are on the free list; whilst university professors and other distinguished men of learning frequently gain admission at a nominal fee. Art is

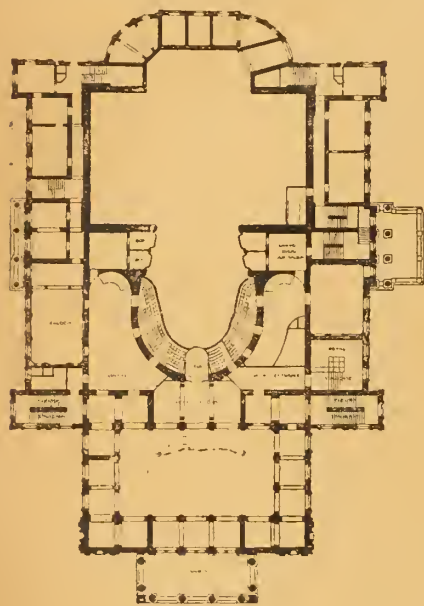


FIG. 1.

encouraged on the stage: the attendance of the cultured classes is sought in the auditorium. Although the price of admission is comparatively small, it is yet sufficient to secure, in addition to the privileged, an assembly of a certain social standing. On some occasions of national festivity, however, an exception is made, and the auditorium is thrown open to all comers absolutely free of payment. The pride that a Continental Court takes in its theatre is most noticeable.

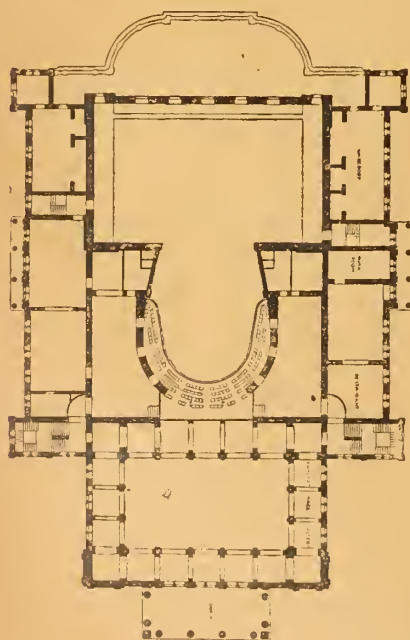


FIG. 2.

Not only does the sovereign use the building for the entertainment of his official or private guests, or for his public receptions, but no general Court ceremony is complete without a visit to the Royal play-house. Indeed, some performances rank as high State functions, all the seats being filled by special invitation.

As an example of the space which is given up in a building of the Court Theatre type to a concert-hall for Court and other functions, I

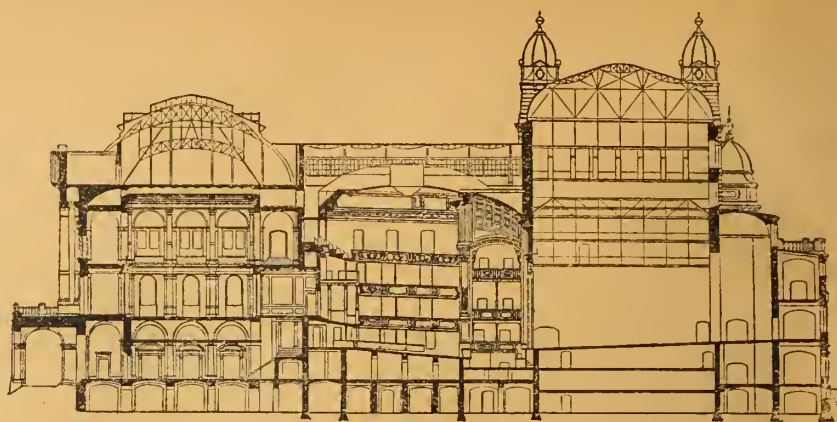


FIG. 3.

illustrate the plans, Figs. 1 and 2, of the Grand State Theatre, Mecklenburg Schwerin. Fig. 3 is a longitudinal section of the same building. The space usually devoted to the foyer and grand staircases is designed for a concert-hall extending to a height equal to two stories of the theatre, and in length the whole front of the building. The area-level of the concert-hall is accessible from the first flight of the staircases which lead into the theatre, while the gallery of the concert-hall is also approached from the third flight of the theatre staircases.

The State or Court box is placed in the centre of the auditorium on the first tier; behind this box, and between the theatre and the concert-room, is the Royal saloon, which can be used for Royalty both for concert-room and theatre. This saloon has a separate entrance from the street, and is approached by a staircase placed on the right of the building.

In addition to the State-box here described, there is on the right of the auditorium the Grand Ducal stage-box, generally used by high personages. The approach to this box is arranged in the centre of this side façade with an inclosed carriageway. A special staircase serves for this entrance. On the ground floor large doors open from the vestibule into a corridor behind the auditorium; the central door leads to the parquet or stalls on the first floor, the two side doorways lead to the staircases on the right and left of the theatre, which serve as an approach to the second and third tiers of seats. These staircases have special exit doors of their own leading directly into the street, without re-entering the vestibule, so that people can depart from the tiers above without mixing with any of the audience leaving through the vestibule.

The staircases are planned with more steps in a flight without intercepting landings than are accepted by authorities as wise for the safe construction of staircases where large crowds have to descend rapidly—in many cases there are as many as nineteen steps without a break; the circular staircases near the proscenium are also in a form which would seldom, if ever, be found in a theatre of the present day.

Doubtless the architect of this theatre, Herr Daniell, was entirely influenced in his design by having to place the concert-hall and assembly-room in front of the auditorium for the special Court functions which would be held therein, to which he has sacrificed to some extent the arrangements for the ingress and egress of the people.

No doubt the most magnificent building of this particular class in the whole world is the Sunper and Hasenauer Court Theatre at Vienna, with its magnificent auditorium, to which is attached the most luxurious suite of reception rooms, most frequently used for Court ceremonies and the entertainment of the Emperor's guests.

One of the most ambitious schemes of a building used for more than one audience is to be seen in Madison-square Gardens, New York, erected by Messrs. McKim, Mead, and White. The history of the building is told by Mr. Horace Townsend as follows:—"When New York was a younger city than it is now, and the city was clustered about the lower end of the island which it now almost entirely covers, one of the principal railway stations was built by the famous Commodore Vanderbilt in close proximity to Madison-square; but as that locality gradually became the heart of the city the station was moved

further northward, and the enormous building, which covered an entire 'city block' or plot of land 425ft. by 200ft., was left on the Commodore's hands. He did not pull it down, but at small expense turned it into a sort of rough Agricultural Hall, where he held horse shows, dog shows, boxing matches, and so forth, while once a year it was tenanted by Mr. Barnum's 'Greatest Show on Earth.' It was a malodorous, ramshackle sort of place," says Mr. Townsend; "but year after year it stood there, producing a fair rent, but nothing approaching the interest on

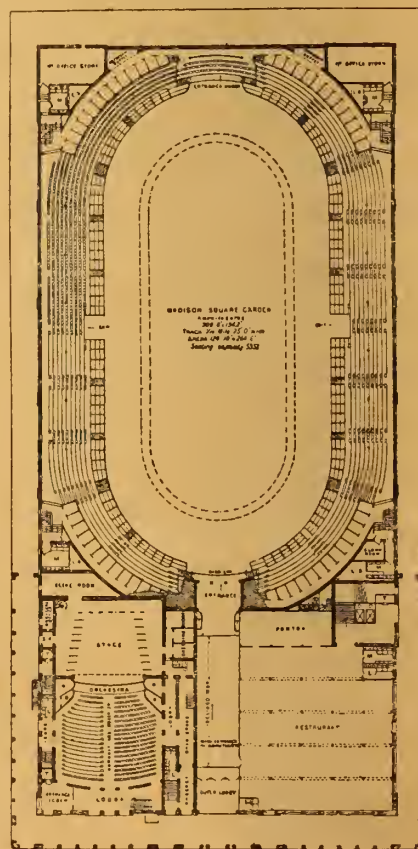


FIG. 4.

the sum of money it represented. Many plans were discussed for the turning of it to better account; but all proved abortive, until a syndicate of the richest bankers and so forth in the city bought the property for some million and a half dollars (£300,000), and built on its site a comprehensive structure devoted to public amusement.

The block consists of an enormous amphitheatre 310ft., by 194ft., by 80ft. in height, comprising 30,000ft. super., with a track a mile long, and it has seating capacity for 6,000 persons. In addition to this amphitheatre is a large restaurant, with main room 80ft. by 90ft., and a number of lesser rooms attached. Over the rest of the large hall is built a concert-room, while at the side there is a theatre which will seat 1,200 persons.

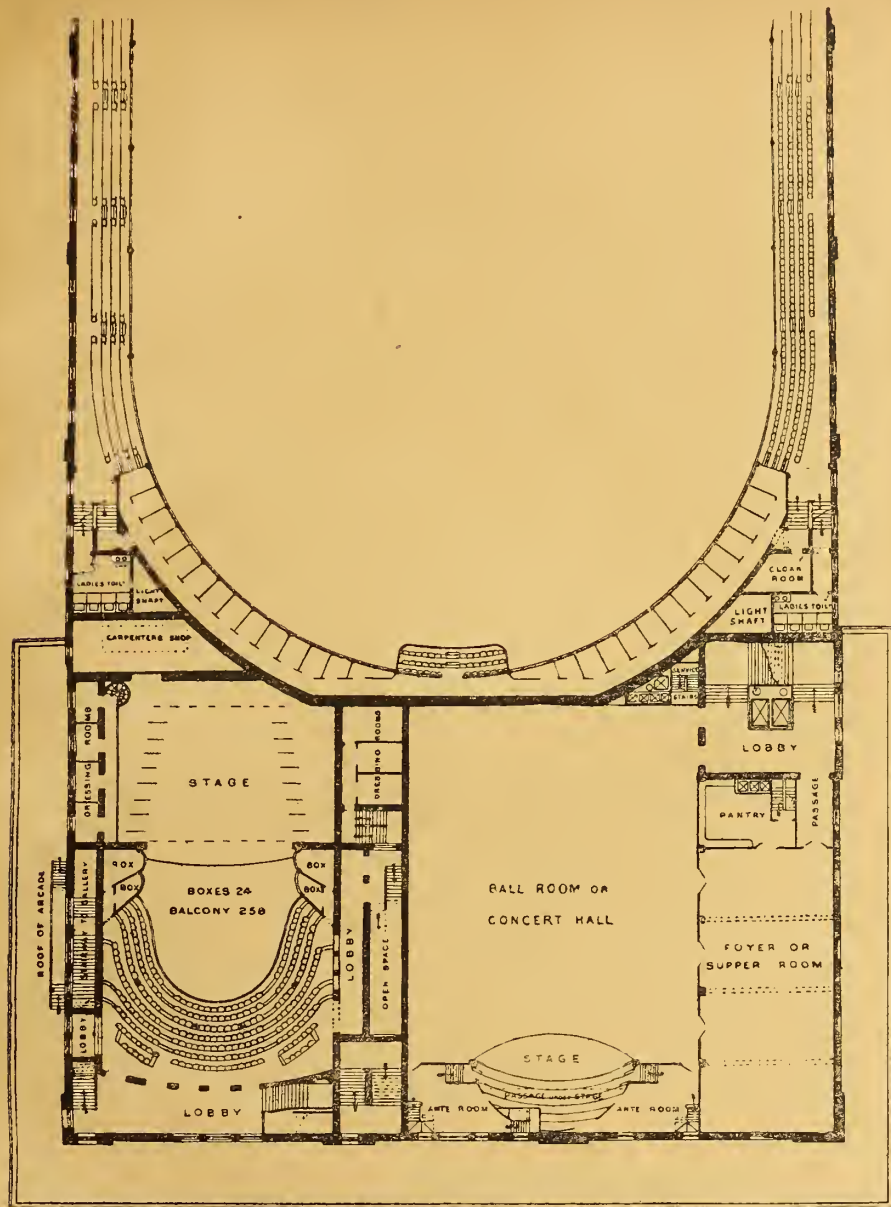


FIG. 5.

The concert-hall accommodates no less a number than 1,500 people. There are additional attractions in this enormous place of entertainment, there being a tower 300ft. high, with a platform 200ft. above the pavement, and the roof over the theatre is 112ft. by 200ft. This building is

Erdmann Hartig, is another building of a class devoted to a lighter form of entertainment, and, like Mr. Kiralfy's palace in Philadelphia, it is connected with a winter-garden and open-air concert garden.

There is still another class of theatre which is

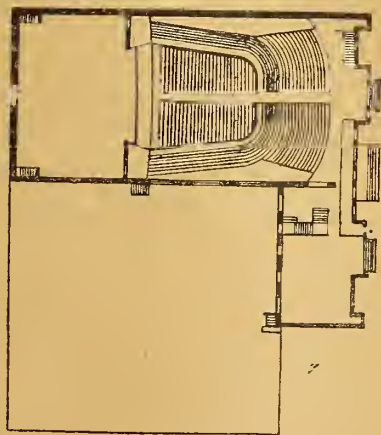


FIG. 6.

said to be one of the first to be erected under the new regulations at New York.

Fig. 6 is Mr. Kiralfy's Alhambra Palace at Philadelphia, a building devoted to variety entertainments and spectacular shows. Bhreeke's Concert-Room in Braunschweig, by architect

also used as a concert-hall; but it is a class which is distinctly Continental. I refer to the people's theatre, the most typical example of which is at Worms. In addition to the theatre, the block comprises a public hall and assembly-room, with small stage for concerts, and, further, a restaurant.

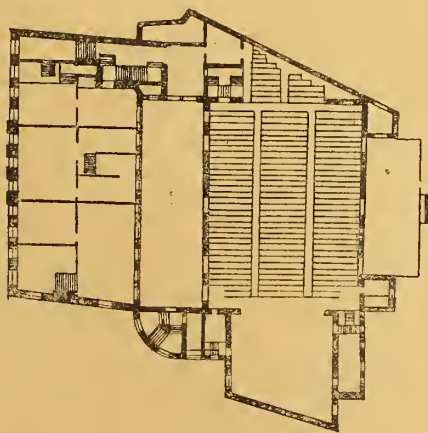


FIG. 7.

There is a large garden at the side, which can also be used for outdoor concerts. The theatre accommodates 1,183 people, and, with standing room, can hold 1,400. The concert-room is so arranged that it can be used as a foyer to the theatre, and a terrace outside is also available both to the theatre and concert-hall. The ample space given for cloak-counters is a special feature, and attention should be drawn to the circular lounge. The theatre is so arranged that not only performances can be given therein, but also concerts; and in addition to the orchestra in front of the stage, there are, in the rear of the auditorium, an organ and seats for a choir of 100.

SANITARY CONGRESS AT NEWCASTLE.

WE continue from p. 335, last issue, our report of the very successful congress held by the Sanitary Institute at Newcastle-on-Tyne, which was brought to a close on Wednesday by various excursions. The sectional meetings were opened on Thursday in last week. The conference of Municipal and Sanitary Engineers and Surveyors was presided over by Mr. Francis J. C. May, M.Inst.C.E., borough engineer of Brighton, who delivered an address on

SANITARY ENGINEERING FOR LARGE TOWNS,

in which he urged that the public health department should have a separate existence from the Local Government Board under a recognised chief, who, as Minister of Public Health, should have a seat in the Cabinet. He went on to speak of the importance of water supply, healthy dwellings (including inspection of new houses during construction), the removal and disposal of house refuse, and the removal of nuisances, including inspection of the constructing and subsequent testing of sewers and house-drains, and of the various connections therewith, sewage disposal works, ventilation of sewers and house-drains, and the construction of good roads and impervious pavements. It was a subject for extreme regret that as the law stood at present it was an impossibility in most cases to insist upon the system of back drainage. Sewage disposal was one of the most difficult problems of the present day. Notwithstanding the experiments and experience of the last 25 years, it was incumbent upon engineers to find a more satisfactory method of disposal than that of disposal into rivers, which was a wilful waste of water. Another imperative duty of a local authority was to secure a good water supply. It was an absolute necessity of life. Waste of water in the household was a sin, but how much greater was the transgression in works and factories, where the demand was greater? He felt it a distinct duty of the municipal engineer to do all he could to prevent waste in this department. As regarded healthy dwellings, the existing by-laws as to the building of houses were sufficiently stringent if carried out strictly. The removal and disposal of house refuse and its destruction by fire was a most essential element in relation to their efforts to secure healthy dwellings, especially amongst the poorest part of their population.

CLAY FOR SEWER JOINTING.

Mr. R. S. Rounthwaite read a paper on "Sewer Jointing." He said that by many people clay jointing was looked upon as a relic of Paganism and ignorance. Nevertheless, he was in favour of it. The objections to cement were by no means few or insignificant. There could not be sufficient certainty that in the execution of the work the joint was carefully ridged off in the inside. The least carelessness on that joint would cause the creation of a sediment, which would go on until it attained such proportions as must result in serious deposits, and the germination of sewage gases. Neither could there be any certainty that before the pipes were covered workmen would not walk upon them and break the joints. There were other objections to cement. The objections he had heard to clay were—1, that rats scratched it away; 2, that worms bored through; 3, that the roots of trees broke through and got into the pipe; 4, that the joints did not remain watertight; 5, that clay cracked in dry positions; and, 6, that joints were forced when under pressure. Having combated these objections, he went on to say that he preferred clay to cement, but he wanted something better than either. He drew attention to a new agent, where a bituminous substance was used, which could be brought to such consistency that

it would neither run out nor become brittle and hard. In the discussion which followed Mr. E. G. Mawbey, of Leicester, thought the time had come when the use of the ordinary socketed pipe was abandoned for all important sewage and drainage purposes. It was not possible to insure, with Portland cement or clay, a sound joint or true invert. He had no hesitation in condemning clay as a jointing material, and in recommending a combination of bitumen and Portland cement, such as adopted in Hassall's, Stanford's, Doulton's, and other inventions. Clay joints were not used in the Leicester sewers.

IMPROVED METHODS OF DRAIN CONSTRUCTION.

Mr. F. C. Lynde, in a paper on this subject, said that, notwithstanding the great progress made in sanitary and drainage work, they were still far from perfect, and if exposed above ground instead of being buried out of sight, object-lessons would be gained therefrom which would be of great value both to workmen and to those whose lives were jeopardised by living under insanitary conditions, the result of defective drainage. The causes might be put down to want of knowledge on the part of workmen; inexperience in respect of the proper construction of details; absence of proper tools for insuring the best quality of work at the minimum cost; competition amongst contractors to obtain work at any price (in some cases the prices being inadequate to provide good material and skilled labour without fair profit); taking for granted by those in responsible positions that drainage work under their charge had been properly carried out, without troubling to test the work. The speaker proceeded, by means of numerous diagrams displayed on the walls, to explain various suggested improvements on existing methods. These included a deflector bend forming a perfect method of connecting branches with the main drains, gasproof and watertight traps, intercepting traps, and a drain-badger.

SANITARY INSPECTORS' GRIEVANCES.

Dr. George Reid, medical officer to the Staffordshire County Council, presided at a conference of sanitary inspectors, and delivered an address, in which it was urged that those appointed to such posts should be to some extent specialists, and that their position should be improved. The chief grievances of sanitary inspectors were summed up as follows:—The frequent disregard by authorities, in appointing their officers, of evidence of qualification in the shape of experience and training in sanitary work; 2. The insecurity of tenure in such appointments; 3. Inadequate salaries and allowances. These grounds of complaint more especially, although not entirely, applied to non-county boroughs and small urban and rural districts. As regards the salaries paid in the case of towns of under 50,000 and over 50,000 inhabitants, the amount, on an average, was about £2 a week—the wages of a skilled artisan. Among the smaller towns, the salaries paid varied very much, and extra duties of a varying nature, and not necessarily connected with sanitary work, were frequently imposed. He held that the only remedy for these grievances would be the establishment of a Government Health Department, with a Minister at its head—a suggestion which was heartily endorsed by the members of the Conference.

PARISH COUNCILS VOTED A NUISANCE.

A paper on "Sanitary Work in Rural Districts" was read by Mr. William Pland, of Urmston, in which emphasis was laid on the difficulties occasioned by the creation of district councils, and in the discussion Mr. Branson, of Northampton, and Mr. Lowery, condemned the parish councils, the latter characterising them as great nuisances.

CYCLING FOR LADIES.

An interesting section was that devoted to domestic hygiene, in which the ladies attending the Congress met, under the presidency of the Mayoress of Newcastle, Mrs. Lorde. The chief paper was one by Dr. E. B. Turner, on "The Sanitary Aspect of Cycling for Ladies," in which the author took a favourable view of the new pastime, stating that it had improved the standard of health of riders, and the necessity of proper clothing for lady cyclists was enforced.

At the conference of Medical Officers of Health, presided over by Dr. Alfred Hill, of Birmingham, a joint-paper by Drs. Waldo and Walsh, of London, was read on "Whole-time Service of Medical Officers of Health v. Part-time Service,"

in which the authors contended that the officer should devote his entire time to the work.

On Friday the section devoted to Sanitary Science and Preventive Medicine was opened by an address from Professor W. H. Corfield, of London, who took as his topic

THE TEACHING OF PUBLIC HEALTH.

He reviewed the history of sanitation, and referred to great teachers of hygiene in the past and present. He pointed out that the general death-rate had decreased since the passing of the Public Health Act of 1875, and, no doubt, a similar result would follow the passing of the Public Health (London) Act of 1891. This led him to ask how far could such reductions go. The notion had got abroad that a death-rate of ten per 1,000 per annum would imply a mean length of life of 100 years, and that, therefore, so low a death-rate as 10 could not be attained. But this was a fallacy. The mean duration of life depended upon the birth-rate as well as the death-rate, and with a death-rate of ten per 1,000 there must also be a birth-rate of ten per 1,000 to make the mean length of life 100 years. With a death-rate of ten and a birth-rate of 20 per 1,000, the mean length of life would be just under 70, and the mean would be 55½ with a birth-rate of 30, and a little under 51 with a birth-rate of 35. Was it to be said that a mean life of 51 years, which, with a death-rate of 30, the present birth-rate in London was unattainable? Certainly not. It was not only unattainable, but it ought to be attained, and he did not despair of even a lower death-rate being reached in some of our large towns.

THE SUBMERGED TENTH.

In the Medical Officers of Health Section, Dr. R. S. Marsden, Birkenhead, read a paper on "Some Duties which Devolve upon Municipalities in connection with the Public and the Submerged Tenth." The study of the social sanitary question, including the better housing of the people, the reforming of their habits, and the improvement of their general sanitary surroundings deserved, he said, to fix the attention of medical officers of health. A discussion ensued on the question, most of the speakers being of opinion that the most practical course was to deal with the young. A resolution to the effect that the Notification of Diseases Acts needed revision was adopted.

At the Sanitary Inspectors' Conference, Mr. H. Thomas, of Bermondsey, moved:—"That the Council of the Institute be recommended to support the superannuation Bill promoted by the Sanitary Inspectors' Association."—Mr. F. T. Poulson, Staffordshire, seconded the motion, which was carried unanimously.—Mr. Thos. F. Cass, Hull, read a paper on "The Duties of Sanitary Authorities in Relation to Factories, Workshops, and Shops," in which he sought to enforce the necessity of having the drainage of factories inspected.

On Saturday no meetings were held, the day being devoted to excursions to Alnwick Castle, Warkworth, Craigside, and other places of interest.

ENGLAND TO THE FORE IN SANITATION.

On Monday, Section II., devoted to Engineering and Architecture, was opened, the President being Sir Andrew Noble, of the Elswick Works. He remarked that in these days of fierce competition it was satisfactory to find that England more than held her own in the field of sanitary engineering. The provision of sanitary arrangements by English firms in Continental hotels was regarded as a guarantee of excellence. The undertaking of water supply by the local authorities in England, and the increased quantities provided, were good tests of the sanitary progress of the nation. The increasing provision of baths in private houses was a satisfactory feature of the time, and he had no doubt that ten years hence a working man's house without a bath would be an exception. He also spoke with satisfaction of the better sleeping accommodation that was being introduced into houses, but said he doubted whether public baths and washhouses furnished a useful form of bath accommodation.

FILTRATION OF SEWAGE.

Mr. Henry Law read a paper on "The Purification of Sewage by Filtration." The desiderata were—the permanence of the filter, the greatest possible removal of polluting matter, and effecting this removal in the least possible time. Formerly it was supposed that filters acted simply me-

chanically, by only straining out of the water those foreign substances which were contained in it in a state of suspension. It was, however, now fully established that the process of filtration, or the passing of impure water through a porous bed, not only arrested those foreign substances which were held by it in suspension; but that in those cases in which the polluting organic substances in solution had an affinity for oxygen, they were acted upon by chemical decomposition, and new products formed of an innocuous character. And, yet more recently, it had become known that the agents through which this chemical decomposition and oxidation is effected were minute living organisms to which the name of nitrifying organisms had been applied. The impurities contained in sewage consisted of matter both in a state of suspension and in solution. Thus, for a filter to possess permanently the power to purify sewage, it was necessary that the insoluble matters in suspension should have been removed previous to its being passed through the filters. This led to the conclusion that liquid sewage should be deprived by precipitation of the insoluble matters held in suspension previous to its being passed through a filter. The liquid to be filtered being passed on to the filter was caused by its weight to pass through the filter; if downwards, the rapidity of flow was proportional to the square root of the height of the column of the liquid, and if upwards it was proportional to the square root of the difference in the heights of the two columns; and consequently by varying the height of this column, or the difference between the two columns, the time occupied by the liquid in passing through the filter could be regulated. As the liquid permeated the filter it was brought into close contact with the air which had been absorbed in the pores of the filtering medium, and through the intervention of the nitrifying organisms the organic matter was decomposed and carried out in the filtrate. This process was continued until the air imprisoned in the pores of the filter was exhausted. The process of filtration must then be suspended for a sufficient length of time to enable fresh air to be absorbed into the filter, and when this had been effected the operation was repeated. Mr. Dibdin, the chemist to the London County Council, gave preference to a different mode of procedure. He preferred to fill the filter with the liquid to be filtered until it just appeared upon the surface of the filter, the channels for the escape of the filtrate having been closed. He allowed the filter to remain in this state for an hour, and then ran off the filtrate, leaving the filter empty for about another hour. One inconvenience attending the use of either of these systems of filtration was the length of time occupied in the draining off of the filtrate and in the aeration of the filter. A method had been suggested by Mr. Lowcock of continuously supplying the filter bed with air under pressure, and this system had been tried in America by Mr. Waring. If this system were successful and the time occupied by the liquid in passing through the filter was sufficient to allow of the perfect nitrification of the organic matter contained in the same, the process of filtration might be carried on continuously. But there were many points upon which further information was required.

Other papers read in this section were by Mr. H. A. Roehling on "The Present Status of Sewage Irrigation in Europe and America," in which the system of utilising town sewage on land was advocated; another on "India's Sanitary Needs," by Mr. J. W. Parry, late executive engineer Indian State Railways, in which the necessity for reforms in villages was emphasised; and one on "River Pollution," by Professor Henry Robinson, of London. The main sources of pollution, broadly speaking, arose from sewage outfall works, where the system adopted was incapable of producing continuously good results; from manufacturing refuse being passed into streams as the natural vehicle for getting rid of waste products; and also from trade refuse and accumulations of filthy matter being allowed to collect close to the banks and to be washed into the streams. All these, he held, admitted of a remedy, which should be applied.

CLIMATE AND HEALTH.

On Tuesday, the closing day, the Meteorological and Geological Section was opened by Mr. W. H. Dines, who gave an address on climate and its effect upon the average length of life. Climate had, he said, an important bearing on health, temperature being by far the most potent climatic factor. The colder climates were the

healthiest. There were other important elements of climate beside temperature, and from a health point of view humidity was perhaps the chief. The place which had the highest rainfall did not of necessity have the highest relative humidity. From the Registrar General's returns, he came to the conclusion that a temperature below 60° was the most suitable to human life. No one could deal with the Registrar-General's returns without noticing the steady decrease in the death-rate that had been brought about by improved sanitation, and, speaking of ventilation, he said that the absence of ventilation in public buildings, such as churches, chapels, and theatres, was disgraceful to a civilised people. It was no exaggeration to say that there was not one church in 100 lighted with gas the air in which would bear analysis with a satisfactory result half an hour after the beginning of evening service.

A DEFENCE OF TWO-GALLON FLUSHES.

An important paper on "Flushes and the Diameters and Inclines of Drains," illustrated by models and diagrams, was read by Mr. Arthur B. Plummer, F.R.I.B.A., of Newcastle. The author explained that, in March last, he was asked, as hon. secretary of the Northern Architectural Association, to get up a memorial among local architects to the Newcastle and Gateshead Water Company, requesting that four gallons should be allowed for flushes in lieu of the two gallons proposed by the company. Previous to taking any further steps, the author called upon Mr. Smith, the secretary, who drew his attention to the excellent fittings and cisterns recommended and used by the company. With the use of such fittings it was reasonably maintained that a two-gallon cistern was all that was necessary for flushing purposes within a residence, and it was mentioned that water companies were not required to provide water for flushing drains outside a dwelling but simply for domestic purposes. The representatives of the water company next invited Mr. Leeson, architect, of Newcastle, and himself to a further interview at the Manor's Yard, and thereupon arranged to fit up various cisterns and w.c. fittings, and lengths of drains for their further private inspection. With the officials they made a number of experiments and tests in connection with the various apparatus fitted up. There were two lengths of drain laid (each about 83ft. long). One length was formed of 6in. drain-pipes, with a fall of one in 40, and having a Buchan trap at 19ft. from where the drain gradient commenced, and with an obtuse bend at 12ft. from the discharged mouth of the drain. The second length was formed of 4in. glass-lined pipes, with a fall of one in 60, and having a Buchan trap at 6ft. from the start of the drain gradient, with a right-angle bend at about 12ft. from the discharge mouth of the drain. Various w.c. apparatus were fitted up in connection with these two lengths of drain, and were placed at heights representing the ground and first-floor levels of a dwelling-house. They first tested the 6in. drain with a ground-floor Shanks' two-gallon flush siphon cistern with a 1½in. flush-pipe. The distance from the water-line in the cistern to the top of the wash-down basin was 3ft. 8in., and from the top of the basin to the bottom of the pipe where the drain gradient commenced was 3ft. 8in. A mixture of soft-soap and sawdust weighing 10½oz., and without paper, was placed in the basin. The first flush cleared the basin; but it was not till the sixth flush that half the charge came out at the mouth of the drain, and at the eighth flush the remainder came out. They carried out eight other similar courses of tests with various flushes, and found that, although the 4in. drain was not of so steep a gradient as the 6in. pipe, and although it also had a much more acute bend in it, the result of these experiments was decidedly in favour of the smaller drain-pipe. It was felt, however, that the only way to obtain exact results was to make a very large number of similar experiments in connection with each drain and apparatus, and to strike an average of the results in each case. The water companies' representatives proposed that the Northern Architectural Association should send a representative to work in conjunction with their company's agent in connection with these proposed further tests, and, in accordance with this suggestion, such arrangements as desired were subsequently agreed upon. It might be taken for granted that no water company would desire to supply less water for flushing purposes than such an amount as might be the minimum quantity necessary, as in such a

case two or more flushes would be found to be necessary, and would undoubtedly be used by consumers instead of one of adequate amount. Now that pedestal closets were being universally introduced, and used at all times and for all sorts of household purposes, the much greater amount of water wasted and used than was formerly the case became a matter of serious consideration for any water company. Mr. Plummer continued: I am clearly of opinion that all siphon cisterns are a mistake, so far as water companies are concerned, and they are not necessary from other points of view. Of course, in the case of siphon cisterns, the full amount of the flush, say two gallons, is obliged to be used upon every occasion, whereas with other cisterns only half a gallon can be used if desired, and in many instances may be all that is necessary; on other occasions it is, however, quite indispensable that the handle should be pulled till the full two-gallon flush is obtained. Various architects have for long been convinced that many local authorities often compelled drains to be laid of unnecessarily large diameters in connection with private properties, and have felt that if only such authorities could be convinced that such is the case, it would be a decided advantage. If the water companies' experiments help to prove that drains of as small a diameter as necessary are more easily flushed and kept clean with a minimum flush than drains of an unnecessarily large diameter (which more easily choke up and become foul), we may reasonably expect that some good will be the result of these experiments. The by-laws of the various local authorities in the North of England practically leave the question of the diameter to the discretion of such authorities. It would seem desirable that the maximum as well as the minimum size of drains should be stipulated and considered, and that a regular scale of sizes of drains should be drawn up and included in the by-laws (as in the case of the various thicknesses of walls); if such scale were not binding in every case, it would, at any rate, be able to be referred to as guide by any council or architects as to how they should use their discretion. The London County Council made an application to the Local Government Board last year, desiring that the flush might be increased from two to three gallons. The result of this inquiry was that the two-gallon flush was adhered to. I am of opinion that two gallons is sufficient for satisfactory sanitary apparatus, but not enough for flushing large drain pipes laid to a gradient of from 1 in 40 to 1 in 80. On August 11 a new series of tests were commenced, when four 82ft. lengths of drain were laid to a gradient of 1 in 40, and alongside each other—viz., 6in. and 4in. sanitary pipe drains, and 4in. and 3in. glass-lined metal pipes. Each length had an almost right-angled bend at 12ft. from the mouth, at a further distance of 4ft. there were Buchan's traps in the 6in. and 4in. pipes, and a Dubois trap in the 3in. pipe; at a further distance of 8ft. there were four junctions in connection with yard conveniences; 58ft. beyond the drains were connected with four soil-pipes, each having connection with ground and first-floor w.c.'s. All the cisterns were two-gallon, with 1½in. flush-pipes and hopper basins. We started to experiment with the 6in. drain by charging the top-floor w.c. with a 6oz. solid mixture of soft soap and sawdust, &c., as before, and flushing with two gallons. The same thing was next done in connection with the ground-floor closet, and then with the yard w.c. We commenced again and continued in rotation as before till each of the three closets had been flushed and charged twenty times. After the fourteenth round the drain was entirely blocked. Of 22½lb. put in only 7lb. passed out. Considerable force was necessary with a hose-pipe next morning to clear this drain out again. Similar experiments in connection with the 4in. sanitary pipe resulted in the charge passing much more freely through it till a stoppage took place at the end of the sixth round, and again a very considerable flush was necessary to clear the drain. In the case of the 4in. metal pipes the results were satisfactory, and the 3in. metals were even more so; each charge practically came direct through the drain with each flush, and it therefore became unnecessary to again test this drain under less severe circumstances. It must be remembered that in allowing a two-gallon flush, the Newcastle Company are only doing what almost all other companies in the kingdom do with the exception of South-end, where a 2½-gallon flush is conceded, and of Bradford, where there is (or was) a three-gallon flush. It would, perhaps, be possible

satisfactorily to meet the requirements of water companies and the present demands of local authorities by having drains of a V or egg-shaped section. (Mr. Plummer showed a section of drain, in which the lower portion was three-parts of a small circle, and the upper part a segment of a circle twice as large. This would maintain the advantages of the circular exterior, and also obtain the small and large circular interior, for flushing and flood purposes, and avoiding the objection of being top-heavy and difficult to manufacture, as was the case with the otherwise excellent egg-shaped pipes. Another satisfactory course would be to convey waste-water from baths, &c., to a flushing tank at the head of the drain, or where bath wastes can be conveyed direct there, no better flush could be desired under almost any circumstances.) We conducted a further series of tests at the water company's yard, allowing consideration for other water flowing in the drains between the use of the w.c.'s. The closets were therefore charged in the same way as before, and in the same rotation, but after each flush with the charge in it, each cistern was discharged a second time into the drain simply as water without any charge. In no case was this second flush of the nature of a four-gallon flush at one time, because the first flush was allowed to be cleared through the drain and the cistern to fill again before the second was discharged into it. In the case of the 6in. drain, the second flush had the effect of preventing the stoppage, as was the case in the former tests, and the 4in. and 3in. pipes worked satisfactorily. A third series of tests, similar to the first, was conducted with a 2½ instead of a two-gallon flush, with the result that the 6in. pipe now worked satisfactorily, and it therefore became unnecessary to test the 4in. and 3in. pipes in this way. I am of opinion that wash-down closets are the best from a sanitary point of view, and for flushing purposes.

Among the awards at the Health Exhibition held in conjunction with the Congress was that of a silver medal to the Expanded Metal Co., Ltd., 39, Upper Thames-street, E.C., for expanded metal.

FACTORY CONSTRUCTION AND FACTORY ACTS.—IX.

By GEORGE H. BIBBY, F.R.I.B.A.

BUILDING ENACTMENTS.

THE construction of factories and workshops in the Metropolis is not only subject to regulations under the provisions of Factory and Workshop Acts, but also to many restrictions under the London Building Act, 1894. For instance, section 74, sub-section 2, recites: "In every building exceeding ten squares in area used in part for purposes of trade or manufacture and in part as a dwelling-house, the part used for the purposes of trade or manufacture shall be separated from the part used as a dwelling-house by walls and floors constructed of fire-resisting materials, and all passages, staircases, and other means of approach to the part used as a dwelling-house shall be constructed throughout of fire-resisting materials, the part used for purposes of trade or manufacture shall (if extending to more than two hundred and fifty thousand cubic feet) be subject to the provisions of this Act relating to the cubical extent of buildings of the warehouse class"; but it is provided that there may be constructed in the walls of such staircases and passages such doors as are necessary for communicating between the different parts of the building, and there may be formed in any walls of such building openings fitted with fire-resisting doors.

Section 75 of the London Building Act, 1894, recites: "Except as in this section provided, no building of the warehouse class (including factories) shall extend to more than two hundred and fifty thousand cubic feet, unless divided by party-walls in such a manner that no division thereof extend to more than two hundred and fifty thousand cubic feet." The restriction contained in this section upon the cubical extent of a building is, however, not intended to apply to any factory or workshop which, being at a greater distance than two miles from St. Paul's Cathedral, is used wholly for the manufacture of the machinery and boilers for steam vessels, or for a retort-house, or the manufacture of gas, or for generating electricity, provided that such building consist of one floor only, and be constructed of brick, stone, iron, or other incombustible material throughout, and shall not be used for any purpose other than such as here specified.

There is, however, contained in section 76 of the London Building Act, 1894, a special provision, which enables factory owners (who may require for the purposes of their trade a greater cubical extent than before mentioned) to seek permission to enlarge their buildings; but it must be shown that proper arrangements have been, or will be, made and maintained for lessening, so far as reasonably practicable, danger from fire, and with the further provision that such buildings shall not extend to a number of cubic feet exceeding 450,000 (or any less number allowed) without being divided by party-walls in such manner that the cubical extent of each division does not exceed that number. But no such enlarged factories must exceed 60ft. in height, neither may they be used for the purpose of any trade or manufacture involving the use of explosives or inflammable materials.

With regard to residences attached to or near factories for timekeepers, caretakers, managers, and others, it may be pointed out that section 200, sub-section 7, of the London Building Act, 1894, recites: "Every person who erects a building nearer than 50ft. to a building used for any dangerous business, or a dwelling-house nearer than 50ft. to a building used for any noxious business, shall be liable to a penalty not exceeding £50, and to a daily penalty not exceeding the like amount for every day during which such first-mentioned building or such dwelling-house shall

The fact that it is often practicable to provide an additional means of escape from upper floors by way of the roof may be taken into account. Where the roofs of the adjoining premises are level with those of any factory or workshop, it may be found convenient to provide a staircase or step-ladder leading on to the roofs, care being observed that the dormer or other doors leading to the roofs are not kept locked, and thus liable to be useless as a means of escape when required. Further than this, such provisions for escape would be practically useless unless there be a ready means of passing from one roof to another, or if the height of the roof be beyond the reach of ordinary fire-escape ladders.

In Fig. 19 is an illustration of a mode of providing assistance for persons passing over roofs and party-walls, and shows other means of preventing accidents to workpeople during fire or panic. Under all circumstances it is highly desirable that the staircase, &c., leading to such roofs should be of, and be inclosed by partitions of, fire-resisting materials.

The provisions of the London Building Act, 1894, which affect the means of escape over roofs (directly or indirectly) are contained in section 61 of that Act, which recites:—

"The flat gutter and roof of every building and every turret, dormer, lantern-light, skylight, or other erection placed on the flat or roof thereof shall be externally covered with slates, tiles, metal, or other incombustible materials, except wooden cornices and barge-boards to dormers not exceeding twelve inches in depth, and the doors, door-frames, windows, and window-frames of such dormers, turrets, lantern-lights, skylights, or other erection.

"Every building exceeding thirty feet in height used solely or in part as a dwelling-house or factory, and having a parapet, shall be provided either—

"(a) With a dormer window or a door opening on to the roof; or

"(b) With a trap-door furnished with a fixed or hinged step-ladder leading to the roof; or

"(c) With other proper means of access to the roof.

"The plane of the surface of the roof of a building of the warehouse class shall not incline from the external or party-walls upwards at a greater angle than forty-seven degrees with the horizon."

With regard to factory and furnace chimney shafts, the London Building Act, 1894, makes several important provisions, and unless special permission be obtained for exemption, every chimney shaft for the furnace of a steam-engine, brewery, distillery, or manufactory must be constructed in conformity with the following rules:

"(1) Every shaft shall be carried up throughout in brickwork and mortar of the best quality, and, if detached, shall taper gradually from the base to the top of the shaft at the rate of at least two inches and a half in ten feet of height.

"(2) The thickness of brickwork at the top of the shaft and for twenty feet below the top shall be at least eight and a half inches, and shall be increased at least one half brick for every additional twenty feet measured downward.

"(3) Every cap, cornice, pedestal, plinth, string-course, or other variation from plain brickwork shall be provided as additional to the thickness of brickwork required under this Act, and every cap shall be constructed and secured to the satisfaction of the district surveyor.

"(4) The foundation of the shaft shall always be made to the satisfaction of the district surveyor, on concrete or other sufficient foundation.

"(5) The footings shall spread all round the base by regular offsets to a projection equal to the thickness of the inclosing brickwork at the base of the shaft, and the space inclosed by the footings shall be filled in solid as the work progresses.

"(6) The width of the base of the shaft, if square, shall be at least one-tenth of the proposed height of the shaft, or if the same is round or of any other shape than square, one-twelfth of the height.

"(7) Any firebricks built inside the lower portion of the shaft shall be provided as additional to and independent of the thickness of brickwork prescribed by these rules, and shall not be bonded therewith."

The great height to which it is frequently necessary that the smoke-shaft of factories should be carried renders it most imperative that the construction of these should be carried out

with many precautions to insure the stability of the work. In the erection of some of the larger shafts, I believe it is considered advisable that the bricklayers, if more than one, should constantly and regularly exchange positions, so that any irregularity on the part of a workman with reference to the work of his companions shall not be found on one side only of the shaft, but be distributed on all sides.

The St. Rollox chimney and the Townsend chimney, both in Glasgow, are of great height, the former being 445ft. and the latter 468ft. in height, and there are several chimneys from 300ft. to 400ft., or thereabouts, in this country. When such erections as these are found to be settling on one side, or exhibiting cracks and other defects, it has frequently been found advisable to straighten them by cutting out wedge-shaped portions of the brickwork at one or more heights from the ground, and from the opposite side of the shaft to that in the direction of which it may be found to lean. An expert has informed me that the proper time for performing this delicate operation is at the time when the wind prevails towards the direction in which the shaft leans: by this precaution the wedges, which are inserted as the brickwork is removed, may more easily be brought forward; with each gust of wind the wedges are momentarily released from the weight of one half of the chimney, and at that instant must be brought slightly forward. If the wedges were brought out suddenly and completely from

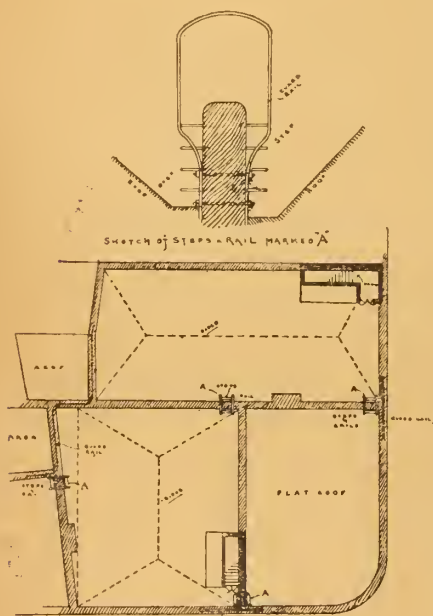


FIG. 19.

be allowed to so remain near to such dangerous or noxious business"; but it is provided that where a building erected before the 9th day of August, 1844, and within 50ft. from any building used as a dangerous business is pulled down, burnt, or destroyed by tempest, it may be rebuilt.

Section 180, sub-section 3, prohibits the establishment or carrying-on of a dangerous business in any building or vault, or in the open air, at a less distance than 40ft. from any public way, or than 50ft. from any other building or any vacant ground belonging to any other person than the landlord.

In section 63 of the London Building Act is contained another provision likely to affect large factories:—"Every new building exceeding 60ft. in height shall be provided on the stories, the upper surface of the floor whereof is above 60ft. from the street level with such means of escape in the case of fire for the persons dwelling or employed therein as can be reasonably required under the circumstances of the case," and no such stories of such building may be occupied until a certificate has been issued by the authority having control that the provisions of this section have been complied with.

This section resembles closely the provisions of section 7 of the Factory and Workshop Act, 1891, but deals only with those upper floors that are more than 60ft. above the street level, whereas the Factory and Workshop Act, 1891, includes all upper floors.

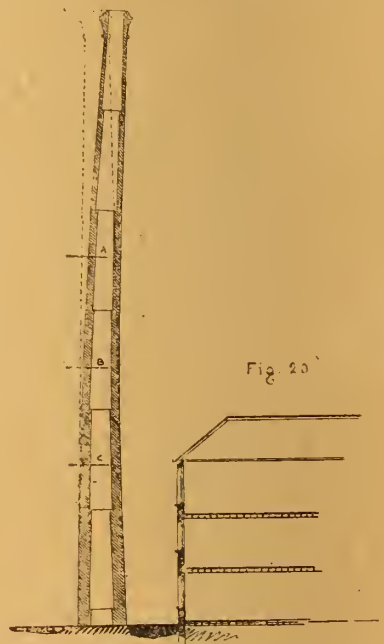


Fig. 20

the chimney, there would be a possibility of a fall of the chimney in the opposite direction, or of serious damage to the whole of the fabric. During such operations the shaft would appear to be supported upon about one half of the diameter of the lower portion, and partly by the pressure of the wind from the opposite side. The safety of one of these shafts frequently involves serious considerations beyond the cost of the chimney, which alone may have cost £5,000 or £6,000, or possibly much more. When the demolition of a lofty chimney-shaft is necessary, a common mode of bringing it to the ground is to remove the lower brickwork on more than one-half of its sides, wooden props being substituted in such a manner as, when removed, the chimney shall fall in the required direction; the safest mode of removing the support afforded by the props being to set them on fire, thus giving the workpeople a fair chance of escaping to a safe distance.

In Fig. 20 the wedges would be cut out at A B C, with the view of bringing the shaft into an erect position, and obviating the danger of its fall upon the factory; but it cannot be said that after such operations the structural condition of the chimney would be perfect. The difficulty of carrying out such works would, however, be far greater and more complicated if the chimney-shaft were built with hollow walls, as there would be obvious difficulties in making good the joints to the internal portion.

(To be continued.)

ADAPTABLE SPECIFICATIONS.—VIII.*

CARPENTRY AND JOINERY: FACTS AND MEMORANDA.
(Continued.)

STRENGTH OF TIMBER AGAINST COMPRESSION (continued).—If the table last given is employed, the safe permanent load on the timber will not be more than one-fourth of the crushing weight therein stated. These figures, which have come into common use, seem to have been originally derived from experiments on very small and well-selected specimens of the various woods. They show a much greater strength, therefore, than pieces of larger scantling possess, such as are commonly required in actual building. Colonel Seddon, in his treatise on "Builder's Work," gives the result of experiments on larger-sized specimens of wood. Some of these are as follows. They are the weights which a square inch of the different woods will bear before crushing:—

White deal	4,340 to	5,040lb.
Dantsic yellow deal	2,770 to	7,700lb.
Memel and Riga ditto	2,360 to	6,440lb.
Pitch-pine	6,090 to	6,790lb.
Yellow pine	1,570 to	4,800lb.
English ash	6,720 to	7,280lb.
Spanish mahogany	5,400 to	7,800lb.
Honduras ditto	6,300 to	8,820lb.
English oak	3,040 to	8,050lb.
Dantsic oak	6,850 to	7,410lb.
Teak	4,480 to	10,820lb.

The great diversity in these results seems to have depended largely on the size, and especially on the length of the specimens tested. Cubes of 2in., 3in., and 4in. usually gave the highest figures, and logs of timber, 20ft. long or more, the lowest. It appears that one-third of the average breaking weights of each kind of wood given in the table from which these last figures are extracted, would be a safe permanent load.

Tensile Strength of Timber.—The same authority gives the following as the weights per square inch required to tear apart in the direction of the grain, the following descriptions of wood:—

American white or spruce deal ..	3,270 to	4,760lb.
Dantsic yellow fir	2,240 to	4,480lb.
Riga ditto	3,080 to	4,480lb.
Pitch pine	4,200 to	5,180lb.
Yellow pine	1,800 to	2,800lb.
English ash	3,780 —	—
Chestnut	10,000 to	13,300lb.
Spanish mahogany	2,360 to	4,950lb.
Honduras ditto	2,480 to	3,570lb.
English oak	5,880 to	8,890lb.
Dantsic ditto	3,360 to	5,460lb.
Teak	2,590 to	4,060lb.

Strength of Timber Against Cross-Strain.—The following, worked out according to a table prepared by Captain Sankey, R.E., are the loads which, if applied in the centre of the length, will break beams of yellow deal of the given dimensions. The timbers are in all cases supposed to be set on edge, and the quality to be good. They are supported at both ends:—

4in. x 3in.	6ft. long	11½ cwt.
Ditto	10ft. "	6¾ "
6in. x 4in.	8ft. "	45 "
Ditto	10ft. "	36 "
Ditto	12ft. "	29 "
Ditto	14ft. "	25 "
7in. x 2in.	8ft. "	30¾ "
Ditto	10ft. "	24¾ "
Ditto	12ft. "	20½ "
Ditto	14ft. "	17½ "
9in. x 2in.	10ft. "	40½ "
Ditto	12ft. "	33½ "
Ditto	14ft. "	28¾ "
Ditto	16ft. "	25½ "
9in. x 3in.	12ft. "	49½ "
Ditto	14ft. "	43¾ "
Ditto	16ft. "	37½ "
Ditto	18ft. "	33¾ "
11in. x 2in.	14ft. "	43¾ "
Ditto	16ft. "	37¾ "
Ditto	18ft. "	33 " "
11in. x 4in.	20ft. "	60½ "
Ditto	22ft. "	55 " "
Ditto	24ft. "	48 " "

SPECIFICATION, PART VI.: CARPENTRY AND JOINERY.

VI. 1. QUALITY OF MATERIALS.—All the woodwork, where not otherwise described, is to be of the very best yellow fir, according to the description which here follows:—All fir more than 3in. in thickness is to be Crown Memel timber of the very best quality imported, and all deals and thinner stuff not otherwise described are to be first quality Onega or Archangel deals. All

timber is to be free from sap, shakes, and loose knots, and where used for joiners' work is to have no knots of any kind larger than a shilling. The oak is to be the best Dantsic, thoroughly seasoned, and free from all defects.

VI. 2. QUALITY OF MATERIALS (alternative).—The woodwork, where not otherwise described, is to be of sound and thoroughly well-seasoned yellow fir timber, free from sap, shakes, and large or loose knots. All fir more than 4in. in thickness is to be what is described by shippers as "best middling" Memel or Riga, and no Swedish timber is to be used. The deals are to be what shippers term "best mixed" Gefle or Soderham deals or else first quality Onega or Archangel deals. The oak is to be best Dantsic, thoroughly seasoned, and free from all defects.

VI. 3. PITCH-PINE.—The pitch-pine is to be thoroughly well seasoned, free from sap, shakes, large and loose knots, and from turpentine spots. For carpentry, it is to be selected clean and straight-grained. For joiners' work, the panels are to have a well-figured and wavy, but not coarse, grain, and there are to be no knots visible on the faces of the pitch-pine joinery. All pitch-pine work is to be begun as early as practicable, and stored in a dry, airy situation, so as to shrink before, and not after, it is finally put together.

VI. 4. MAHOGANY.—The mahogany is to be best [Honduras] [Tabasco] [Hayti] [Spanish], thoroughly well seasoned, free from all defects, and well figured [being equal to the sample marked "mahogany for," in the architect's office]. All mahogany in sight is to [be French polished] [to have an eggshell polish, similar to that on the above named sample].

VI. 5. WHITE DEAL.—The floors of the [kitchen and attics] are to be inch white batten floors of best quality, well seasoned, and free from dead knots and other defects, laid folding.

VI. 6. SHRINKAGE OF WOODWORK.—Any woodwork in floors and skirtings which shrinks so as to leave a space of more than ¼in. between two floor-boards, or a visible space, though less than ½in., between skirtings and floors, must be made good by the contractor at his own expense, as must also any other work, whether carpentry, joinery, plaster, glass, painting, or decoration which is injured in the making good of the shrunken woodwork. All doors or casements which shrink, or are so imperfectly fitted as to leave more than ½in. between them and the rebate of the frame or lining, whether at the front, back, or top, will have to be refitted by the contractor with new or altered linings as the architect may direct, and all sashes which may shrink or be ill-fitted so as to be liable to rattle, are to be altered, or to have their frames and beads altered to the architect's satisfaction.

VI. 7. CANADIAN OR QUEBEC OAK is on no account to be used in any part of the work.

VI. 8. ENGLISH OR FRENCH OAK, if thoroughly well seasoned and free from defects to the architect's satisfaction, may be substituted for the Dantsic oak herein specified.

VI. 9. EXECUTION OF THE WORK.—All the work is to be executed in the most careful, efficient, and workmanlike way, with all necessary joints, notchings, halvings, scarfings, mortises and tenons, and other labour. All wall-plates are to be properly lapped and pinned where the lengths join, and to be dovetailed and pinned at the angles. Purlins are only to be jointed over a truss, and not more than one-third on the same side of any one truss. No joists, ceiling joists, quarterings, or common rafters are to be more than a foot apart.

VI. 10. ALL WOODWORK IN SIGHT is to be wrought, unless expressly directed to be otherwise. All roof timbers and roof boarding which will be exposed to view [except in lofts and sheds] are to be cleaned off in the most efficient manner immediately before the internal scaffold is taken down, being entirely planed over if visibly dirty.

VI. 11. PROTECTING OPEN-TIMBERED ROOFS.—Properly protect all the timbers and woodwork of these roofs, until their completion, from sun, wind, and rain, covering them up with rough slabs or with cloths and tarpaulin as may be most effectual, so as to prevent the wood from being opened by sun-cracks or disfigured by soot washed in by the rain.

VI. 12. LINTELS, ETC.—Put lintels to all square-headed openings not shown to be otherwise treated [which are not covered through the whole thickness of the wall by stone heads or brick camber arches] [in plastered walls]. These lintels are to be of the full thickness of that part of the wall which is not carried by a stone head

or a brick camber arch or iron girder. Each lintel is to be 4in. longer at each end than the width of the opening, and is to be 1½in. deep for every foot or part of a foot in the clear span of the opening.

VI. 13. WOOD BRICKS.—Provide and build in all the wood bricks required to properly fix the joiners' work.

VI. 14. FIXING BLOCKS (alternative to VI. 13).—Provide and build in a sufficient number of Wright's fixing blocks, No. 1 size, to properly fix the joiner's work.

VI. 15. SCANTLINGS OF TIMBER.—All timbers figured on the drawings are to be of the sizes there marked. Where timbers are not thus figured, their sizes are to be as follows:—Wall-plates and pole-plates to be 4½in. by 3in., set flat; purlins to be 6in. by 4in., set on edge; sleepers to be 5½in. by 3in., set on edge; common rafters and ceiling joists to be 4½in. by 2in., set on edge; ridges to be 5½in. by 2in.; trimmers and trimming joists to be an inch thicker than the other joists in the same part of the work.

VI. 16. LAMINATED RIBS.—The curved laminated ribs [in the roof] are each to be formed of [4] inch and a half thickness, strongly screwed together, breaking joint, and cut to curve on the bottom and top edges. All the outer boards in these ribs are to be cut out of the same quality of [Memel] timber as that used for the roof, so as to match the roof timbers in appearance. The soffit of these ribs is to have a bent covering piece cut out of the same timber, and [6in. by ¾in.] The screws on the outer face of the ribs to be counter-sunk and neatly plugged.

VI. 17. BOARDING AND FELT FOR ROOFS.—The whole of the roofs except are to have inch grooved and tongued boarding in batten widths, laid on the common rafters to receive the [slates] [tiles]. This boarding is everywhere to be covered with [Engert and Rolfe's] best in-odoriferous roofing felt, properly lapped and turned up so as to keep out water in case of temporary injury to slates or tiles.

VI. 18. TILE LATHS. Provide and fix [to the rafters] [on the roof-boarding] stout tile laths to receive the tiling.

VI. 19. BATTENING FOR SLATING.—Provide and fix on the common rafters where there is no boarding for the slating, at the proper distances required to carry out the slater's specification, good fir battens, 2½in. by 1in.

VI. 20. EAVES, VALLEY, AND GUTTER BOARDING.—Provide and fix to all eaves and valleys sound inch rough boarding, and to all lead or zinc gutters inch gutter boarding and bearers with all necessary labour. Provide and fix similar boarding, grooved and tongued, to all lead and zinc flats; form drips, and do all firing up, oblique cutting, and other work that may be necessary.

VI. 21. FASCIAS TO GUTTERS.—Provide and fix to the eaves of the 5½in. by 1in. wrot. fascias to fix the iron gutters.

VI. 22. BEADED AND QUIRKED FASCIAS TO GUTTERS.—Provide and securely fix to the projecting rafter-ends of the roofs 5½in. by 1½in. boldly beaded, quirked and chamfered fascias to carry the cast-iron gutters.

VI. 23. OAK SPROCKETS AND TILTING FILLETS.—Strongly spike to the sides of the common rafters in the roof wrought oak sprockets 4in. by 4in. and [2ft. 6in.] long, shaped at the ends as shown. Put along the top of these sprockets, to carry the iron gutter, a wedge-shaped oak tilting fillet, 4in. wide, 1½in. thick at the lower end, and ¾in. thick at the upper end. The thick end of the tilting fillet is to be vertically over the extreme projection of the sprockets, and the whole has to be so set out that the extreme projection of the sprockets from the outer face of the wall is [2in.]. The [slates] [tiles] which project beyond the outer face of the wall are to rest on lin. deal grooved and tongued boarding in 5in. widths, wrought on the soffit.

VI. 24. CEILING BOARDING.—The boarded ceilings of the are to be of ¾in. grooved and tongued pitch-pine in 4½in. widths fitted with a close square joint [matched and V-jointed].

VI. 25. STUD PARTITIONS.—Where not otherwise figured or described, these are to be 4in. thick, besides the plaster. They are to have 5in. by 4in. heads and sills, 5in. by 4in. braces, and 4in. by 2in. studs or uprights, except at the ends of the partition and next the door openings, where the uprights are to be 4in. by 4in.

VI. 26. FLOORS ON FILLETS.—The following floors—namely, those of—are to be best yellow batten straight-joint floors, laid on

1½ in. by 1½ in. fillets, resting on the concrete already specified to cover the internal area of the building.

VI. 27. WOOD BLOCK FLOORS.—The following floors—namely, those of—are to be [1½ in. pitch-pine] [1½ in. yellow deal] [1½ in. best wainscot] wood-block floors laid [herring-bone fashion] in sizes of 12 in. by 3 in., with two plain margins, each 3 in. wide, all round the walls, projections, and hearths, laid in the best manner according to’s system, on a floated cement surface upon [the concrete already specified to cover the internal area of the building] [a level bed of cement concrete, composed as directed in the bricklaying specification, and 6 in. thick].

VI. 28. INCH STRAIGHT-JOINT FLOORS.—The following are to be best inch yellow batten straight-joint floors—namely

VI. 29. INCH-AND-A-QUARTER PLOUGHED AND TONGUED FLOORS.—The following are to be best 1½ in. double-ploughed and tongued floors, in 5½ in. widths, with mitred margins to hearths—namely

VI. 30. PITCH-PINE FLOORS.—The following are to be picked pitch-pine floors, entirely free from knots, turpentine spots, and all other defects, laid in 4½ in. widths and grooved and tongued, and with mitred margins round the hearths—namely, those of

VI. 31. PARQUETRY BORDERS.—These borders are to be put wherever shown on the drawings, and are to be [veneered oak, ½ in. thick, with two black lines] [made according to the detail drawings] [of the prime cost value of two shillings per foot super.].

VI. 32. FLOORS not otherwise specified, if of wood, are to be inch yellow batten floors laid folding.

VI. 33. HERRINGBONE STRUTTING.—All floors having joists more than 4½ in. deep, and more than 8 ft. long, are to have one tier of herringbone strutting across the joists if they are not more than 10 ft. long, and two tiers if they are of any greater length: the tiers to be spaced out at equal intervals in the length of the joists.

VI. 34. PUGGING.—The following floors—namely—are to have ¾ in. rough boarding fixed between the joists, by nailing 1 in. by ¾ in. fillets on each side of them, an inch above their bottom edges. On this rough boarding, pugging formed of chopped hay well mixed with mortar is to be laid, to a uniform thickness of 2 in.

VI. 35. WALL BOARDING.—Board all the walls of with ¾ in. matched and beaded rebated boarding in 5 in. widths or proper grounds.

VI. 36. CEILING BOARDING IN YELLOW PINE.—The boarding of the ceilings visible inside [the hall and porches] is to be of inch picked yellow pine free from all defects, grooved and tongued [and V-jointed] in 5 in. widths.

VI. 37. SKIRTS.—The following places are to have 6 in. by ¾ in. square skirtings, namely The following are to have 7 in. by 1 in. chamfered ogee and quirked skirtings—namely The following are to have 9 in. by 1½ in. double-beaded and quirked and hollow-chamfered skirtings—namely The following are to have All skirtings are to be on proper grounds. The skirting of the hall or passage adjoining each staircase is to be continued up the stairs as a wall-string, and this wall-string, measured at right angles to its rake, is to project [3½ in.] above the stairs at its narrowest parts—that is, where the nosings of the steps cut on to it.

VI. 38. DOOR-FRAMES.—The following doors are to have 4½ in. by 3 in. rebated and beaded door-frames—namely The following are to have 5½ in. by 3 in. rebated, boldly-beaded and quirked door-frames—namely The following are to have door-frames with a moulding 5 in. in girth, and to be 5½ in. by 3 in. rebated frames—namely All doors marked or specified as [pitch-pine] [oak] [mahogany] are to have the frames, linings, and mouldings belonging to them also of [pitch-pine] [oak] [mahogany].

VI. 39. DOOR AND WINDOW LININGS.—The following doors are to have 1½ in. double-rebated linings on proper grounds—namely The following are to have 1½ in. single-rebated and beaded linings on proper grounds—namely All other doors are to have 1½ in. single-rebated linings on proper grounds. The following windows are to have 1½ in. panelled and moulded window linings and heads—namely The following are to have 1½ in. plain linings, with a bead round the edge—namely

VI. 40. DADOES.—The dado of to be 1½ in. panelled and moulded, with moulded capping 2½ in. by 1½ in. The dadoe of to be made according to the detail drawing. All dadoes to be fixed on proper grounds, and so put together as to avoid visible shrinkage.

VI. 41. ARCHITRAVES AND MOULDINGS.—The following doors and windows are to have on each side [3½ in. by 1½ in.] deal architrave mouldings made to detail—namely, The following are to have on each side 2½ in. by 1½ in. deal architraves selected by the architect from those made by [Fawkes and Co.] The following are to have on each side 2 in. by 1½ in. deal architraves, selected. All architraves to be properly fixed to grounds. Provide and fix the following mouldings of [yellow deal] [pitch-pine]—namely [chair rails] to and

VI. 42. WINDOW-BOARDS.—Put to the following windows 1½ in. window-boards with moulded returned edges to detail—namely The other windows are to have inch window-boards with rounded returned nosings.

VI. 43. TRAP-DOORS.—Provide and insert in [the roofs] where [shown] [directed] No. inch trap-doors 2 ft. 3 in. square in 1½ in. rebated linings the depth of the [rafters] [joists], and properly trim the [rafters] [joists] for them.

VI. 44. PITCH-PINE DOORS.—All doors marked “pp” on drawings are to be of specially-selected pitch-pine, quite free from knots as well as from all defects, and with a well-figured but not too coarse grain.

VI. 45. LEDGED DOORS.—The following are to be 1½ in. ledged and braced doors—namely

VI. 46. DOORS MARKED “A” ON PLANS.—The doors marked “a” on plans, and any others not marked or specified, are to be 1½ in. 4-panel square doors, with 10 in. bottom rail and lock rail, and the rest of the framing 5½ in. wide.

VI. 47. DOORS MARKED “B” ON PLANS are to be 1½ in. six-panel square doors, with 10 in. bottom rail and lock rail, and the rest of the framing 5½ in. wide.

VI. 48. DOORS MARKED “C” ON PLANS are to be 2 in. doors in eight panels, to drawing; each panel chamfered all round one side, and with a V sunk in the framing all round the panel; the other side of the door square-framed, with 11 in. bottom rail, and all the other framing 6 in. wide.

VI. 49. DOORS MARKED “D” ON PLANS are to be 1½ in. six-panel, moulded both sides, with raised panels; the bottom rail and lock rail being 10 in. wide, and the rest of the framing 5½ in. wide.

VI. 49. FOLDING DOORS.—All doors shown to open in two leaves are, unless otherwise described, to be formed as folding doors, with a rebate and bead down the centre, and each half of the doors is to have the full number of panels above described as belonging to the letter it is distinguished by.

VI. 50. SWING DOORS.—Doors marked on plans as swinging through must have the frames made to suit, and not be rebated, although they may be so described elsewhere.

VI. 51. PLATE-GLASS IN DOORS.—The doors of are to have the [two upper] panels glazed with best patent plate in shifting fillets, fixed with brass screws.

VI. 52. LEAD GLAZING IN DOORS.—The following doors namely are each to have No. panels filled with lead glazing to detail, value [5s.] per panel—the lead glazing to be fixed by shifting fillets and small brass screws.

VI. 53. CUPBOARDS AND LOBBIES to be of 1½ in. framing moulded one side, with the portions so shown hung as doors. The panels are to average about [14 in. by 8 in.] in the clear. The tops are to be of inch grooved and tongued and beaded boarding in 4½ in. widths, resting on a 4 in. by 1 in. fascia all round the inside of the lobby, and being further strengthened by 4 in. by 2½ in. double chamfered bearers, where the top is more than 3 ft. wide. The bottom rail of cupboard and lobby framings is to be 9 in. wide, and the other stiles and rails 5 in. wide.

VI. 54. SASHES AND FRAMES.—The following windows, namely are to have 1½ in. deal chamfered sashes, with deal-cased frames, oak-sunk and weathered sills, iron weights, brass-cased pulleys, and best white lines. The following, namely are to be of the same description, except that they will have 2 in. ovolo sashes. The following, namely, are to be of the same description, except that they will have 2 in. Honduras mahogany sashes, and that all parts of the frames, beads, and fillets which are visible either inside or outside the

window are to be of Honduras mahogany also. All sashes to be double-hung, unless expressly directed to be otherwise.

VI. 55. CASEMENTS AND FRAMES.—The following windows, namely are to have 1½ in. chamfered casements in 4 in. by 3 in. doubly-chamfered frames with oak weathered and throated sills; the casements made to open when so marked on the drawings. They are to be hinged with a pair of best 3½ in. brass hinges to each casement. Provide and fix to each casement which opens a fastening to be selected, value 7s. 6d. p.c.

VI. 56. PIVOTED CASEMENTS.—The casements marked on the drawings as “pivoted” are to be each hung with steel pivots, in brass bushed sockets, so that the upper part of the casement opens inwards. Provide and fix to each of them gearing value 10s. p.c., for opening, shutting, and fastening them.

FIREPROOFING TESTS.

THE committee appointed by the Tariff Association of New York, the Architectural League of that city, and the American Society of Mechanical Engineers have submitted a report of work already done on the investigation of test methods of fireproofing structural metal in buildings, and for obtaining data for standard specifications. The committee added to its own board by the creation of an advisory board, which included many of the leading architects, superintendents of buildings, structural engineers, underwriters, and others. The *American Architect and Building News* gives particulars and illustrations of the testing plant. Referring to the column test, the report says: “The column is placed in compression by means of a hydraulic ram underneath, resting on three 24 in. I-beams. In order to keep the entire length of the column within the furnace, filler blocks of cast iron are placed between the ends of the column and these beams. The hydraulic ram is 12 in. in diameter, and the water-pressure can be carried to 2,500 lb. per square inch. The temperature is measured by means of a Uckling and Steinhart pyrometer.” The tests on steel and on cast-iron columns were made to a certain programme: (1) That a series of tests be made on steel and on cast-iron columns without any fire protection, these to be taken as a basis of comparison with those that were to follow. (2) That a series of tests be made with similar steel and cast-iron columns, protected with different materials, and in different manner. (3) That a series of tests be made on unprotected beams and girders. (4) That a series of tests be made on protected beams and girders. The results are shown in diagram. We may first mention the column test No. 1. When the temperature was raised rapidly, which was a fire test without water on a steel column (a Carnegie steel box-channel section 14 ft. 0½ in. high), “the temperature of the air was 80° Fahr. in the shade. The gas producer was fired the day before, with valve closed against furnace.” The “log of trial” given in tabular form records the following facts: That when the column began to show red, at 1,200° Fahr., it had a total load of hydraulic pressure of 48.06 tons, and just after this it began to yield, at 1,210°. The result is shown by a flashlight photograph. The following notes are given: The brick walls cracked, the greatest damage being done where one wall was bonded into the next; the cracks extended through the bricks. Along the horizontal joints the walls cracked most in the bond courses. All the walls were too hot to hold the hand to them. The strength by Gordon’s formula is as under: Breaking strength per square inch, 45,630 lb.—area of cross section, 15sq.in.; breaking load, 15 × 45,630 = 312 tons. Actual greatest load cold, 141.4 tons, with no change of form. A Carnegie steel Z-bar column, described in detail, was next tested, the furnace test being the same as last without water, but the temperature raised slowly. The log given shows a hydraulic pressure of 84.8 tons, and the column began to yield when the pyrometer showed 1,125°, and strength by Gordon’s formula is given as follows: Breaking strain per square inch, 42,820 lb.; area of section, 14.15sq.in.; breaking load, 14.15 × 42,820 = 605,900 lb., or 303 tons. A cast-iron round column with flanges faced on both ends, 13 ft. high, 8 in. diameter external, with same furnace, was tested, with the result that column became slightly bent at 1,137°, and with a pressure of 84.8 tons. According to

Gordon, the breaking strength is given at 902,000lb., and safe load $1\frac{1}{2} \times 902,000$, 90.2 tons. Other tests on cast-iron hollow round columns with flanges at both ends are given, one of them with water thrown upon it, in which the "column bending" is noted at a temperature of $1,275^{\circ}$ under the same load. The column is stated to have been badly bent, but uninjured; the brick walls and arch roof cracked when water fell on them. These logs do not appear to afford us any important deduction from the facts, and we are without full particulars of the columns. As regards the last test recorded, the jet of water was thrown through a $\frac{3}{4}$ in nozzle. The column was first heated to 675° , and then quenched with water without injury. The heat was then slowly raised to a temperature of $1,075^{\circ}$, and the column, which was dull red, was again quenched with water. The heat was then raised to $1,300^{\circ}$, and the column, which showed a bright red, was again quenched, when the column began to yield by bending before the last application of water, but was otherwise unaffected. The two previous cases of cast iron columns also failed by bending under the load.

NEW BUILDING REGULATIONS FOR LIVERPOOL.

THE town council of Liverpool discussed at their last meeting the proposed new code of building regulations for the city. The health committee recommended that an application for a provisional order be made to the Local Government Board to alter and amend certain provisions of the Liverpool local Acts so as to require the width of all new streets to be at least 36ft., in lieu of 33ft.; all back passages to be at least 9ft. wide, in lieu of the present requirements, and all back passages exceeding 300ft. in length to have a cross passage; also that all back streets or back passages of 9ft. wide, when constructed to the satisfaction of the council, be adopted by the corporation; and further—"That no building be erected to a height beyond a limiting angle of 45° from the opposite side of the street or open space on which the same abuts, without the consent of the corporation, and that the term 'building' in this resolution shall not include any warehouse to which the provisions of the Liverpool Fire Prevention Acts, 1843 and 1844, may apply." The council unanimously adopted the clauses in the recommendations dealing with the width of streets and with back passages. Alderman Cookson (chairman of the Health Committee), referring to the height of buildings, said if the council adopted the principle contained in that clause of the recommendation, there would be plenty of safeguards to protect all interests for old or new buildings. The committee would not draw a drastic line, but the clause would prevent inordinately lofty buildings being run up.

In reply to a question, Alderman Cookson said the required extra width of back passage would come off the yards.

Mr. W. W. Thomas, M.S.A., moved an amendment, that the clause referring to the height of buildings be struck out of the recommendation. He thought there were quite sufficient safeguards already, and there was no likelihood of higher buildings than those in existence in the city being erected. Mr. Cohen seconded the amendment. He failed to see that any benefit would accrue to anybody from the clause. Questions of light and air were settled in courts of law by judges who thoroughly understood such matters, and property owners did not wish to be left to the whims of councils, the *personnel* of which was liable to change each year. The clause was one of the most iniquitous proposals ever brought forward in the council. If passed, it would be placing the foot of the council on the neck of freeholders. Alderman Garnett said the corporation was the largest property owner in the city, and it should make sure that such a clause would not injure the value of its own property. The law was quite sufficient with regard to the rights of light and air. He suggested that the recommendation should be taken back by the committee for further consideration. Colonel Morrison thought some check should remain in the hands of the council to prevent the running up of very high buildings, but he agreed that the present clause required further consideration from the committee. Mr. G. H. Ball pointed out that the council had no by-law relating to any class of property except that which came under the "dwelling-house" interpretation. There ought to be some limitation to the building of property as regards

height. Alderman Cookson was willing to take the clause back for further consideration. The amendment was carried by a show of hands.

SANITARY PLUMBING REFORM AT THE ANTIPODES.

NOT very long ago, the inhabitants of Australasia were regarded, at all events, by that large section of the British public whose definition by Carlyle was scarcely flattering to their intelligence, as, if not absolutely akin to Othello's

Cannibals that each other eat,
The anthropophagi, and men whose heads
Do grow beneath their shoulders,

still, at least, like Touchstone's friend, the Shepherd, in a very "parlous state." Truly, in some phases of civilised life there was, and perhaps is even yet, considerable room for such opinions; but in many others they are utterly belied by facts, and big fields of legislation in which Australia and New Zealand have shown themselves as pioneers to the whole world. The kangaroo is thoroughly typical of Australia, and, possessed of exceedingly long legs, when he takes a leap he covers an amazingly large stretch of ground; and, in like fashion, the animal's human associates, when once they tear themselves from gold and silver-mining speculations and the perennial charms of horse-racing and cricket, and shake themselves clear of some characteristic apathy and *laissez-aller*, accomplish in a very short space of time reforms that almost take away the breath of those bred and reared in the conservative atmosphere of older and slower-going lands. One of such reforms is that which has been effected in the "Sunny South" in the domain of sanitary plumbing.

Scarcely a dozen years have passed since the sanitary condition of most Australasian towns and cities was a disgrace to civilised humanity. True, it may not have been worse than that of many a Continental town; but it was none the better for all that. To take only the parent metropolis of Australia, the drainage of Sydney was simply abominable. So much may be said without in any way reflecting on the able and zealous Southern statesmen who are dead and gone, for the problems to be faced in spreading civilisation over a country of cannibals and naked blacks, twenty-five times as large as the United Kingdom, and more than three-quarters the size of all Europe, were utterly stupendous, and the results achieved within the space of 109 years, and more especially since Constitutional Government was first granted to Australia but little over 40 years ago, will take no mean position in the history of the British Empire. Moreover, the sanitation of Sydney had for a long time been engaging the consideration of thoughtful and scientific men, and as far back as 1867 and 1875 Royal Commissions were appointed to report respectively on various proposals for the water supply and drainage of the metropolis. Sundry outbreaks of small-pox, typhoid, and other zymotic and filth diseases stimulated public attention to the whole subject, which, in consequence, assumed a more practical shape, and led to the hurrying on of the construction of the present waterworks (the first contract for which had been let in 1879), and of the existing sewerage system (the initial contract for which was taken in 1880).

It is not the present object to describe in detail these two grand and impressive undertakings, which have together cost considerably over five millions sterling. Still, it may be briefly mentioned that the water for Sydney (which is of remarkable purity) is brought from the Nepean, Cataract, and Cordeaux Rivers, through 63 miles of tunnels, open canals, wrought-iron aqueducts, and cast-iron conduits having a capacity of $17\frac{1}{2}$ millions of gallons daily; and that the sewage is carried—that of the northern slopes of the metropolis, direct into the Pacific Ocean at a spot some miles to the south of Sydney Harbour, and that of the southern slopes to a sewage farm on the shores of Botany Bay, with altogether about 200 miles of sewers, drains, and storm-water drains, of which nearly one-half are ventilated. In 1887 both sets of works were sufficiently advanced to render necessary the creation by the Parliament of the colony, for the purposes of administration, of the Metropolitan Board of Water Supply and Sewerage, which was accordingly not only brought into existence, but was armed with very large and formidable powers, being subject only to the general control of the Minister for Public Works.

It is from the commencement of that board's administration in 1888 that the present subject matter may be said to date.

The Water and Sewage Board had not been long at work before it had necessarily to deal with the detailed reticulation of the sewerage and the connection of the house-drains with the general system. This, of course, led to a house-to-house inspection, not only of the drains themselves, but of the general sanitary arrangements, and plumbing, and their actual condition; and when, like Sir Thomas, in the words of good old Goldsby, the inspectors "went poking their nose into this and to that," the state of things revealed, especially in the older houses—in many cases, first-class hotels, and what were supposed to be unexceptional private residences—was positively appalling. During 1890 evidence as to the condition of affairs was accumulated under the energetic direction of the board's able and indefatigable sanitary engineer, and the Sydney newspapers were asked to take the matter up. Not a single daily journal, however, dared raise the panic which it was feared would ensue upon the facts being made public. In January and February, 1891, however, the leading organ of the Australasian professional press published a short series of articles entitled "Sydney on a Volcano," in which the dangerous and disgusting insanitary condition of many tenements was completely exposed. So horrible, indeed, were some of the revelations (which were emphasised by illustrations), especially as to the office, condition, and actual action of soil-pipes, that they were only warranted by the stern sense of public duty which prompted the publication of the matter, in which the position was definitely laid down, that the citizens "should never rest content until it could be said of Sydney hygiene that it stands before the world *sans peur et sans reproche*." Through the action of the Master Plumbers' Association of New South Wales, the articles were republished in leaflet form and distributed broadcast through Sydney by thousands; and from that time has gradually come about a standard of sanitary plumbing in the city and elsewhere as highly laudable as the previous state of things was beneath damnation. In virtue of their powers, the Water and Sewerage Board enacted a set of the most stringent by-laws with reference to all domestic plumbing, decreed that only licensed plumbers should be allowed to operate on any fitting connected in any way with the board's water and sewerage schemes, and themselves assumed the issue of the plumbers' licenses. Then the question arose, On what conditions should these licenses be granted? It became clear that not only must efficiency in sanitary plumbing be secured by examination, but that some machinery must be devised by which the plumbers could be educated to pass such an examination. So, by the co-operation of the Public Instruction Department, which for years past has had the control of technical education in New South Wales, a department of Sanitary Engineering was established at the Sydney Technical College and its branches, in which a thorough three years' teaching of theoretic and scientific sanitation, both architectural and engineering, is combined with technical and practical instruction in sanitary and general plumbing, both in the laboratory and class-room, further assisted by a drawing course, in which are taught the principles of sanitary design, the geometry of plumbing, and the preparation of working drawings of sanitary fittings. The Technical College does not itself issue plumbers' licenses, but, through the examining board of its department of Sanitary Engineering (which consists of the lecturer in charge of the department, who is president; the lecturer in charge of the department of Architecture; and the teacher of plumbing), it grants a diploma of competency as master plumber on the candidate passing a most searching three days' examination, written, oral, and practical; and it is on this diploma alone that the Water and Sewerage Board issues its Master Plumber's license. Examinations of a simpler character are likewise held for drainers' certificates and certificates of competency to lay on water, upon which respectively the board issues its Drainers' and Water-fitters' licenses; and these licenses are required to be held both by persons laying on water or doing drainage work under the metropolitan board, and by those engaged in any similar operations under the Public Works Department direct in any other part of New South Wales. Persons qualifying for the examination are not required to necessarily join the college classes; but they

usually find it to their advantage to do so, as practically it is extremely difficult to obtain the necessary technical and scientific knowledge otherwise. When the Metropolitan Board was created it adopted at the outset the practice common in cases where qualifying examinations are first instituted in connection with a professional or trade calling which a considerable body of men have long been practising, and issued service licenses to all master plumbers who were *bond fide* in business at the time. But the Hunter District Board, which controls the water supply and sewerage of a large and important portion of the colony, when it subsequently came into existence (in 1892) refused to allow any service licenses, and all plumbers had, from the first, to pass an examination at the Newcastle or Maitland Technical Schools, or at the Sydney College, before they could obtain a Hunter District license.

The question may now be asked, How have all these stringent measures operated? The unhesitating answer is comprised in one word—Admirably! The progress in sanitary plumbing made during the last four years, not only in Sydney—not only in various other districts of New South Wales—but in many parts of Australasia generally, has been phenomenal. When the examinations were first instituted, men rebelled at having to submit themselves to the ordeal, and thought it an insult. But the practical work which they then managed with difficulty to do was carefully preserved, and is still in existence. Well, its authors are now ashamed of it; no one will acknowledge it; and it is a pleasant tradition of the department's laboratories that, as with Topsy, it must have "grewed," for, like the Margate "little vulgar boy" (of Uncle Ingolsby again), it fails to find a father, and it "hasn't got no ma!" But more than that! Melbourne is now effecting, in metropolitan sanitation, what Sydney has accomplished. A vast scheme of sewerage has been in progress for some years, and as the drainage reticulation has advanced, the same necessity has arisen as arose in Sydney for competent sanitary plumbers, duly licensed. The Melbourne and Metropolitan Board of Works (which corresponds in its objects with the Sydney Water and Sewerage Board), not only insist upon an examination in the theory and practice of sanitary plumbing on the same general lines as the Sydney College Diploma examinations, as the necessary condition for the granting of Master Plumbers' licenses, but the Sydney Master Plumber's diploma is accepted, without further examination, as a full qualification for the Melbourne license. Considering the traditional jealousy that has so long existed, and on so many points, between these sister-cities, a higher tribute could scarcely be paid to the Sydney system. But that tribute finds endorsement in several other of the Australasian colonies.

At Wellington and Christchurch, New Zealand, examinations for plumbers' licenses are now held, based on the examinations of the Sydney College, and the Sydney Master Plumbers' diploma is recognised as a guarantee of efficiency, not only in Queensland and Western Australia, but in some parts of the United States as well. But the water and sewerage boards are going still further. At present it is only master plumbers who must compulsorily undergo an exhaustive examination before they are allowed to practise. A Bill, however, is now before the legislature of the Colony (and has passed the Lower House) to amend the Water and Sewerage Acts, in the direction of conferring still greater power upon the metropolitan and Hunter District boards, whereby, among other important matters, they will be in a position to prevent any but competent workmen undertaking any kind of plumbing work. Indeed it is more than likely—and it is greatly to be hoped—that before long these boards will emulate the laudable example of Vancouver, Canada, and Maryland, U.S.A., in both of which no plumber can be employed at all unless he be certificated by examination. When the amending Bill is finally passed (as it doubtless will be), and its provision are carried into effect, sanitary plumbing in Sydney and other parts of New South Wales will stand indeed before the world as an example of the most complete advancement, literally *sans peur et sans reproche*.

But a singular episode in connection with the reform of sanitary plumbing in Australasia has yet to be narrated, and the narration will remind the readers of a lady's letter, the pith of which tradition declares to be usually found in the postscript. The Worshipful Company of Plumbers,

like other worshipful companies, is, of course, a very formidable body, and a good deal has been heard of it during the last few years, in connection with the registration of plumbers. Some time ago, a gentleman settled in Australia, who was not only a member of that Company, but actually, it is said, one of the examiners for registration, wishing to resume his plumbing avocations, he recently applied to the Sydney Water and Sewerage Board for a license. His credentials from the worshipful company were unexceptionable; but the board's regulations are like the laws of the Medes and Persians, and the applicant was forced to present himself at the Technical College for examination. Alas that the fact should have to be recorded—but he failed! In view of the peculiar circumstances, the examiners were as lenient as they could be; but it was impossible to grant him a Master Plumber's diploma, and rumour has it that the gentleman is now busily engaged in working up his subject, with a view to a fresh effort to secure the necessary credential. So that it has actually happened that an examiner of the Worshipful Company of Plumbers of the imperial metropolis has positively been "plucked" in examination by the sanitary plumbing authorities at the "semi-civilised antipodes!" The moral of the fact is obvious. In the "Sunny South," things, when they are done at all, are seldom done by halves. While England has been talking for years about the "registration of plumbers," and adopting in a half-hearted way that questionably useful system, the Australasian colonies have been insisting absolutely that their sanitary and domestic plumbing shall be entrusted solely to men capable of passing the most searching examinations both practical and theoretical, in the subjects of their calling. That this is so, the very first set of examination papers used by the Sanitary Engineering department of the Sydney Technical College will fully show. Since the early part of 1892, the examinations, where they have altered in character at all, have naturally not become easier than they were, and the Worshipful Company of Plumbers might therefore do worse than lay these facts to heart.

DE LIBRA.

A novelty in the building trade of Gateshead is being introduced in the covering of some new premises with vulcanite in High Street, opposite Sunderland Road end. It is intended to utilise the premises as a café. The vulcanite roof is claimed to be waterproof, storm-proof, and fire-proof.

After having been closed for renovation and alteration, Queen-street Congregational Chapel, Leeds, was reopened on Friday. The building has been cleaned and redecorated by Messrs. Greenwood Bros., of Briggate, and an electric-light installation put in by Mr. Edwin C. Wallis. The alterations include an improvement at the rear of the chapel, giving better access to the pulpit, and the placing of new windows in the vestries, whilst the sanitary arrangements have been overhauled. The total cost amounts to over £500.

On Wednesday week a new Roman Catholic church, dedicated to the Mother of God, was opened at Broadbottom by the Bishop of Nottingham. It is Early English in style, with parport facings. Mr. Oswald Hill, of Manchester, was the architect, and the contractors were Messrs. Storrs, of Stalybridge. The building is 80ft. by 26ft., and there is accommodation for about 300 worshippers. The altar is of Caen stone with marble pillars. This altar, and two side altars of the same material, were executed by Messrs. Boulton, of Cheltenham. The windows are of stained glass, by Messrs Edmondson, of Manchester.

A statutory meeting of the shareholders of the company which has been recently formed for the purpose of developing a recreation ground at New Brighton, near Liverpool, was held on Friday. The chairman made a statement explaining the progress of the work. This, he stated, was well in hand, nearly 200 men being now engaged, and contracts having been given out for the erection of the Tower, which was to form one of the main features in the undertaking. The athletic sports and the cycle track were in an advanced state of formation. The contract for the building of the Tower had been let to Messrs. Handysides and Co., of Derby, the directors having failed to come to terms with Messrs. Heenan and Fronde, of Manchester, by whom it had been at first proposed the work should be undertaken. The buildings surrounding the Tower would be constructed by Messrs. W. A. Peters and Sons, of Rochdale, and Messrs. Donlton and Co., of Lambeth, were the contractors for the terracotta work. The architects were Messrs. Maxwell and Tuke, of Manchester.

OBITUARY.

MR. ROBERT WILLIAM PEREGRINE BIRCH, M.Inst.C.E., who has died suddenly at the age of 51, was widely known as a hydraulic and sanitary engineer, and had been professionally engaged in most of the important inquiries, Parliamentary and otherwise, relating to water supply and sanitary subjects during the past 20 years. He usually acted for the London water companies in their struggles with the London County Council, and gave evidence on their behalf on several occasions, when he emphatically expressed the opinion that it was unnecessary to look beyond the present sources for the water supply of London. He believed that if adequate works of storage were carried out and the unnecessary waste of water prevented, the needs of London could be amply supplied by the existing companies. This view was adopted by the Commissioners in their report. Mr. Birch was for many years a member of the Council of the Sanitary Institute. He died at Foyers, on Loch Ness, while on a visit to the works he was carrying out for the British Aluminium Company, an important part of which—viz., the tunnel, power works, and factory—were successfully completed in June last, and are now in active operation.

MAJOR-GENERAL R. STEWART BEATSON, R.E., who died at Bedford on Wednesday week at the age of 83, received from the Admiralty in 1830, while still a young subaltern, the responsible appointment of Director of Engineering and Architectural Works in the Dockyards and other naval establishments at Portsmouth, which he held for six years, being then transferred to a similar appointment at Woolwich till its abolition in 1848. He then served in Canada till 1854, and for having rescued, at great personal risk, during the destruction by fire of the Parliament House at Quebec, in February of that year, valuable public records, he received the thanks of the Canadian Legislature. Later in the same year he was appointed Superintending Engineer of the Ordnance Manufacturing Departments at Woolwich. He served in New Zealand from 1866 to 1869.

WE have to announce the death of Mr. WILLIAM SMALLPEICE, architect, of 42, Well-walk, Hampstead, who since 1888 has been the district surveyor for East Hampstead under the London County Council and their predecessors in office, the Metropolitan Board of Works.

CHIPS.

The value of the personal estate of the late Mr. Edward J. Hunter, J.P., amounts to £86,541. The testator has bequeathed a painting of "Our Saviour," by Carlo Dolci, to the National Gallery.

A peal of ten bells, cast to the order of Mr. Peter Kelly, Monaghan, by the firm of Messrs. Gillett and Johnston, of Croydon, for St. Macartan's Roman Catholic Cathedral, Monaghan, were blessed on Sunday by his Eminence Cardinal Logue.

The Chester-le-Street District Council have received a letter from the Treasury recommending that Mr. McGregor, late Highway Surveyor for the Durham and Chester-le-Street Highway Board be paid an annual sum of £165 6s. 8d. for the loss of his office through the highways being taken over by the District Councils.

The *Liverpool Mercury* admits that "there can be no disputing the fact that Manchester is rapidly developing into a timber port, the consignments of this commodity having each year increased to a very large extent."

A monument in honour of Prince Bismarck will be unveiled on the highest summit of the Black Forest on October 14th.

The Leigh Rural District Council have received the sanction of the Local Government Board to a loan of £4,000 for the purpose of providing a water supply for the township of Lowton. It will be obtained from the Liverpool Corporation at 9d. per 1000 gallons.

In the case of William Elijah Godfield Lewington, of Lyddington-road, the Portway, West Ham, builder, the order for discharge from bankruptcy has been suspended for two years ending August 7, 1898. The public examination was concluded on May 25, 1894. In the case of W. Williams, of Cannon-street, E.C., late of Sydenham, the discharge has been refused, and in that of Benjamin Mnsgrave, of Hull, builder and contractor, the discharge has been suspended for four years ending July 10, 1900.

The will of Sir Joseph Prestwich, formerly Professor of Geology at Oxford University, has been proved at under £2,600.

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ILLUSTRATIONS.

"THE HOLY FAMILY," BY A DUTCH OLD MASTER.—NO. LXVI.
AND LXV., NEW BOND STREET, W.—WIDNES MUNICIPAL
LIBRARY AND TECHNICAL SCHOOL.—BRICK HOUSE,
KENT.—HOUSE AT STAFFORD.—TRINITY HOSPITAL, MILE
END, E.—DETAILS OF DINING-ROOM FITMENTS.

Our Illustrations.

OLD MASTERS FROM THE CONTINENT, NO. XXXVIII.—
"THE HOLY FAMILY," BY AN UNKNOWN MASTER
(ABOUT 1500).

This picture was painted by an unknown artist about the time that Hans Memling was born, an event usually put down to 1495. We published a "Holy Family" by that great Flemish master on December 20th, last year, from Brussels. The Dutchman's interior, given to-day from Dresden, is, of course, very different from the rural scene depicted by Memling; but as kindred examples almost contemporary with each other, a connection, at least to that degree, is established between the two renderings of the same subject, while both painters, in accordance with the tradition of their times, have represented their characters in the costume of the period. The anachronism presented, too, by the groined interior and geometrical tracery of the window, and Late Gothic settle, on which the crowned figure of Our Lady is enthroned, presented, however, nothing of the nature of incongruity to the old painters, whose lively faith in the perpetual "communion of saints" ever realised in them the immortality of the departed, who, no longer confined to time and space, were looked upon as contemporaries in that kingdom wherein the Angel of the Apocalypse proclaimed "that there should be time no longer." And it was, of course, in this spirit that personages who lived at different periods and in distant places are frequently seen represented grouped together. In other works those who employed the artist are shown as contemporaries of Our Lord. An inestimable example of this, the "Madonna" of the Meyer Family, by Holbein, also from the Dresden Gallery, was illustrated in the *Building News* for March 8, 1895. The burgomaster is kneeling with his wife and children on either side of the Virgin, who, in a standing posture, carries the infant Saviour, and occupies a handsome niche, enriched by a shell canopy. The Dutch sense of homeliness pervades this devotional picture which we publish to-day, though the evident intention of the designer was directed towards a rich and even regal rendering of the Madonna's surroundings, befitting the Mother of God and Queen of Heaven. St. Anne, seated in a Mediæval chair, carries a small market basket, and is shown in the act of presenting an apple, fit emblem of the "first-fruits" of salvation to the Holy Child, while St. Joseph, introducing possibly the donor of the picture, is represented in attendance upon the Blessed Virgin and her sacred charge. The pious appropriateness of the situation, the dignified decorum and scrupulous care with which all the appointments of the apartment are properly located, evince the ideal aimed at by the artist, whose work is eminently characteristic of his school, besides displaying a marked influence of Flemish mannerisms and style. The picture is in

the Royal Gallery at Dresden, and our illustration is a reproduction from Mr. Hanfstaengl's photograph of the original.

NOS. LXVI. AND LXV., NEW BOND STREET.

This building is now nearing completion. The ground story consists of a double shop, with a large saloon in the rear, and the upper part is planned as a dwelling-house. The front is built of Poulton thin red bricks and Portland stone. Messrs. G. S. S. Williams and Son are the builders, and they have done their work exceedingly well. The architect is Mr. Arthur Keen. The drawing here reproduced was shown at the Royal Academy this year.

WIDNES MUNICIPAL LIBRARY AND TECHNICAL
SCHOOL.

Our illustration furnishes a view of this technical school and free public library. The buildings are finished in red pressed bricks and terracotta, with a tower. The new structure is on a favourable site, and has elevations to three principal streets. The building is divided into a public free library and a technical and art school, each having a main entrance facing Victoria-road. Entering the free library, the visitor finds himself in a spacious corridor with rooms on either side. On the left is the reading-room, with open-timbered roof. Rests of convenient height and shape will be arranged around the room for the daily papers; and the weekly papers, instead of being laid on the tables, will also be placed on stands. The magazines are to be located on tables. The adjoining room is the lending library, lofty, and lighted by both top and side lights, and it is to be fitted with a large counter. By means of a staircase access is gained to a book-store in gallery form, with a store-room for old periodicals and newspapers. There is a separate side entrance to the lending library. Although there is interior communication between the library and technical school, the main entrance to the latter is in Victoria-road. There is a corridor running the length of the building. On the right are the commercial and physics classrooms, and a lecture-room, fitted up with a gallery, and communicating with the lecturer's preparation room. On the left hand is a keeper's room, committee-room, and two classrooms. The committee-room is fitted with a mantelpiece of oak. The classroom adjoining is for ladies acquiring knowledge with regard to cookery, dressmaking, &c. The other classroom is intended for the teaching of handicrafts, such as plumbing, joinery, &c. To the rear of the building is the laboratory; it has an open-timbered roof, and is a spacious room, being 60ft. long by 25ft. wide. It has yet to be fitted up. There are numerous fume chambers for carrying away noxious vapours. In conjunction with the laboratory is a balance-room. There are also a store and reagent room. On the upper floor, to which access is gained by a staircase in oak, are the rooms for the teaching of art. On the right of the corridor is the elementary art room, 66ft. long by 26ft. wide, fitted with a large platform and desks. On the left is a room for machine construction and drawing. At the end of the corridor is the painting room, lighted from the north. On this floor also are the keeper's living rooms, to which there is a separate entrance at the rear of the building. The woodwork throughout is of pitch pine, stained and varnished, the panels of the doors being specially selected wood. The corridors, passages, and reading-room are paved with pitch-pine blocks, while the entrance-hall is laid with ceramic mosaic. The regulating apparatus is easily controlled and most efficient. The wood-block floors have been laid by Mr. Roger Lowe, of Farnworth. The work has been carried out by Mr. Isaac Dilworth, contractor, of Wavertree, Liverpool, from the designs of Messrs. Woodhouse and Willoughby, F.R.I.B.A., of Manchester. Their plan was selected in open competition by Mr. H. Hartley, F.R.I.B.A., the assessor appointed by the committee. The total cost of the building, including the furniture and fittings, will be about £13,000.

BRICK HOUSE IN KENT.

This drawing is a view of the entrance front of a proposed house for a sheltered wooded site in Kent. The walls are of red brick, hand-made, and 2in. thick, the upper part being constructed of half-timber work of solid oak framing, and the roof covered with red tiles. The half-timber work is finished with an adzed surface, and as far as possible the natural edges of the logs are

used. The brick and tiles are both chosen with a view to weathering readily. The interior is finished in a simple and homely way, with oak and pitch-pine in some of the sitting rooms, and white paint in the bedrooms. The architects are Messrs. Baillie Scott and Seton Morris.

HOUSE AT STAFFORD.

This house was built for the Superintendent of County Police, to take the place of a house demolished to make room for the new County Council offices. The facings are of special-made sand-faced bricks, 2in. thick, with Hollington stone dressings. The whole of the floors, stairs, and roof are constructed with concrete and steel, the roof being covered externally with Stonesfield slates. The architect is Mr. H. T. Hare, and our illustration is reproduced from the drawing which was exhibited at the Royal Academy this year.

TRINITY HOSPITAL IN MILE END, E.

This is the plate which we promised to give when we illustrated the plans and general drawings from Mr. C. R. Ashbee's excellent monograph memorial volume in the *BUILDING NEWS* for August 21 last. We then noticed this publication and the subject of it at some little length, and Mr. Matt. Garbutt's clear bird's-eye view, reproduced with our review, gave a first rate idea of the extent and interest of this quaint pile of old London buildings. The central feature in the picture is formed by the chapel, of which building the accompanying elevation of its façade is most interesting, while the relative position of the section of one side of the quadrangle shows how the houses range on either hand. The spirited sketch, made by Mr. Max Balfour, of Capt. Richard Maples' statue greatly enhances the value of our plate. This worthy was one of the pioneers of English enterprise in India in those early days just after Bombay had come to us by the dowry of Catherine of Braganza. He appears as "Captain Maples, of Madrasspatam," and when his will was proved on August 28th, 1680, it was found he had been faithful to the old Trinity spirit of fellowship. There is, adds Mr. Ashbee, in his account from whence we are quoting, a glimmer of romance and generosity about the record that Maples had left diamonds to the value of 1,500 pagodas to be sent over for the use of the Guild. The costume of this statue, and that of Captain Sandes, is of vital importance. "In the day when everybody with the least pretension to 'taste' insisted in masquerading, if immortalised by statuary, in the Classic toga, as Roman Consul, or Attic orator, these two honest seamen had the common sense to see that their own clothes suited them best. Contemporary statues that are not in the pedantic costume of Greece or Rome, but in the periwig and tails of Mr. Vanslipperken, might be numbered on the fingers of one hand;—in London I believe these two statues are unique."

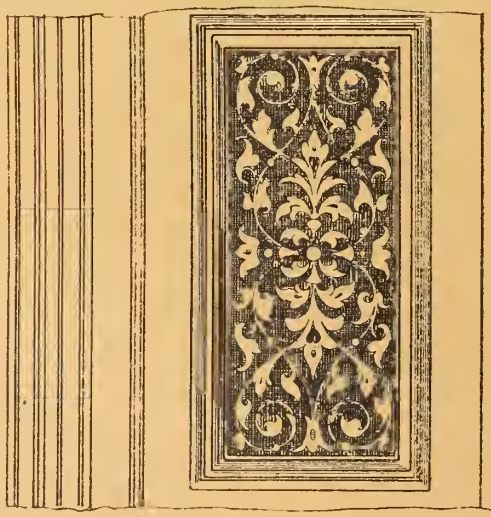
MODERN GERMAN INTERIOR WOODWORK.

LAST week we published the general drawing of the dining-room fitments executed for the private residence of Mr. C. Von Groszheim, one of the firm of Messrs. Kayser and Groszheim, architects. To-day we give a double-page sheet of details from the working drawings showing the several parts of buffet and wall lavatory at large. A description of Mr. Wasmuth's publication, "Der Innere Ausbau," was printed on page 337. This particular work was carried out by Messrs. Max Schulz and Co.

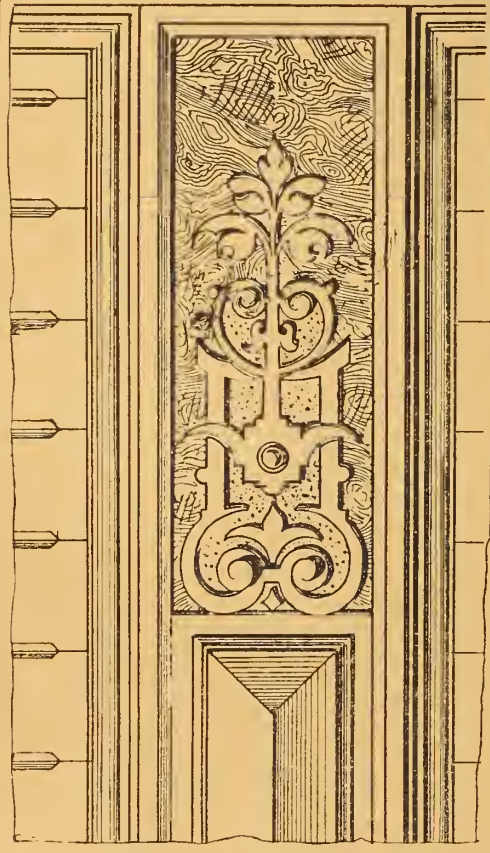
Several structural alterations and improvements are being made in the Royal Courts of Justice during the Long Vacation. Two new entrances to the corridors are being constructed so as to give more convenient access to suitors from the general hall. A new doorway leading to the Queen's Bench side is being opened between Courts I. and II., and a similar doorway is in course of construction on the Chancery side between Chancery Court No. I. and the Admiralty Court. The lighting and ventilating machinery is also undergoing renovation.

A committee of the corporation of Norwich have under consideration a scheme for the erection of a town-hall in the Market-place, in which most of the public business of the city could be transacted. It is proposed to make provision in the building for offices for the municipal and sanitary departments of the corporation, the guardians of the poor, the county court, the Inland Revenue, and the inspector of factories, if the various authorities desire their offices to be centralised and such accommodation to be provided for them. An expenditure of from £80,000 to £100,000 is contemplated.

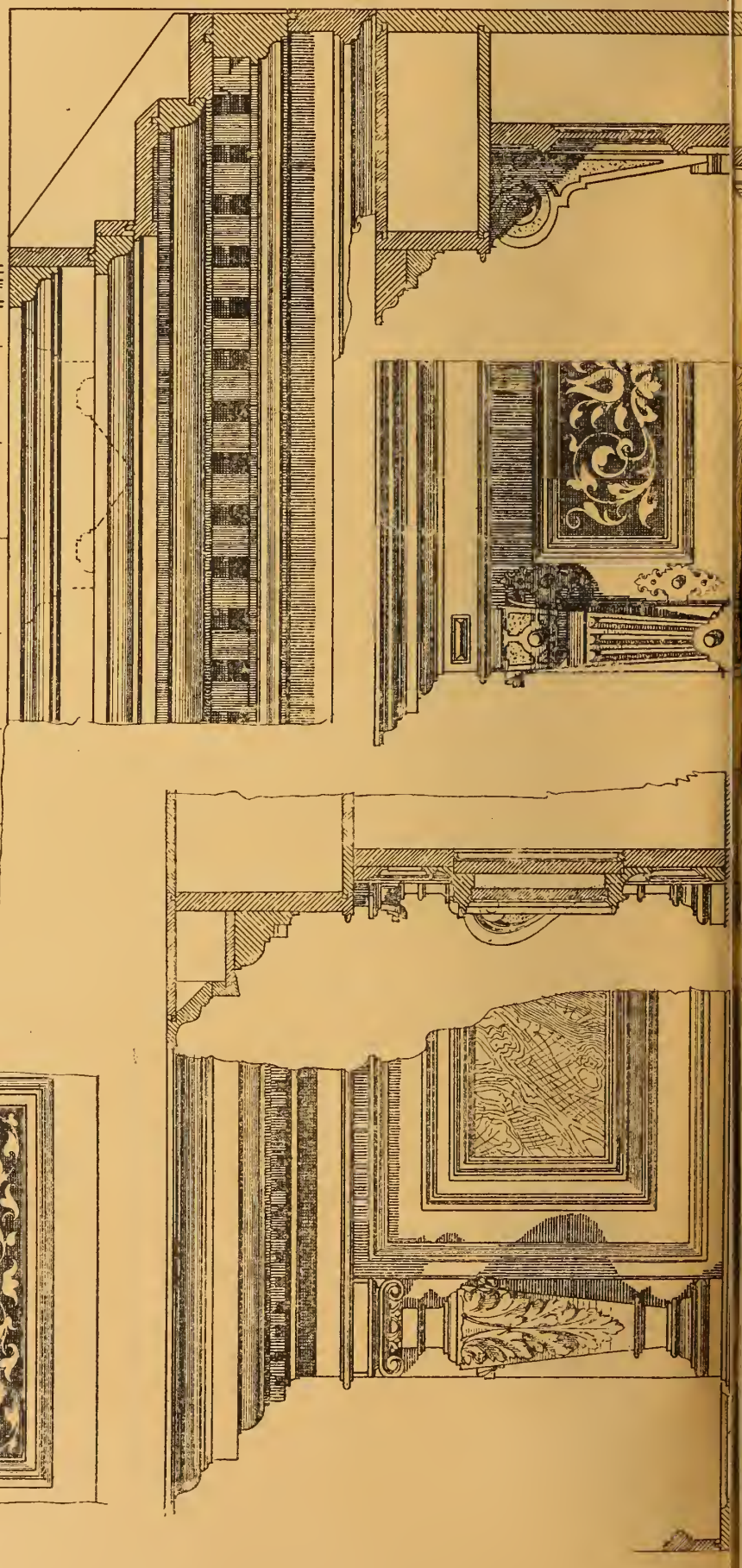
Detail of Intarsia-work
to Door

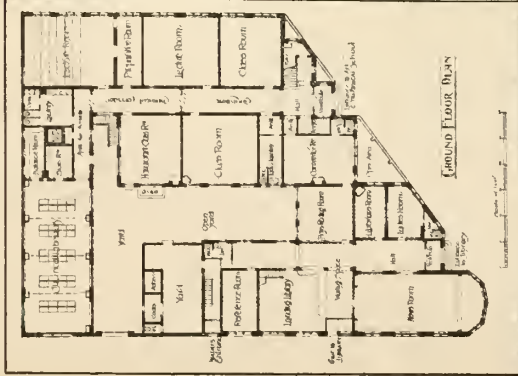


DETAILS OF
DINING ROOM -
FITMENTS
Messrs. Kayser & Von-Gosshelm
Archts



Detail of Ceiling





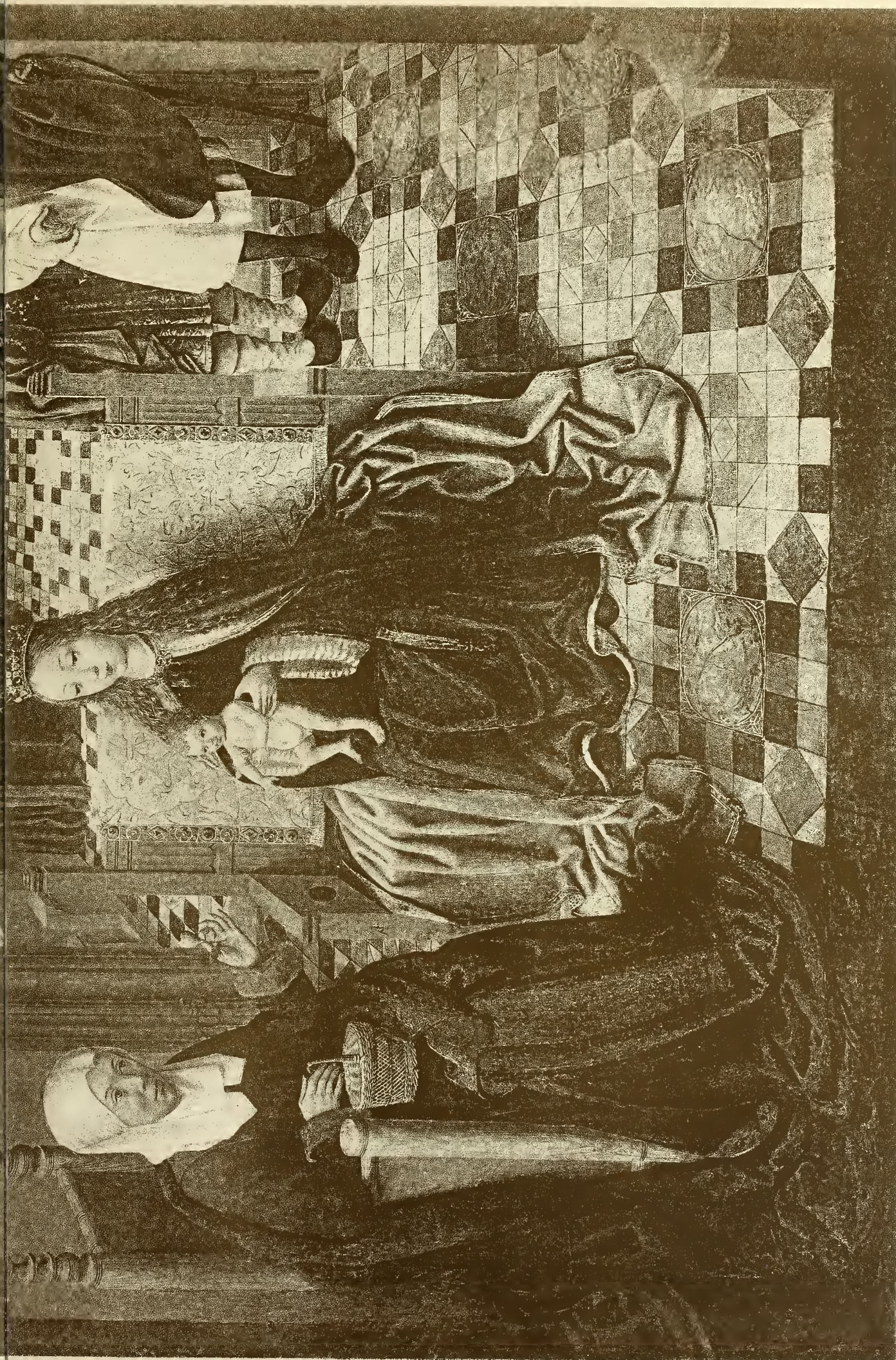
WIDNES
MUNICIPAL LIBRARY
AND
TECHNICAL SCHOOL
WOODHOUSE WIDENINGBY 3000
MUNICIPALITY

HOUSE AT STAFFORD. H. T. HARE, ARCHT.



THE BUILDING JEWS. SEP. 11, 1896





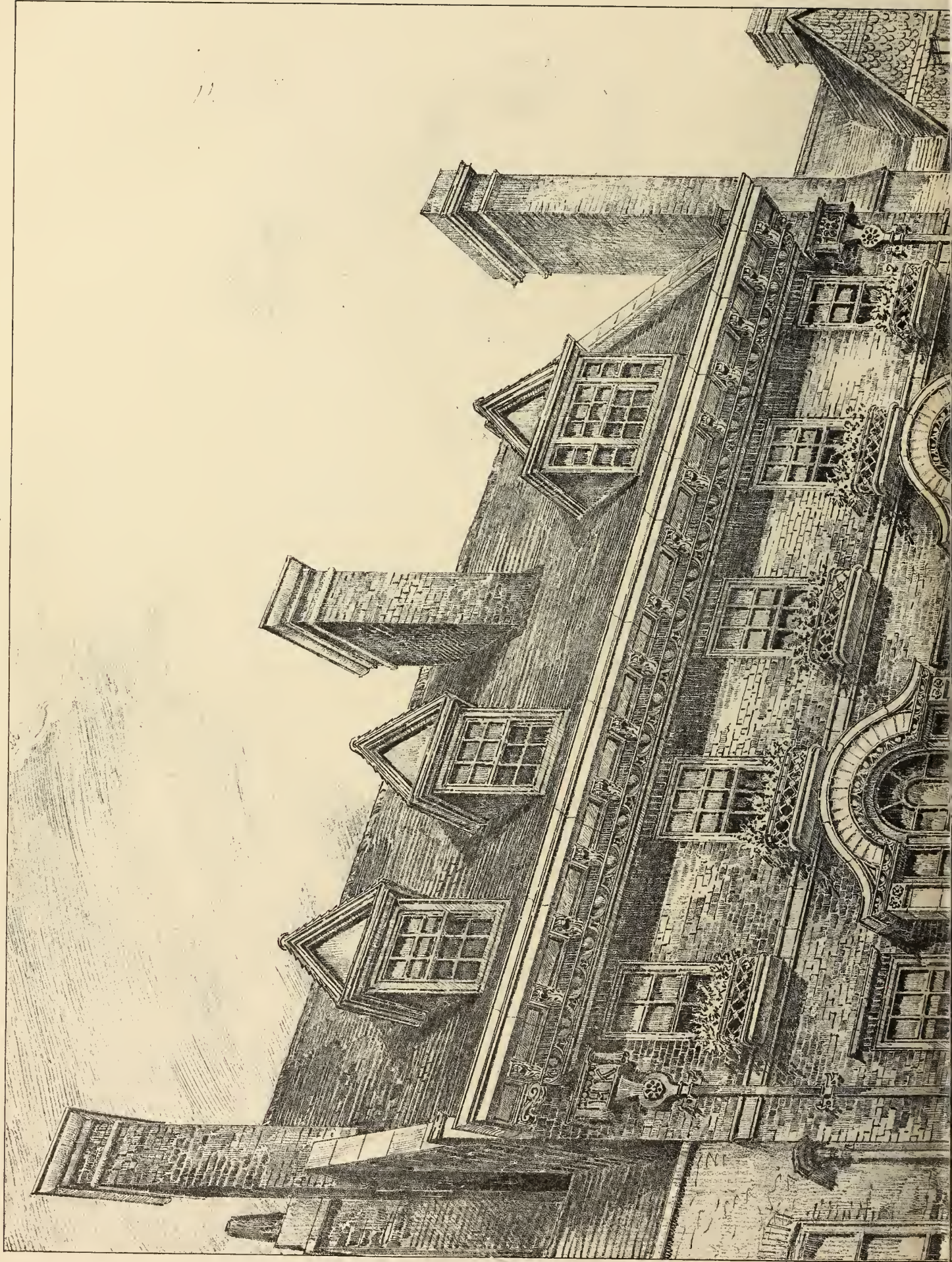
FROM A PHOTO BY FRANZ HANFSTAENGL.

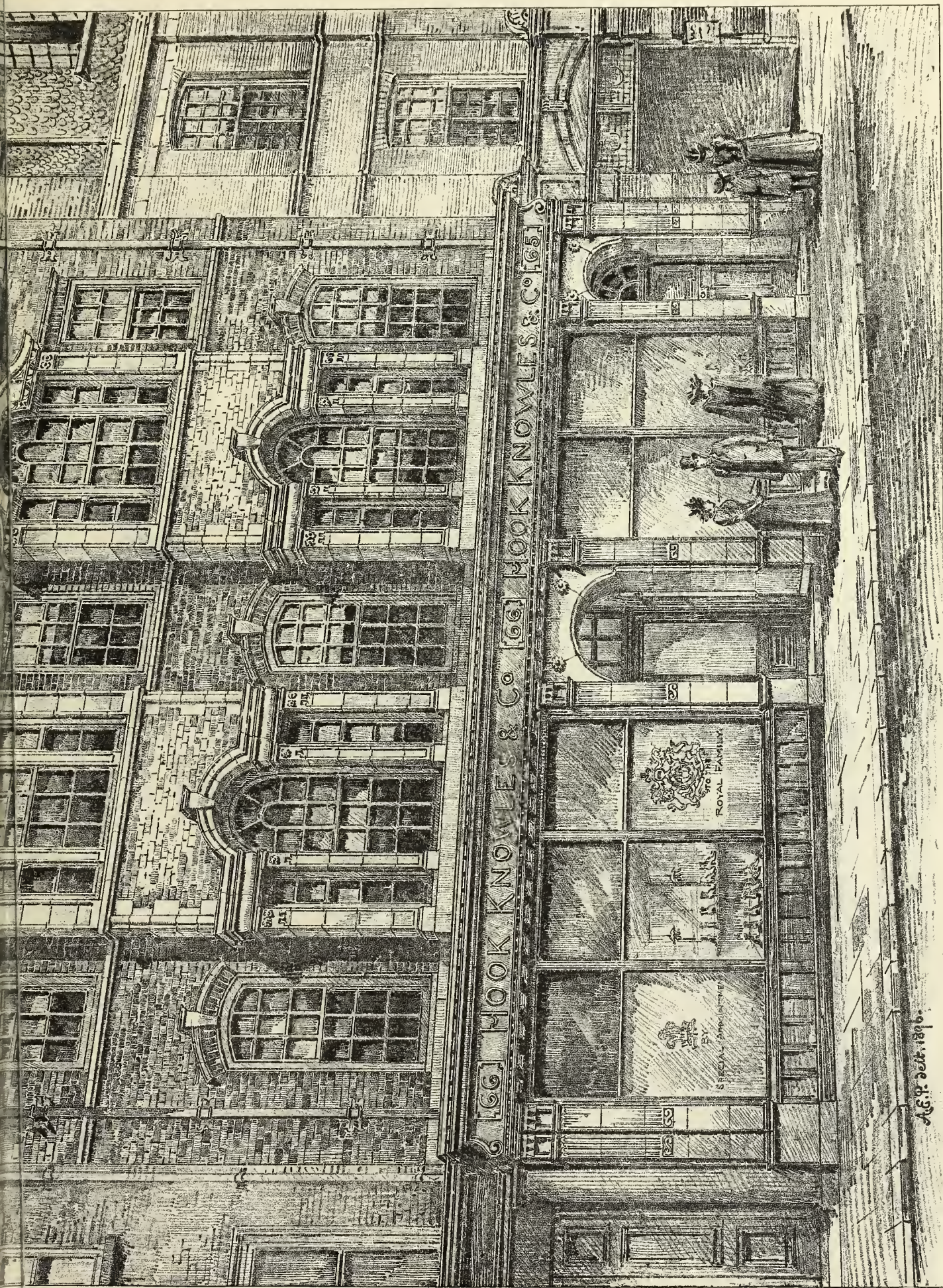
OLD MASTERS · ON THE · CONTINENT · N° 38 ·

THE HOLY FAMILY · (DRESDEN) BY AN UNKNOWN MASTER · (ABOUT 1500) DUTCH SCHOOL.

Photo-Tint by James Akerman, 21, Queen Square, London W.







"Photo-Tint", by James Akerman, 6, Queen Square London, W.C.

N^os 66 & 65. NEW BOND ST. W. ARTHUR KEEN. ARCHT.

THE BRICK HOUSE · KENT · ENTRANCE FRONT

MESSRS BAILLIE SCOTT & SETON MORRIS ARCHTS

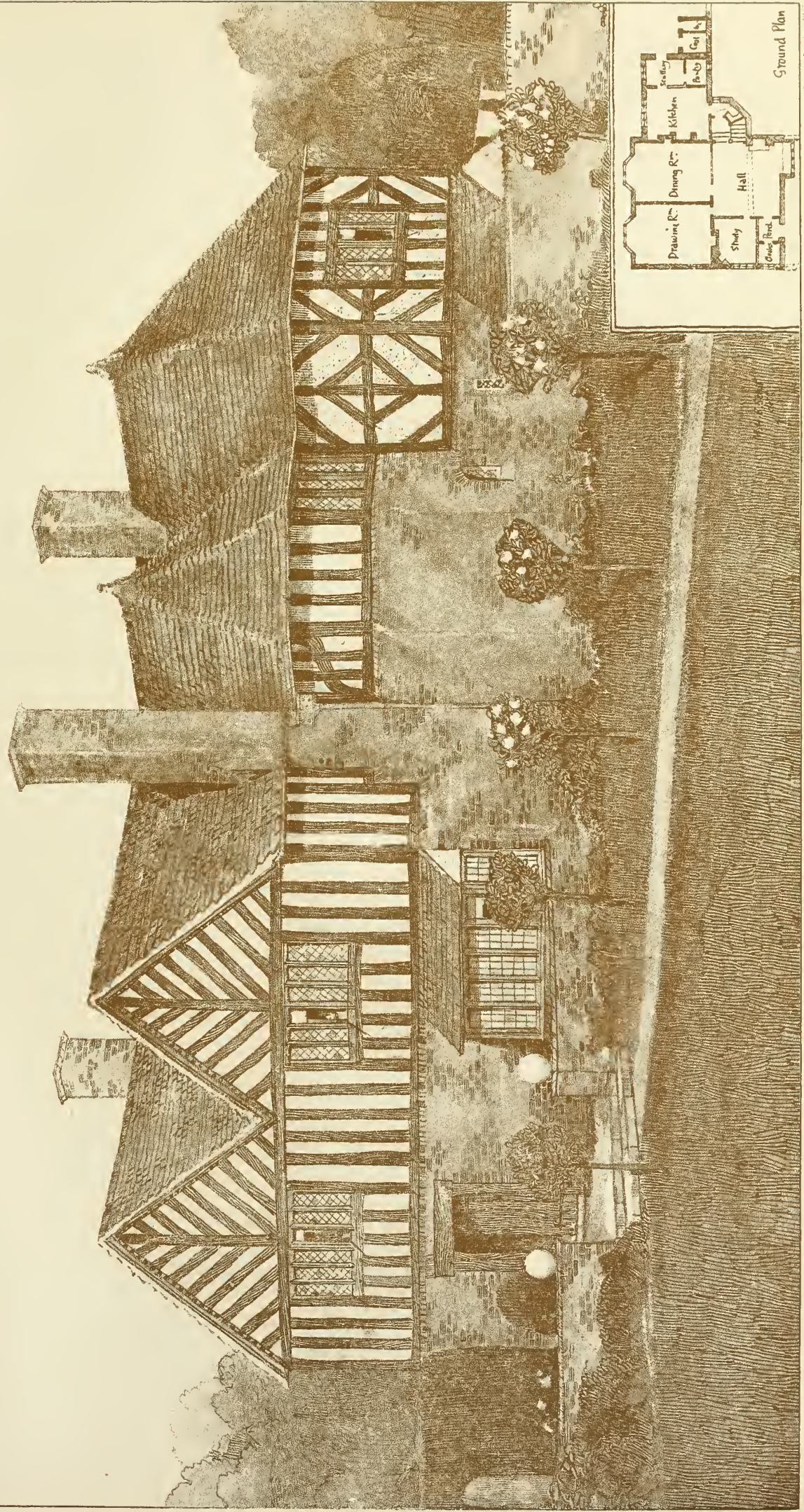
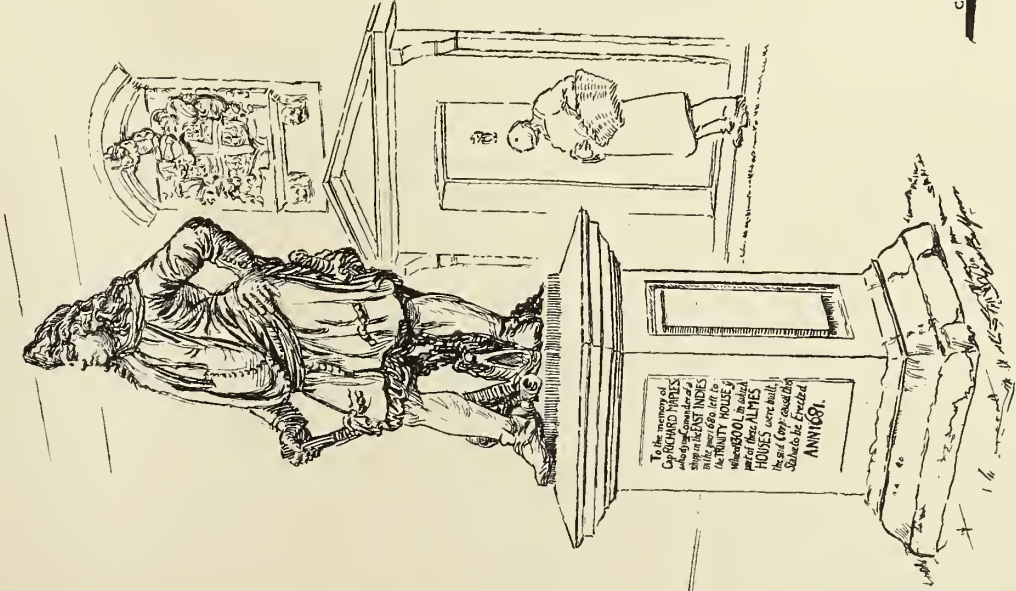
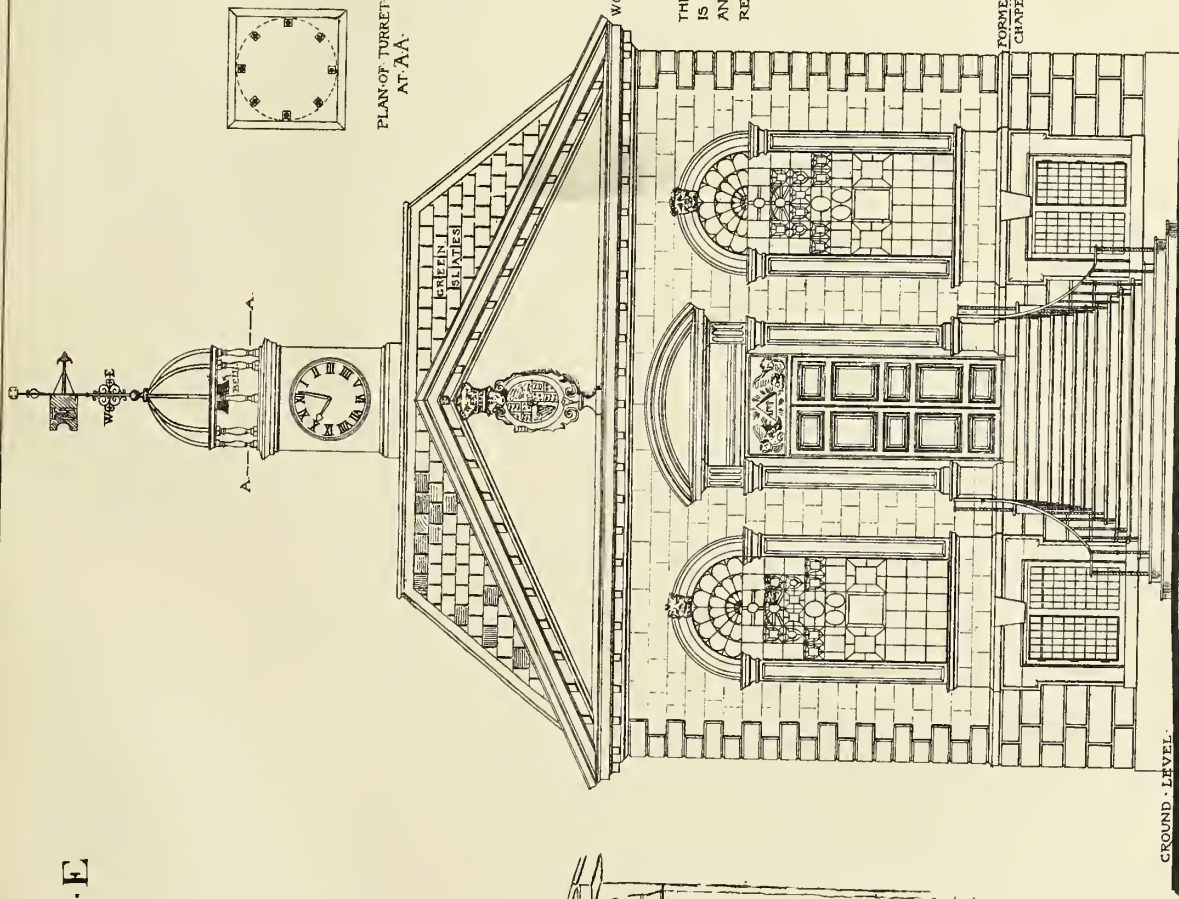


PHOTO-TINT by James Akerman 8, Queen Square, London, W.

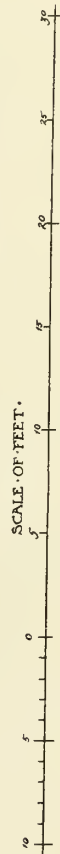
TRINITY · GROUND ·
MILE · END · ROAD · LONDON · E



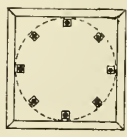
DRAWN BY MAX BALFOUR.



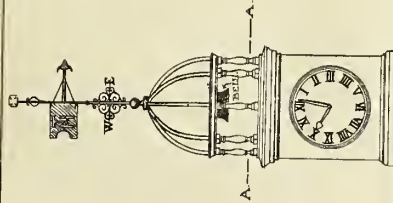
CHAPEL ·



SECTION · ACROSS · MAIN · QUADRANGLE · LOOKING · NORTH ·

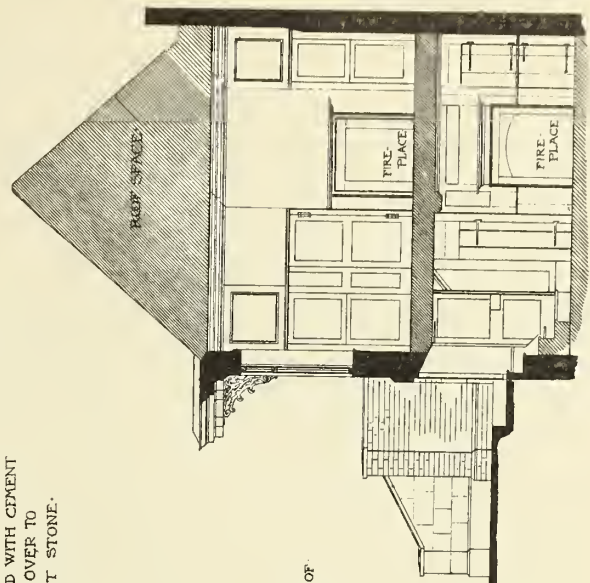


PLAN OF TURRET
AT · AA ·



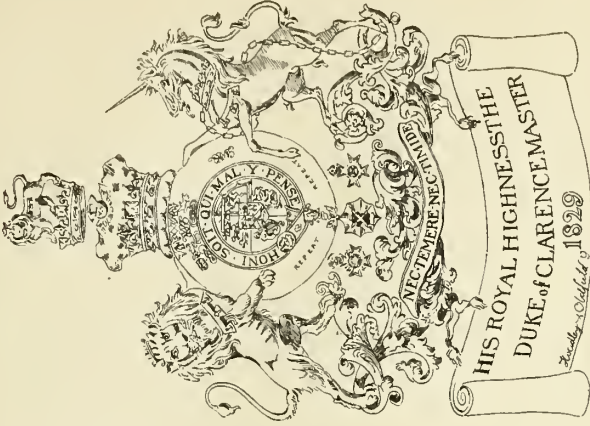
W · O · D · C · O · R · N · I · C · E ·

THE EXTERIOR OF CHAPEL
IS COVERED WITH CEMENT
AND LINED OVER TO
REPRESENT STONE.

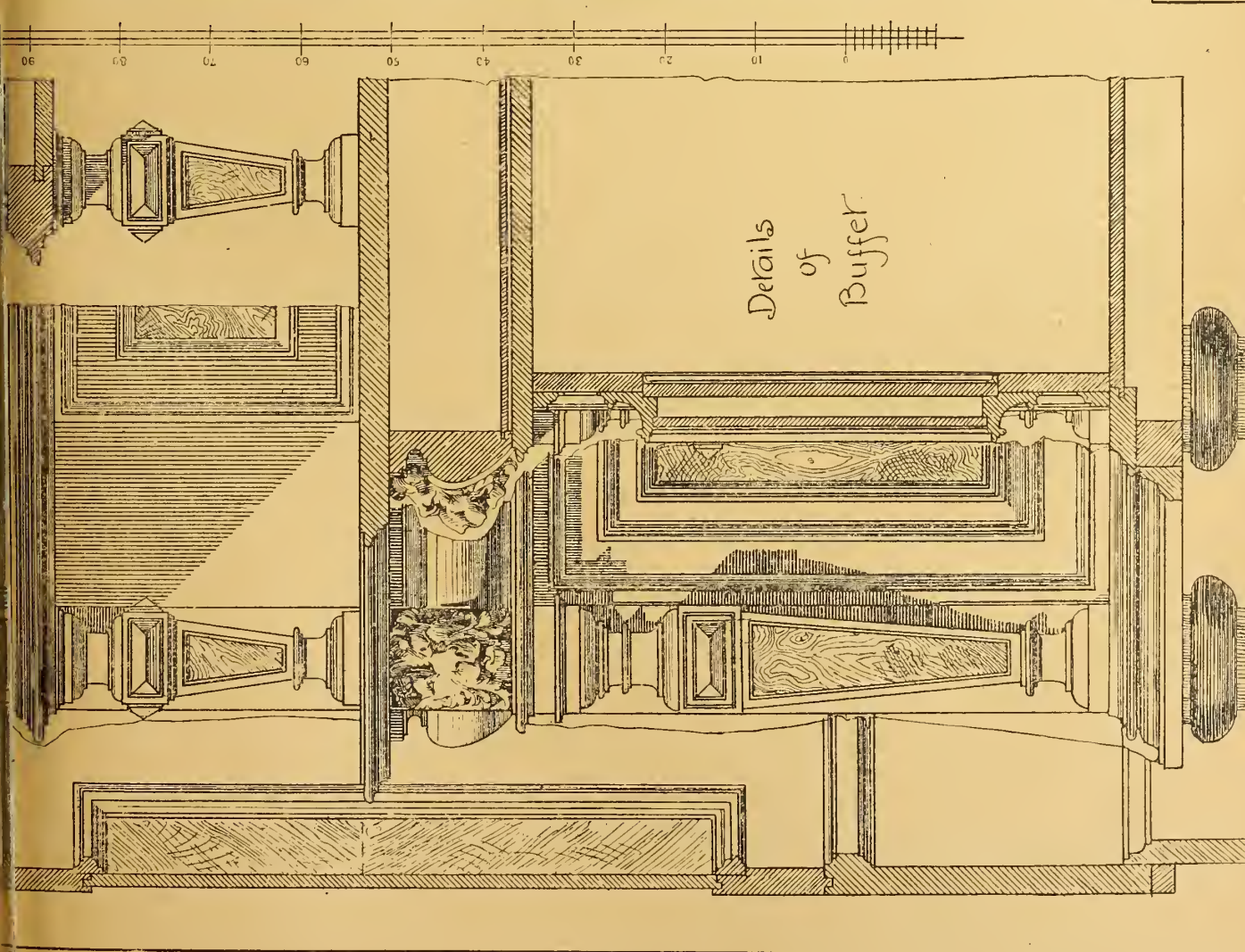
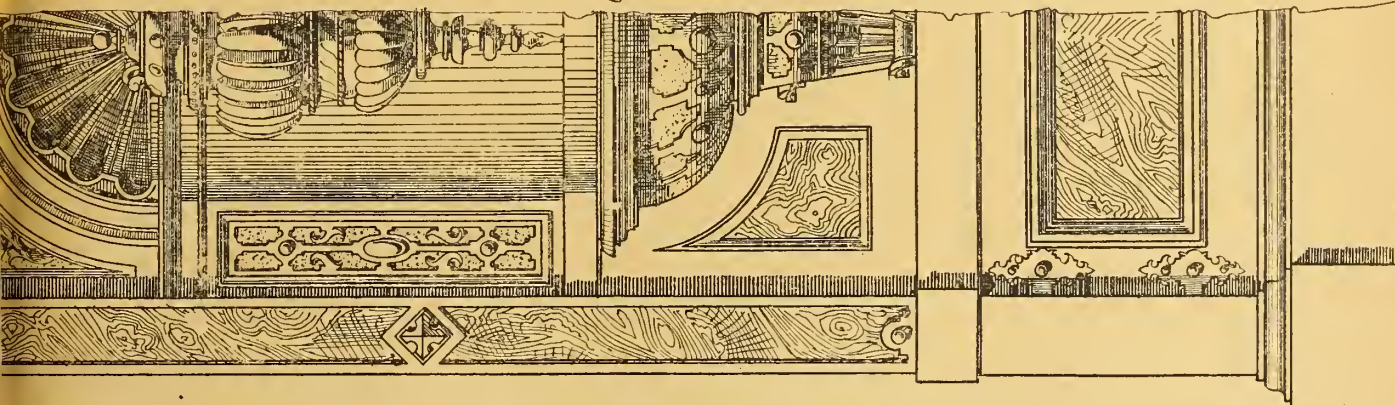
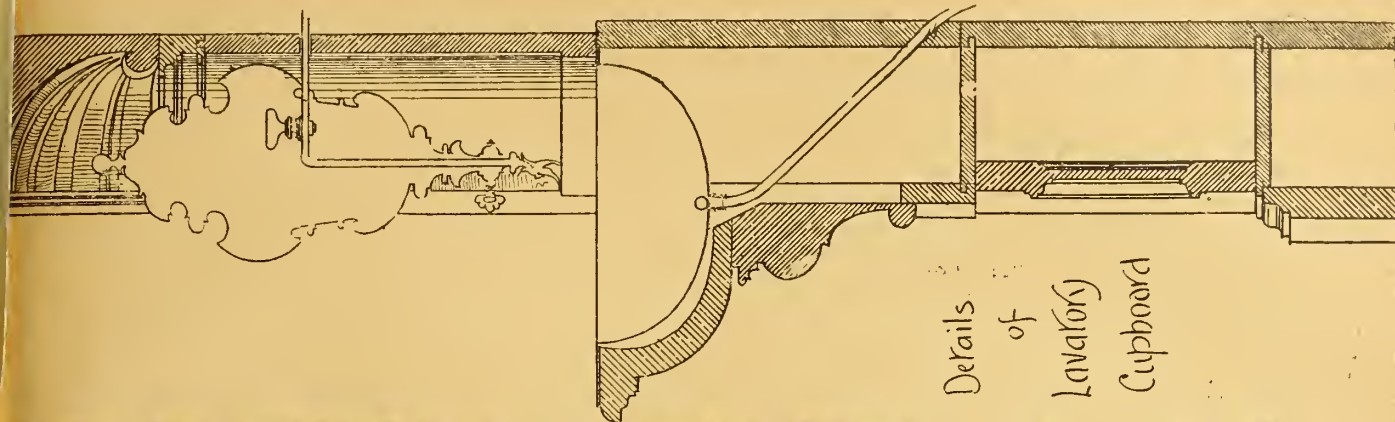


HOUSE ·

DRAWN BY ERNEST CODMAN



HIS ROYAL HIGHNESS THE
DUKE OF CLARENCE MASTER
1829



Building Intelligence.

ARBROATH, N.B.—The Old Church of Arbroath, which was destroyed by fire on 14th November, 1892, has now been rebuilt, and was reopened for public worship on Friday. The Old Church was erected about the year 1590, and it was considerably altered in 1762, the condition in which it was put then being the same as existed when it was burned, except that a spire, which was saved from the fire, was erected in 1832 in place of the original tower, which had been one of the towers of the precinct of the Abbey of Arbroath. The new church, which occupies the site of the old, has been erected from designs by Mr. J. J. Burnet, A.R.S.A., Glasgow, which in a competition were selected by the adjudicator, Mr. H. J. Blanc, A.R.S.A., Edinburgh. It is a Gothic structure, in the style of the 13th century, and consists of the tower with a spire, a chancel, nave, double transept, and aisle. The aisle and transept are galleried, and the chancel is an extension of the nave. A dado, 14ft. high, in carved woodwork, is erected on the side of the nave, the windows being above it. The fronts of the galleries are also carved, particularly the corporation pew. An organ in a carved wooden case has been erected in the west end of the building by Messrs. Brindley and Foster, Sheffield, at a cost of about £1,300. In front of it is the chancel, floored with marble and tiles. The eastern window is a long three-light window, lancet-shaped. It is a memorial window, consisting of Scriptural subjects—Patriarchs, Prophets, the Saviour, St. Mary, and St. Elizabeth—erected by the family of the late John Macdonald, town clerk of Arbroath, in memory of their parents. The designs were by Sir Edward Burne Jones, and the work was done by Messrs. Morris and Co., of Surrey. All the woodwork of the church is stained the colour of dark oak. We illustrated the new church in our issue of October 25, 1895.

BRISTOL.—Another step has been taken towards completing the restoration of Bristol Cathedral. It has been decided to carry out the remaining works, estimated to cost about £5,000, in sections, and the contract for the first section has been let to Messrs. W. Cowlin and Sons, who commenced operations about a fortnight ago. Messrs. Cowlin had reported that 'The east end, from north to south choir aisle, is in a most deplorable condition; in fact, the larger portion is falling into ruin; the parapets and pinnacles to choir and aisles demand immediate attention; at the east end they are nearly eaten through with decay, and may be picked away with the hands; they are considerably out of perpendicular, and in a highly dangerous condition.' This report left the committee no alternative but to undertake, with as little delay as possible, that section of the work. The contract also includes the construction of an additional door in the wall of the north transept (facing College Green), and it is expected that the work will occupy about six months. By that time it is hoped that the funds will enable the committee to proceed with other sections of the restoration.—Extensive improvements are being carried out to the tower of St. Thomas's Church, Bristol. The old church of St. Thomas was destroyed in 1789, and the present building was completed in 1793. The original tower, which is a very good example of the Perpendicular style, was allowed to remain, but it has now become so dilapidated that much restoration is necessary. A considerable portion is being refaced, and a new panelled parapet and angle pinnacles are being added, that over the stair turret being on a larger scale than the other three. As far as possible the old lines of the tower are followed, and the surface is being disturbed only where the stone is decayed. The cost of the work, which amounts to about £1,600, is being defrayed out of a legacy. Mr. W. V. Gough, of Bridge-street, Bristol, is the architect, and the work is being done by Messrs. Cowlin and Son.

HONITON.—St. Michael's Church, which has been undergoing considerable structural alterations, including new seating accommodation and heating appliances, was formally rededicated on Friday. The work, begun sixteen years ago, is now practically complete. Under the direction of the late Mr. Edward Ashworth, architect, of Exeter, and mainly at the expense of the Honiton Charity Trustees, the chancel of this venerable church was restored, carved oak stalls taking the place of the wretched boxes that had previously choked its aisles. The 15th century groined rood-

screen, having an unbroken length of 50ft., and described in Hems' "Rood Screens in Devonshire Churches" as "one of the very finest in the county," was at that time also restored, the whole of the work having been carried out by Mr. Harry Hems, of Exeter. Now the remainder of the church has been renovated, including the ancient western tower, erected by Peter Courtney, Bishop of Exeter, about A.D. 1480. Among the special gifts is a lectern, designed by Mr. E. H. Harbottle, of Exeter, the architect for the present restoration, and executed in well-seasoned Devonshire-brown oak, by Messrs. Harry Hems and Sons, of Exeter. The base is boldly buttressed, and above the octagonal stem is a carved capital, from which groined brackets proceed, carrying the book-board, the front and sides of which are carved and traceried. Messrs. Hems and Sons are also carrying out from Mr. Harbottle's designs a new font. The bottom step, which is an irregular oblong, is of polished Devon marble, mottled, the steps above being of white marble. The octagon shaft is of polished Devonshire marble. The double-tiered carved capital above is of marble, and the bowl of polished English alabaster. The altar and credence-table have been made by Mr. Herbert Read, of Exeter, from Mr. Harbottle's designs. Mr. Turner, of Honiton, has been the general contractor.

PETERBOROUGH CATHEDRAL.—Mr. J. L. Pearson, R.A., has recently made a further report upon the west front of the cathedral, in which he states that, upon closer examination, he found the north gable very much worse than he had believed it to be when looking at it from a lower level; he therefore reluctantly suggested that this gable should be taken down and rebuilt, and he had requested Mr. John Thompson to furnish estimates of the cost of such work. The other two gables were much in the same condition. In a subsequent communication Mr. Pearson expressed the hope that it might not prove necessary to take down and rebuild the central gable. These reports having been considered at a meeting of the restoration executive committee, it was resolved: "That in view of the fact that the reconstruction of two of the gables of the west front is now for the first time considered necessary by the architect, it is desirable to obtain a second professional opinion as to the best mode of dealing with the present condition of the west front."

SELBY ABBEY.—The vicar and churchwardens of Selby Abbey have just received a report from Mr. C. Hodgson Fowler, F.S.A., architect, of Durham, who had been called in to report upon the condition of the Abbey tower, much anxiety having been felt as to the stability of the upper part. Many portions of the heavy parapet seemed far from safe, and the certainty that the fall of even one stone might do serious damage to the building made it necessary to seek for the best possible advice as to the condition of the tower. Mr. Fowler considers the state of the lower part of the tower satisfactory, but regards the upper part as demanding immediate attention. Although the matter was one about which there could not with safety be much delay, it was nevertheless one which required careful consideration as to the best means to adopt. In the mean time, an estimate had been made as to the cost, which was put down at from £500 to £700.

Lasswade School Board have resolved to build an infant school to accommodate 250 children in Loanhead, from plans by Mr. R. M. Cameron, Edinburgh.

A sub-committee of the Dudley Town Council, appointed to consider the advisability or otherwise of adopting the electric light in the borough, has recommended the corporation to apply for a provisional order empowering it to supply electric light for public purposes, the estimated cost of the undertaking being £25,000.

The east window of the parish church of Green's North has been filled with stained glass at the cost of Miss Catharine Mary Pinckard, as a thank-offering on the attainment of her hundredth birthday. The window is of three lights, and represents the Crucifixion and Resurrection of Our Lord. It was designed and executed by Mr. C. E. Kempe, of London. The venerable donor was present at the memorial service.

The box pulpit in the Wesleyan Chapel at Louth has just been replaced by a rostrum of polished oak, Italian Renaissance in style. The work has been carried out by Mr. Christopher Adlard, from designs by Messrs. Croft and Bentley, architects, of Louth and Grimsby.

COMPETITIONS.

EDINBURGH.—The Lord Provost's Committee of the Edinburgh Town Council have resolved to invite Mr. Alfred Waterhouse, R.A., to act as assessor to assist the corporation in coming to a decision as to which plans for the reconstruction of North Bridge-street shall be awarded the premiums that have been offered.

TORQUAY.—Thirty designs, by local and other architects, were sent in to the town clerk of Torquay on Tuesday for the proposed pavilion pier which is to be erected at a cost not exceeding £5,000. As we announced last week in our "List of Competitions Open," Mr. Alexander Graham, F.S.A., F.R.I.B.A., of Carlton Chambers, S.W., has been appointed by the Torquay Corporation as assessor, and three premiums are offered, of the respective values of 50 guineas, 20 guineas, and 10 guineas.

CHIPS.

The Lord Provost of Glasgow, Sir James Bell, will lay the foundation-stone of the new bridge over the Clyde at Jamaica-street on October 8.

The Garston Urban District Council adopted a scheme on Friday for acquiring the electric light, and decided to ask the Local Government Board to sanction their borrowing £25,000 to carry out the necessary works.

A Local Government Board inquiry was held at the town hall, Eastbourne, on the 3rd inst., by Mr. G. W. Willcocks, as to applications by the town council for sanction to borrow £1,200 for the purchase of land in East-street for a model common lodging-house, £900 for the purchase of the Cavendish-place Fire Station premises, £850 for the purchase of land at Seaside, and £250 for the erection of a weights and measures office. The town clerk and Mr. Gloyse, the borough surveyor, explained the proposals.

The rural district council of Newtownards have adopted plans by Mr. Lamon, C.E., for a supply of water to the village of Mill Isle.

The Dunfermline committee of the Fifeshire County Council are about to carry out extensive works of water supply for Kelty district from plans by Messrs. Leslie and Reed, of Edinburgh. The works will include the construction of an embankment and outlet works at Loch Glow, with filters and tank near Craigenat, and providing and laying about five miles of cast-iron pipes from Loch Glow to Kelty.

The town council of Bury, Lancs., have appointed Dr. J. W. Howarth, of Stockport, as medical officer of health, at a salary of £300 per annum.

On Tuesday week Mr. F. H. Tulloch, M.Inst.C.E., an inspector of the Local Government Board, held an inquiry at Ventnor, relative to the application of the district council for permission to borrow sums of £2,500 for works of sewerage, and £1,708 for street improvements. Mr. A. Houston, town clerk, explained that the proposal was to sewer the newly-annexed district of Lowtherville, or Upper Ventnor, which lies in the valley of the Downs on the Wroxall-road. It will be necessary to construct a tunnel under the high road, commencing 40ft. deep near the old toll gate, with a depth of 70ft. at the cemetery cutting, and falling 1ft. in 120ft., the southern end of the tunnel coming out near St. Alban's Church. The tunnel sewer would have connection with the Castle-road sewer, which has an outfall in the Sea-road at Flower's Bay, at Steephill. The tunnel was to be 2ft. wide and 3ft. 6in. high. Of three schemes submitted to Mr. Francis Newman, county surveyor, this was reported upon as the best. Mr. E. J. Harvey, town surveyor, gave details of the proposals.

The dissolution is announced of the partnership heretofore subsisting between H. Young and J. Lousdale, builders and contractors, Junction Works, Mayall-road, Herne-hill, S.E., under the style of Young and Lonsdale; and also in the case of R. Neill, R. Neill, jun., J. S. Neill, A. R. Neill, and R. W. Neill, builders and contractors, Manchester, under the style of Robert Neill and Sons, so far as regards J. S. Neill.

The City of London Swimming Association are having plans prepared for a proposed swimming bath, to be situated close to Blackfriars Bridge on the foreshore in front of the Royal Hotel. The association have obtained promises of subscriptions to the amount of £5,000, and if the Thames Conservancy authorities will give the site, the Corporation are to be asked to take up the matter and provide the rest of the money. The bath is to be built in the form of an amphitheatre, some 200ft. long and 80ft. wide, with rows of seats rising one above the other. For two-thirds of its length the bath is to be of uniform depth, so as to allow water polo and similar games to be played. The remaining third of the bath is to have a sloping floor.

ARCHITECTURAL & ARCHÆOLOGICAL SOCIETIES.

PLYMOUTH ARCHITECTS AT ST. GERMANS.—The Plymouth, Stonehouse, and Devonport branch of the Devon and Exeter Architectural Society had a pleasant excursion to St. Germans Church on Saturday. Mr. H. G. Luff, the architect for the recent restoration, conducted the party, and pointed out the features of interest, and also produced the plan of the church as it originally stood. The fine old Norman west doorway and towers were carefully inspected by the members, as were also the new choir-stalls, pulpit, and roof, the carving of which has been well executed by Messrs. Harry Hems and Son, of Exeter.

CHIPS.

A new Masonic hall, which has been erected in Front-street, Consett, by Mr. Richard Murray, of Sunderland, was opened on Friday.

It is officially announced that the institution at South Kensington known as the "National Art Training School," will henceforth be styled the "Royal College of Art."

In the Presbyterian church at Glasgar, Banbridge, a tablet has been erected to the memory of the Revs. John and James Rogers. It is of Carrara marble, with side and central pilasters in fluted Cork red marble. The cornice plinths are moulded, and on the pediment is an interlaced monogram. The background is of polished Galway black marble. The work was carried out by Mr. J. E. Emerson, of Newry.

On Thursday in last week Mr. F. H. Tulloch held an inquiry, on behalf of the Local Government Board, at Pokesdown, East Bournemouth, into an application by the district council for permission to borrow sums of £800 for the provision of offices for the council, and £235 for public lighting. The surveyor, Mr. E. W. Ingamells, explained the proposals.

A wooden bridge built over the Whitewater River at Richmond, Indiana, 63 years ago, is now being replaced by a new structure. The bridge was built at Government expense, that for the superstructure having been let in 1833 to Channing and Tindall Madison, who finished it in two years, using for the arches whip-sawed timber. All the work was done by hand, and most of the timbers still show no signs of decay. The stone abutments were, however, nearly destroyed by a recent flood. The old structure is said to have been planned by William Dewey, and completed by Colonel Benjamin Sayre, assisted by Engineers Capt. C. A. Ogden, John Frazier, and Jonathan Knight.

An English company have signified their intention of constructing a railway to the summit of Ben Nevis, provided the necessary consents can be obtained. The projected line is planned to branch off from the West Highland system near Nevis Bridge, passing through Glen Nevis as far as the gorge, and winding up the right side of Corrie Eodham till the summit is reached.

At Morecambe a provisional license has been granted for a large hotel proposed to be built on the site now occupied by the Calton Lodge Estate at the east end of the town, from plans by Messrs. Maxwell and Tuke, of Manchester and Bury. The scheme will involve the expenditure of £50,000. The promoters have acquired about three acres of land, with a frontage of 570ft., and it is intended to demolish some of the existing property on the estate. The hotel will stand in its own grounds, having lawn-tennis courts and a bowling-green. There will be nine private sitting-rooms, in addition to large public rooms, and 82 bedrooms.

The district committee of the Middle Ward of Lanarkshire are about to carry out a scheme of water supply to the village of West Quarter, Strathaven, Overton, Waterloo, Newart-hill, Auchentibbie, Cambuslang, and East Kilbride. Messrs. J. and A. Leslie and Reed, civil engineers, of George-street, Edinburgh, are the engineers, and the tenders for laying pipes were received by the committee yesterday (Thursday).

An iron Wesleyan church built at Peverell Park-road, Mutley, overlooking the Pounds Valley, Plymouth, was opened on Wednesday week. The building, which is a substantial erection, well lighted, and suitable for public worship, has been erected by Mr. C. L. Duke, of Plymouth, from plans prepared by Mr. R. H. Worth. The outlay on building and site has been £1,000.

The new academy, Larkhall, Glasgow (Mr. J. B. Wilson, F.R.I.B.A., architect), is to be lighted with gas on the Stott-Thorp reflex system. The work will be carried out by James Stott and Co., of Glasgow, London, &c. This firm are also about to apply their system of lighting and ventilation at the new drill-halls of the 1st L.R.V., Burnbank, Glasgow.

TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. All communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondents.]

It is particularly requested that all drawings and all communications respecting illustrations or literary matter should be addressed to the EDITOR of the BUILDING NEWS, 332, Strand, W.C., and not to members of the staff by name. Delay is not unfrequently otherwise caused. All drawings and other communications are sent at contributors' risks, and the Editor will not undertake to pay for, or be liable for, unsought contributions.

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ADVERTISEMENT CHARGES.

The charge for Competition and Contract Advertisements, Public Companies, and all official advertisements is 1s. per line of Eight words, the first line counting as two, the minimum charge being 5s. for four lines.

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Front-page Advertisements 2s. per line, and Paragraph Advertisements 1s. per line. No Front-page or Paragraph Advertisement inserted for less than 5s.

Advertisements for the current week must reach the office not later than 3 p.m. on Thursday. Front-page Advertisements and alterations in serial advertisements must reach the office by Tuesday morning to secure insertion.

SITUATIONS.

The charge for advertisements for "Situations Vacant" or "Situations Wanted" is ONE SHILLING FOR TWENTY-FOUR WORDS, and Sixpence for every eight words after. All Situation Advertisements must be prepaid.

NOTICE.

Bound copies of Vol. LXIX. are now ready, and should be ordered early (price Twelve Shillings each), as only a limited number are done up. A few bound volumes of Vols. XXXIX., XL., XLI., XLVI., XLIX., LI., LIII., LIV., LVIII., LIX., LX., LXI., LXII., LXIII., LXIV., LXV., LXVI., LXVII., LXVIII. may still be had, price Twelve Shillings; all the other bound volumes are out of print. Most of the back numbers of former volumes are, however, to be had singly. Subscribers requiring any back numbers to complete volume just ended should order at once, as many of them soon run out of print.

W. M.—MATERIALS.—ALTERATIONS.—The old stones would belong to the building owner, unless it was otherwise agreed between the parties.

F. J. B.—STONE.—CONTRACT.—SPECIFICATION.—The point would turn on the meaning of the term "official specification." But upon the facts you would seem to have a right of action and for relief, on the ground of mistake. Still, the result is rather doubtful.

RECEIVED.—S. J. E.—H. Farmer.—P. A. and Co.—A. W.—Draughtsman.—Chas. Gorton.—D. H. and Co.

Correspondence.

THE EXAMINATION TEST.

To the Editor of the BUILDING NEWS.

SIR,—I have read with interest your able article on "Making an Architect," in last week's issue, and quite agree with you as to the insufficiency of examinations for the purpose. Although useful as a measure for excluding the ignorant and incompetent, the Institute examination is far from being infallible as a test of a man's ability. I have just been looking over an old examination paper. Ten years ago, when I was an assistant and a student, and knew more about the arrangement of Greek temples and abbey churches than the practical everyday requirements of my profession, I could have passed the exam. with very little difficulty; but now, although my practical experience and ability to design and construct are far in excess of what they were then, I could not go through it without spending several months in cramming myself with comparatively useless information, which a man in active practice cannot afford to do.

There is another and more important point. The Institute exam. makes no provision for individual eccentricities or for uninspired moments. For example, the candidate is required to design a building to suit certain requirements and a given site, within a limited time, under the eye of the examiners. How

many men of unquestionable talent and ability are there who would fail in this? I have heard that the late Herr Pöckert could only design at night, or in the small hours of the morning, and I have known a number of other architects with the same failing. There are thousands of brain-workers who can do nothing without complete solitude. In my own case there are days on which it would be utterly impossible to produce a design of any description, however simple; on other occasions I can hardly control my flow of ideas. I must wait for inspiration—I cannot force it. This is a peculiarity which seems mainly confined to architects in practice who have got into the way of making their own time, and as it grows upon one, the older men are most affected. Younger men and assistants, accustomed to office discipline are not, as a rule, much troubled that way.

While admitting the necessity for some test whereby the status of the profession may be maintained, I hold that, until some provision is made for admitting, as Associates, practitioners of experience and recognised standing, who would object to go through the ordeal of an examination, the test devised by the Institute is by no means perfect.—I am, &c.,

Sept. 7. A PROVINCIAL ARCHITECT.

ANOTHER GENEROUS OFFER.

SIR,—I herewith inclose a cutting from a Newcastle newspaper. The proposed infirmary is expected to cost over £100,000; therefore the offer made by the architects mentioned is equal to a gift of about £5,000. I am unable, with the aid of a local directory, to find the name of this generous firm. The address given is a tonsorial artist's shop, and by a curious coincidence, the name on the signboard is the same as that of the first name of the architectural firm.—I am, &c.,

TYNESIDER.

SIR,—As a contribution to the Mayor's suggested fund for the new infirmary, we beg to say we would be quite willing to provide all plans and specification, with the superintending of the new building, entirely free of cost. The same offer will apply to any extension of the present building.—We are, &c.,

PAUL AND BLACKBURN, Architects and Surveyors.
13 and 15, Pilgrim-street, Newcastle, Sept. 4, 1896.

ARCHITECTURAL BOOKS.

SIR,—One of the chief difficulties which architects' pupils and the younger members of the profession generally have to face in the course of their studies is that of procuring the books necessary, many of which are sold at a price far beyond the slender purse of the student.

When I have been reading the advertisements of many serial publications, it has often suggested itself to me, Why cannot some of the more expensive architectural works be issued in a similar way? I have known many young men who, by the expending of sixpence or a shilling a month, have become the possessors of works which otherwise they would perhaps never have had a chance of reading, except in a library. If Gwilt's "Encyclopedia," Chambers's "Civil Architecture," Fergusson's works, and many other similar works could be published in sixpenny or shilling monthly parts, I am sure it would prove a boon to many young men. I suggest this to the various publishers of architectural works, who, I hope, may not consider the "monthly part" *infra dig.* If Messrs. Macmillan can publish Green's "History" in this way, let others follow.—I am, &c., F. H. C.

CLONFERT CATHEDRAL.

SIR,—May I ask the attention of your readers to a most interesting old church, of which I am the incumbent, Clonfert Cathedral? It is situated in the County Galway; eight miles from Ballinasloe Station on the Midland Great Western Railway, and three miles from Banagher on the Great Southern and Western Railway. It was founded by St. Brendan, in the year 558, thirty-nine years before St. Augustine landed in England, and thus before Canterbury Cathedral was founded, and also long before Westminster Abbey, St. Paul's Cathedral, York Minster, Salisbury Cathedral, Winchester Cathedral, or many of the ancient cathedrals, or parish churches, existing at the present day. It has a very chequered and interesting history. It suffered greatly from the incursions of the Danes, who frequently sailed up the river Shannon from Limerick and attacked Clonfert. It was burnt six times between the years 774-1179; and was

plundered three times between the years 949-1065. In the year 1541 it was almost totally destroyed. Bishop Woolley repaired the Cathedral in the year 1664. Since that time, up to the present, a period of over 230 years, some alterations and improvements have been effected, but no general work of restoration has been done; consequently the building is in great need of repair. It is one of the smallest cathedrals in the kingdom, and is considered very beautiful. It is now used as the parish church. It is celebrated for its magnificent 12th-century doorway, one of the finest remaining specimens of Hiberno-Romanesque work in existence. It is also remarkable for its chancel window, nearly a thousand years old, which is similar in design to that of Temple Righ, at Clonmacnoise.

The parish of Clonfert is very large, 27 Irish miles in circumference. There is only a sparse population, consequently the congregation, as in many of the parishes of the west of Ireland, is a small one. Since the disestablishment of the Irish Church there has always been a difficulty in collecting the small amount of annual assessment for the rector's stipend; therefore, much local help cannot be expected for repairs. However, every member of the congregation has contributed to the restoration fund. The late, and the present, bishop of Killaloe and Clonfert, the members of the chapter, all the clergy of the diocese of Clonfert, and other friends have already given or promised me contributions to the fund. Several clergy have kindly allowed me to plead the cause of Clonfert in their pulpits, and have given me the offertory on each occasion. Two years ago it was only intended to ask for a comparatively small sum for the immediate work of necessary repair, to keep the building watertight, so to speak; but on consultation with Mr. J. F. Fuller, F.S.A., architect to the representative body, it was considered better to issue a special appeal for funds, so as to have, if possible, a thorough work of repair and preservation carried out. Mr. Fuller estimated the cost at £1,500, and suggested the carrying out of the work at once, in sections, as money is subscribed. I have collected up to the present from all sources, paid or promised, a sum of £384 10s. 3d. I now most earnestly appeal to all friends of the Church, and to all lovers of antiquity, for contributions to prevent this ancient building from falling into decay. I venture to express a hope that this appeal for the preservation and improvement of such an ancient historic cathedral, which connects the present with the past—the 19th century with the 6th—will not be made in vain. Contributions will be thankfully received by the Lord Bishop of Killaloe and Clonfert, Clarisford House, Killaloe, Co. Clare; the members of the Chapter; the Very Rev. the Dean of Clonfert, Ergenagh Rectory, Omagh, Co. Tyrone; the Ven. the Archdeacon of Clonfert (Sub-Dean), the Deanery, Gort, Co. Galway; the Very Rev. Provost Tibbs (Rural Dean), the Rectory, Ballinasloe; the Rev. Canon Crawford, Woodlawn, Co. Galway; or by—Yours, &c.,

ROBERT McLARNEY, Canon,
Rector of Clonfert.

Banagher, King's County.

NEW SOUTHGATE, N.

SIR,—I wish to call attention to the great need of artisan and other dwellings in this neighbourhood, and to the exceedingly favourable conditions for opening up new estates. There is room for at least 500 dwellings. There is abundance of constant employment; taxes are lower than any surrounding district; land is very cheap, several estates being on the market; it is on the main line G.N.R.; it is most easy of access, and carriage is reasonably low. There has been no building of any consequence for the last 15 years, only one estate being opened in that time, all the houses on which were let before completion some seven years ago. Taxes amount to 5s. 6d. in the £, with no prospect of increase, as compared with 8s. 2d. in adjoining parishes. On the only small building estate now being developed, houses on £40 plots are selling for £500 to £700 with £6 to £9 ground-rent, and letting for £30 to £45 per year.

There is exceedingly great demand for property to let at 8s. to 12s. per week, such houses having quite doubled in value the last ten years. There is an increasing population permanently employed by the G.N.R., the Engineering Co., Stereoscopic Co., County Asylum, Photographic Material and Plate Co., watch-movement makers, &c. The employés of many of the North London drapery

and other stores, the workers at the various Northern Railway depots find it most convenient to live here. This seems the most favourable opportunity for a particularly safe and profitable investment that has has or is likely to occur for years.

This letter is not an advertisement on behalf of any landowner, but an appeal on behalf of a body of working men who, not caring to pay all their wages as rent, are compelled to herd together in small and insanitary rooms, to the great detriment of their health, wealth, and morality.—I am, &c.,
A LOVER OF HEALTHY HOMES.

LEE'S PATENT AUTOMATIC DISINFECTOR.

SIR,—I got one of these, as described in your last issue, and a very cheap and effective little appliance it is. But a caution may save disappointment and accident. It cannot be used at all in some siphon cisterns. You cannot, for instance, get it into Farmiloe's "Wave" cistern—one of the most reliable there is, by the bye. I have three fitted in my house, and have never had an instant's trouble with them. You can get it into Evered's—another good one; but don't forget, as I did, that it displaces a certain quantity of water, and therefore the ball lever requires readjusting, or you will have an overflow, as I did.—I am, &c.,
KAPPA.

CHIPS.

The corrugated iron builders' works of Messrs. Humphrey, at the corners of Ebury Bridge and Buckingham Palace-road, Pimlico, were partly destroyed by fire on Tuesday night. The works consist of a large building of two and three floors, chiefly of corrugated iron, in which were large stores of timber. The fire originated in the stoke-hold, and raged fiercely. The slate works of Messrs. Jones Brothers, adjoining, were damaged by fire.

The permanent collection of the Leeds Art Gallery has been enriched by the gift of a townsman of two oil paintings by Bradford artists—"The Village Mill," by Arnold Priestman, and "Swollen Waters," by Bertram Priestman.

Mr. Brock's statue of the late Bishop Philpott, which was in the Royal Academy this year, was on Saturday unveiled in Worcester Cathedral by the Earl of Coventry. The Bishop is represented as seated in the Episcopal chair. The figure has a conspicuous place in front of the nave organ.

The Sunderland Y.M.C.A., which is in course of elaborate extension, will be ready for opening by the Bishop of Durham on October 19.

A large clock has just been erected in the Town Hall, Hunstanton, by John Smith and Sons, Midland Clock Works, Derby. It is fitted with all the latest improvements, and will doubtless prove a great benefit to the town. The same firm are also erecting a large clock and carillon at Kendal Town Hall.

Within a few weeks, the southern extension of the overhead railway at Liverpool will be an accomplished fact. The whole of the tunnelling will be shortly completed, the permanent way is in a forward condition, the spanning of the Mersey Dock Estate, by a bridge 225ft. in length, is now going on. The terminal station at the Dingle is well in hand, the first of the new engines in the Bramley-Moore generating station is being erected, and the new rolling stock is practically ready.

The corporation of Cardiff are erecting a cholera hospital on Flat Holme Island, in the Bristol Channel, from the designs and under the superintendence of Mr. William Harpur, A.M.I.C.E., borough engineer and surveyor; the contractors are Messrs. Cadwallader and Hockridge, of Cardiff. The wards are being warmed and ventilated throughout by means of Shorland's patent double-fronted Manchester stoves with descending smoke-flues, exhaust roof ventilators, and inlet tubes, the same being supplied by Messrs. E. H. Shorland and Brother, of Manchester.

The Upper District Committee of the Renfrewshire County Council have recommended that Howford Bridge on Crookston-road, over the river Cart, be rebuilt. The present bridge partially collapsed some time ago, when a steam road-roller was engaged in levelling a pipe-track. Messrs. Crouch and Hogg, C.E., Glasgow, have submitted plans for a new bridge, the estimated cost being £5,500.

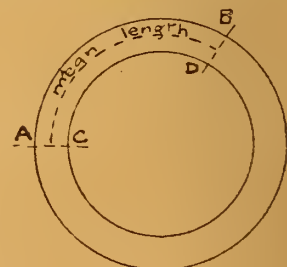
The School of Art Wood Carving Central Technical College, Exhibition-road, South Kensington, has been reopened after the usual summer vacation. One or two of the free studentships, maintained by funds granted to the school by the institute, are vacant. To bring the benefits of the school within the reach of artisans, a remission of half fees for the evening class is made to artisan students connected with the wood-carving trade.

Intercommunication.

REPLIES.

[11540].—**Levels.**—The replies received to my queries regarding levels from G. A. T. Middleton, Sidney N. Glass, and J. W. Lee (the particulars and sketch of which you were kind enough to publish in your issue of Aug. 21st) have compelled me to answer these gentlemen. With reference to G. A. T. Middleton's reply to question 1—that the sill of sewer served as a B.M. and no other was required—I beg to ask him if it is not usual, assuming sill of sewer at point A was taken as a B.M. after the reading at point B was taken, in order to check these readings and prove their accuracy, was it not indeed requisite for the level to be removed and set up in another position, the readings then taken from B back to A? Is the aforementioned method correct or not? This was not done. I therefore say the method of reading level from A to B and there closing was wrong. As regards question 2, is he aware of such a thing as refraction, and the error likely to accrue to levels being taken through glass? Am I right or wrong in objecting to accept levels as being absolutely correct, taken in the aforesaid manner? 3. I refer him to Mr. Greer's reply, the studying of which might be of benefit to him. As regards your correspondent, Sidney N. Glass, the answers to my three questions I pay no attention to, as his improvised level-hook proves to me that his knowledge of levelling and checking levels is limited. For instance, he takes B.M. point A sill of sewer 9'33; then reading point B, and finds between points A and B there is a fall 3'31. So far so good. Where is the check on these levels? He then starts afresh at point A, reading 11'18; then takes fore reading at D 4'72, removes his level to a point somewhere between D and B, takes rear sight 3'27 at point D, then takes reading at point B, sill of M.H. 6'42. Up to this point Mr. Glass's levels are intelligible. Will he explain to me how he gets back to point A with one reading, when it has taken three readings to get from point A to B? He cannot see over, under, or through my house, and if he had followed my sketch carefully he would have spared me an exhibition of his ignorance in attempting to answer my queries. As regards Mr. Lee, to satisfy him that I have an intimate acquaintance with the subject of levelling, I will, for his especial benefit, inform him that the question in dispute is one of *inches*, not of *feet*, and where the health of inmates is likely to be affected by a sewer laid through the house, as in mine, with, as I contend, a backfall, it is then for me to defend my assertions against those of the engineer, who states that there is a fall, thus giving the lie direct to my statements. The methods by which he arrived at his conclusions are, as I have contended since the commencement, incorrect, and impossible to be accepted as correct by anyone having an intimate acquaintance with the subject of levelling. I refer him to my reply to (G. A. T. Middleton) No. 1. As regards 2, the question of refraction, I accept his assumed inaccuracy of '02, which practically is a $\frac{1}{2}$ in. error. Does he not consider me right in still refusing to accept these readings when I tell him the distance between points A and B is about 60ft.? Does the admissible possibility of a $\frac{1}{2}$ in. error not demonstrate the absolute necessity for these levels to be carefully taken and as carefully checked? As regards 3, I refer him to Mr. Greer's reply. I trust Mr. J. W. Lee is not under the impression that I have treated his replies in an ungracious manner. I am at one with Charles Kingsley in saying "Let our hearts be bound as the heart of one man to say that, so far as we have power, so help us God, no man, woman, or child in Britain, be he prince or he be beggar, shall die henceforward of preventable disease." I have already had to mourn the serious loss of one, due to this defective drain and faulty levels, and I intend to prove my statements are, and have been, correct from the commencement. Thus have I sought your aid, through your valuable paper, and am greatly indebted to you for opening your columns to the settlement of the question.—GEORGE R. JOHNSON.

[11541].—**Masonry.**—The length must be obtained at the centre of the thickness. This will give the mean length, which is the correct one. To make this clear, assume the wall as the segment of a circle. See sketch.



It is evident that if the length is obtained by measuring either A B or C D, this would be incorrect. What is required is to average A B and C D, which will give the true or mean length at the centre of the thickness of wall.—ALLEN T. HUSSEL, Ilfracombe.

It transpires that the bank-notes and cheques, which amounted to about £2,000 in value, discovered concealed in the roof of Trevor Hall, Llangollen, the residence of the late Mr. J. C. Edwards, of Ryabon, were hidden there by a member of Colonel Hughes's family between 70 and 80 years ago. There was also found a considerable quantity of rare old oak furniture in the attic. The property, including the bank-notes and cheques, has been removed to Colonel Hughes's residence at Carnarvon.

LEGAL INTELLIGENCE.

BRICKFIELDS AND QUARRIES AND THE FACTORY ACT.—At the Gravesend Police Court on Friday, Mr. William Fletcher, J.P., of Bycliffes, Gravesend, quarry owner, was summoned for employing on his factory, the Hit-or-Miss quarry, six boys each under the age of 16 years without obtaining a medical certificate as to their fitness, and also for not keeping the prescribed register giving particulars of the boys. Mr. F. G. Fraying, from the solicitor's department of the Treasury, prosecuted. Mr. Fletcher admitted the offence, but said that the boys were not directly employed by him, but by a Mr. Dorrners. Their names did not appear on his wages books, and so the matter had slipped his notice. The magistrates fined defendant 3s. 6d. for each boy and 6s. costs, and 10s. 6d. for not keeping a register and 6s. costs. The total amounted to £3 13s. 6d.

IN RE G. AND F. R. TIMEWELL, OF PAIGNTON.—The creditors of George Timewell and Frank Robert Pilditch Timewell, builders, of Paignton, and carrying on business as "G. and F. R. Timewell," held their first meeting at Plymouth on Monday. The statement of accounts showed unsecured creditors for £810 2s. 1d.; fully secured creditors, £1,134 10s. 9d.; while the surplus on the estimated value of securities was £265 9s. 3d. Of £1,948 10s. 4d. gross liabilities, £810 2s. 1d. was expected to rank for dividend, and on this there was a deficiency of £439 3s. 6d. In his observations the Official Receiver noted that the debtors were father and son, and began business at Paignton in October, 1893. The father, George Timewell, put £50 into the business, but the son had no capital. Debtors had previously been journeymen carpenters in Sussex. In their statement debtors showed that they received £2 each per week during the twelve months preceding the date of bankruptcy. Insolvency was attributed to pressure by creditors, and losses on building operations through inability to realise the properties. The Official Receiver considered the assets were over-estimated by the debtors. In their statements of separate estate George Timewell showed no deficiency, and Robert Timewell one of £1 2s. 8d. only. A trustee and a committee were appointed, and the public examination was fixed for to-day (Friday).

Sir Thomas Dawson Brodie, Bart., of Gairloch, Stirlingshire, who died on Monday, aged 64, was an extensive landed proprietor, was principal proprietor of the Carron Ironworks, and Writer to the Signet in Edinburgh. He was in 1892 created a baronet, but as he leaves no family the title dies with him.

The large block of artisans' dwellings erected by the Manchester, Sheffield, and Lincolnshire Railway Co., at St. John's Wood, from designs by Mr. Alexander R. Stenning, are approaching completion. They are situated between the Regent's Canal and Grove-road, and St. John's Wood-road, and cover an area of 4½ acres. They are built in six blocks, each five stories in height, and 375ft. front, and are faced with yellow stocks and red bricks, the roofs being flat and asphalted. The cost has been about a quarter of a million, and accommodation is provided for 2,700 persons.

The new schools at Nanlyffyllon (Tywith) were opened on the 21st ult., the accommodation being: mixed 310, infants 200, and space is arranged in the playground for a future girls' school. The schools are two of nine designed by Mr. E. W. Burnett, Tondū, Bridgend, for the Cwmdd and Llangynwyd Higher School Board.

A new pulpit has been placed in the church of St. Margaret, Stoke Golding, near Nuneaton, and it forms quite an attractive piece of ornamentation to the interior of the old pile. Messrs. Jones and Willis, of Birmingham, have carried out the work, and the design corresponds with the chancel screen, the pulpit being of oak, carved, and is in the Decorated style.

The Worcestershire County Council adopted on Monday a report by the asylum committee recommending the enlargement of the city and county lunatic asylum at Powick, at an estimated cost of £19,000.

The Bristol Docks Committee, who have had under consideration a proposal to provide lock accommodation at Avonmouth Dock for larger vessels than at present, have received a report from their surveyor recommending that this lock be lengthened, at an estimated cost of £45,000. It has been decided to seek the advice of Mr. J. Wolfe Barry, C.B., before coming to a decision on the point.

Sir Barrington Simeon, M.P., on Tuesday opened at Southampton a new grammar school, which is to take the place of the historic King Edward VI. School, in Bugle-street, near the house occupied by Dr. Watts, the celebrated divine and hymn writer. The new school is situated in close proximity to the West Station, and about £12,000 has been spent on the building, though it is not yet completed.

WATER SUPPLY AND SANITARY MATTERS.

BELFAST.—A meeting of the city council in committee was held on Monday, when an important report relative to the sanitary condition of houses in the city was submitted by the medical superintendent officer of health and the executive sanitary officer. The report stated that there are upwards of 22,000 houses, chiefly occupied by the working classes, which have no back doors, and consequently all refuse matter has to be carried through the dwellings to the public street. In the case of many thousands of houses decomposing matter is retained for months within a few feet of the houses themselves. The radical cure for this state of things, the report pointed out, would be to close up all such houses as being unfit for human habitation, but this would mean the turning out of house and home of a population of about 100,000 people; and the providing of suitable dwellings for such a number of persons would be simply impossible. In this case the remedy would be worse than the disease. The report went on to say:—"After giving this subject the most careful consideration for several years and experimenting upon it several ways, we are of opinion that the old system must be abolished and be replaced by some system more in accordance with modern sanitary science; and that the removal of refuse matter from houses, instead of being quarterly, must be made weekly or daily where practicable." Other remedies were suggested in detail. The report was referred to a joint committee.

LEIGH, LANCS.—The district council of Leigh have received sanction from the Local Government Board to the borrowing of £33,548 for an improvement scheme by which Market-street, one of the principal thoroughfares of the town, which at present is a narrow and irregularly constructed street, varying from 18ft. to 46ft. wide, will be made a uniform width of 52ft. A large block of business premises is to be demolished, and for the destruction of these buildings heavy compensation is claimed. Already claims have been received from owners and lessees to the amount of £18,141 16s. 11d., and the district council have called upon the Local Government Board to appoint an arbitrator. Important improvements are also to be effected in Bradshawgate and Chapel-street, Leigh, and the provision of a new fever hospital is being rapidly pushed forward. An extensive sewerage scheme is also being carried out for the district at a cost of between £40,000 and £50,000.

MANCHESTER.—The city surveyor, Mr. T. de Courcy Meade, M.Inst.C.E., has presented to the Corporation Rivers Committee an exhaustive report dealing with the whole question of the main drainage of the city. The Corporation have, at an enormous cost, constructed sewage works at Davyhulme, outside the city, and have carried out a main drainage scheme to connect the city with the works. It has been found that precipitation cannot effectually clarify the sewage. The report discusses the subject under three heads: the treatment by filtration through land; by the construction of artificial filters; and the removal of the effluent sewage to the tidal waters of the River Mersey. After a minute examination of schemes for land filtration and artificial filtration, he comes to the conclusion that neither of them can be recommended for adoption. The charges entailed would be enormous, and the results far from satisfactory. He then propounds a scheme for the conveyance of the effluent sewage to the tidal waters of the Mersey. The point suggested for the admission of the effluent to the Mersey is on the south side of the estuary, and the conduit which would have to be constructed would follow approximately the line of the Ship Canal on the south side, the total length being 15½ miles, with a capacity to carry 70 million gallons a day. The cost of the scheme would not exceed £258,000, and the estimated annual charges for working the sluices and inspection would not be more than £200. The plan has been submitted to Sir Benjamin Baker, and has received his general approval, on the grounds of cost and efficiency, whilst he thinks it would give less trouble in the future and be more free from unforeseen contingencies than any other alternative. The scheme has also been generally approved by Mr. James Mansergh, C.E. The report of the committee recommending the adoption of Mr. Meade's conduit scheme, was presented to the corporation at a special meeting held on Wednesday.

NEWPORT, ISLE OF WIGHT.—The sewage outfall works carried out for the corporation of Newport, at a cost of £10,000 (including the reconstruction of the sewers), were opened by the mayor of that borough on Wednesday week. The precipitating-tanks, three in number, are situated below the surface outside the building. The machinery and apparatus within the works include lime-vats, acid-vats, lime-grinders, and sludge-pumps, all in duplicate, and three filter-presses, with a 6H.P. steam-engine to work the main part of the machinery. The sewage brought by the main sewer to the top part of the building is first of all mixed with cream of lime, which has been prepared by the lime-grinders, and passes on in a liquid state to the vats; it then

flows on beneath the chemical vats, where it will be treated with sulphate of alumina. After being agitated in the well adjoining, the sewage proceeds to the tanks, where precipitation of the flocculent matter takes place. By means of floating valves the effluent is drawn off, and will be discharged in an innocuous state into the river. The sludge is afterwards mixed with five per cent. of lime, and lifted by the duplex pumps into the filter presses, where the remaining moisture is extracted. This latter, being impregnated with lime, is extremely alkaline, and will be returned to the main sewer, thereby effecting a saving in the use of lime. Five and a half tons of liquid sludge will be reduced to one ton of pressed sludge, which is void of any obnoxious odour, and will be sold for fertilising purposes. Mr. Baldwin Latham, C.E., was the engineer, Mr. Henry Hill the contractor, Mr. J. Hall Hill the resident engineer, and Mr. G. Cooke the clerk of works.

CHIPS.

A large stean laundry, which has been erected at Cardwell Bay, near Gourock, was opened on Monday. The building, which is built of brick, is 100ft. square, while there are smaller outhouses. Mr. Steel, of Gourock, was the contractor.

A proposal to acquire Rock Ferry and New Ferry by the Birkenhead Corporation, for the sum of £20,000, will be considered by the Birkenhead Town Council to-day, Friday.

A cookery centre has just been added to the Elm-grove board schools, Brighton, at a cost of £1,200. Messrs. Simpson and Son were the architects, and Messrs. Botting and Son, also of Brighton, were the builders. Accommodation is provided for 56 pupils at one time.

Sir Joseph Archie Crowe, the British Commercial Attaché for Europe, who died on Sunday, aged 71 years, will be best remembered by our readers as an accomplished art critic, and as having been, conjointly with Mr. Cavalcaselle, the author of several works on art, including "Early Flemish Painters" (1857 and 1872), "History of Painting in Italy" (1864), "History of Painting in North Italy" (1871), "Life of Titian" (1877), and "Life of Raphael." Sir Joseph also edited Waagen's "Handbook of Italian Painting." He was the elder brother of Mr. Eyre Crowe, A.R.A.

Albion Hall, Crown-street, Liverpool, a disused Baptist chapel, was reopened on Sunday as a Beth Hamedrash, after internal alteration to suit the new requirements.

The preliminary steps are at last being taken in the proposal for the erection of artisans' dwellings at the Hat Case, Sunderland, until recently a slum neighbourhood. The Sunderland Corporation have invited designs from architects, for which they offer premiums ranging from £50 to £20.

The pier which has been erected at Bangor, from the designs of Mr. John J. Webster, C.E., was on Saturday formally opened for passenger traffic. It has a steel superstructure of braced arch girders with transverse steel joints, and longitudinal timber posts carried on cast-iron columns, and the total length is 1,500ft.

At a cost of £5,350, raised by subscriptions, a vacant piece of land in East-street, in a densely-populated district opening out of Walworth-road, has been secured as an open space. It will be laid out at a further outlay of £1,000 by the Metropolitan Gardens Association. Major Lewis H. Isaacs, F.R.I.B.A., has shown his interest in the locality he represented in Parliament from 1886 till 1892 by promising 100 guineas for the erection of a fountain in the grounds.

At Prestatyn, on Tuesday, a dedication service was held on the occasion of the laying of the foundation-stone of a new building which is being erected to replace the present national school premises. The building will cost £735, and will accommodate 212 children. The architect is Mr. Taylor, of Rhyl, and Mr. H. T. Roberts, Rhyl, is the builder.

The jubilee of the co-operative society in the newly-incorporated borough of Todmorden is being celebrated by the gift to the town by the members of a free library, to be built in a central situation at Strand. The architect is Mr. T. H. Mitchell, of Todmorden, and the principal contractor is Mr. B. Lumb. The exterior will be of Yorkshire stone, and the roof will be covered with green Westmoreland slates. Inside there will be a library-room, 38ft. by 26ft., and a space 25ft. by 17ft. will be left for extensions. There will be accommodation for 26,000 volumes when the extensions are carried out. On the right of the entrance corridor there will be a reading-room, 56ft. by 25ft., divided in the centre by a colonnade. There will be a reference section, another for periodicals and newspapers, and ladies' and boys' reading-rooms. The whole of the rooms will have wood-block flooring, with the exception of the lavatories, which will be paved with tiles.

STAINED GLASS.

WICKHAMBREAU, KENT.—The east window of the parish church has been fitted with stained glass as a memorial to the late Mrs. Duer Gallatin at the cost of her son, Count James Gallatin, of New York, and is the first church window in American glass imported to Europe. It was designed and executed by Baron Arild Rosenkrantz, a yearly exhibitor at the Paris Salon. The window is 18ft. high by 12ft. broad, divided by four lights below, with tracery in the Late Perpendicular style, giving eight small lights above. The subject of the design is the Annunciation.

CHIPS.

A serious accident befell Mr. John M'Ildowie, building contractor, Annan, on Monday. While superintending the masonry of the mansion-house of Milk-bank, in course of erection, Mr. M'Ildowie slipped and fell from a height of 40ft. Besides internal injury, he sustained concussion of the brain, a broken jaw, and a fractured limb. Little hope is entertained of his recovery.

The proposed Technical Education College at Sunderland is likely to cost £15,000 to £17,000.

A memorial to the late Archdeacon Denison has just been erected in the church at East Brent. The monument consists of a massive and coped body-stone of grey Dartmoor granite, a monolith in itself weighing in its finished state over two and a half tons. At the head is a low cross, whose shaft and arms are octagonal, and made of the same material. The inscription occurs on both sides of the bevelled top, and is in inlaid metal letters. The work has been carried out by Messrs. Harry Hems and Sons, of Exeter, who just before the venerable archdeacon's demise restored the Mediaeval churchyard cross at East Brent.

Mr. Charles Bartberger, one of the oldest architects of Pittsburgh, Pennsylvania, died August 19. He was born in Germany, and graduated from the polytechnic school at Karlsruhe. He entered the Government service, but emigrated to Pittsburgh in 1845, and was one of the pioneers among educated architects in that region. He built about 200 churches and other buildings in Western Pennsylvania, Eastern Ohio, and vicinity.

Mr. Robert H. Bicknell, C.E., Local Government Board Inspector, held an inquiry at the Guildhall, Canterbury, on Tuesday week, with respect to the application of the town council to borrow two loans—viz., £6,000 for works of paving and £700 for street improvements.

The new church of the Holy Trinity at Torquay, built at a cost of £12,000, will shortly be consecrated by the Bishop of Exeter. It is Early English in style, and consists of nave, with aisles, transepts, and chancel; while at the north-west corner of nave is a tower and spire, rising to a height of 162ft. Messrs. Vanstone and Mumford, of Torquay, are the builders, and Mr. E. W. Meredith is the clerk of works.

The Belgian historical artist, Victor Lagye, died at Antwerp on Wednesday week. He was a native of Ghent, where he was born in 1825. To complete his studies, he went to Italy at the age of 16, and remained there for some years. He returned to his native country to paint a series of scenes from the modern history of Belgium for the Government. He afterwards settled in Antwerp, where Baron Leys was founding a new school of historical painters. Here Lagye did some of his best work, notably the panels in the marriage hall of the Hotel de Ville, which illustrate the history of the marriage ceremony as performed in the different ages.

After litigation and much delay, the city council of Canterbury have succeeded in making good the claim to the bequest made them by the late Dr. Beasley, of Melbourne, and at the last meeting they provisionally approved plans prepared by the city surveyor for a new museum, twice the size of the existing one. The fresh site, that now occupied by the Greyhound Inn, has cost £4,200, and the estimated cost of the museum is £6,500.

The alterations which are being made by the L. and N.W.R. Co., at Crewe Station are not likely to be completed for three years, possibly five. The tunnelling operations have not really yet been started, although several hundred navvies have been at work ever since the spring. Work has been confined largely to laying down of plant, and the erection of buildings. New steam sheds are to be erected about a mile from those at present in use. Mr. F. W. Webb has sent to the town council a plan for a new enginemens and brakesmen's lodging house for the Gresty-road site. It is to be three stories high; provision is being made for 72 beds, and other accommodation for 100 men. The new schools which the Railway Co. are erecting on the Britannia ground is part of the same big scheme. The neighbourhood of Gresty-road has of late years grown extensively, and the company's alterations are likely to give an impetus to the builders of dwelling-houses in that suburb.

Our Office Table.

MR. G. F. WATTS and Mr. W. Q. Orchardson have, it is stated, refused to accept the presidency of the Royal Academy—Mr. Watts on account of his advanced years, and Mr. Orchardson because he does not care to spare the time for the official and social duties which attach to the post. Mr. E. J. Poynter is now regarded as the most likely successor to the late Sir John Millais. He is the director of the National Gallery; but that cannot be considered an insuperable barrier to his appointment, as Sir Charles Eastlake held the same office during his term as P.R.A.

The fourth annual congress of the National Association of Slate Merchants and Slaters was held at Llandudno on Tuesday. The chair was occupied by the president, Mr. A. B. Partridge, of the firm of Ellis, Partridge, and Co., of Leicester, Bristol, and London. The members left Llandudno by special train for Festiniog, in the centre of the quarry district of North Wales, and inspected various quarries, being escorted by Mr. J. E. Greaves, Lord Lieutenant of Carnarvonshire, a partner in one of the principal quarries, and other gentlemen. At Oakley quarries a large blast had been arranged; a rock containing thousands of tons of material had been bored in five places, each hole being 10ft. in depth, and filled with gelignite. At the appointed time a fuse was fired, and, seven minutes later, there was a terrible explosion, and the huge rock rose and was shattered into hundreds of fragments, the blast being one of the most successful ever fired in the Welsh quarry district. Luncheon was served at Festiniog, and in the evening the members were entertained at a dinner by the quarry proprietors at Portmadoc, Mr. Greaves presiding. On Wednesday, the members were entertained by the quarry proprietors at Blaenau-Festiniog; yesterday, Thursday, by the Hon. W. W. Vivian, at Port Dinorwic; and to-day by Mr. E. A. Young, the agent to Lord Penrhyn.

The Sanitary Institute announces that the twenty-second London course of lectures and demonstrations for sanitary officers and students will be held on Mondays and Thursdays at 8 p.m., commencing on the 28th inst., with an introductory lecture by Mr. A. Wynter Blyth on "The Education, Status, and Emoluments of Sanitary Officers," and closing on Thursday, November 26, with an address on "Scavenging and Disposal of House Refuse," by Mr. Charles Mazon, A.R.I.B.A., the surveyor to the vestry of St. Martin-in-the-Fields. These lectures have been arranged by the Sanitary Institute for the special instruction of those desirous of obtaining knowledge of the duties of sanitary officers, and of other persons desirous of obtaining requirements and a practical knowledge of sanitary regulations. The various subjects will be dealt with in a course of eighteen lectures, given by well-known authorities, including, besides those already named, Professor T. Roger Smith, F.R.I.B.A. (who will deal on October 9th with "Sanitary Building Construction"), Professors Henry Robinson, W. H. Corfield, and A. Boslock Hill, Drs. H. Marley, Louis Parkes, J. J. F. Sykes, H. R. Kenwood, Alfred Hill, and George Reid, and Messrs. J. Wallace Peggs, J. Wright Clarke, and W. C. Tyndale, and will be illustrated with diagrams, drawings, models, and lantern slides. The lectures will include the subjects scheduled for the examinations of the Institute. Inspections and demonstrations have been arranged in connection with the lectures, and will include visits to disinfecting stations, dairy premises, municipal depots, Artisans' dwellings, refuse and sewage disposal works, offensive trades, casual wards, waterworks, common lodging-houses, sanitary works in progress, and other public and private works illustrative of sanitary practice and administration.

A LARGELY-ATTENDED public meeting was held in the Market-square, Coventry, on Monday evening, convened by the Artisans' Dwellings Committee, to consider the inadequacy of the house accommodation in the city. Mr. J. Henton (secretary of the Amalgamated Carpenters' Society) said that regarding the houses that were about to be erected by private firms, the 763 houses on the Red-lane estate would all be swallowed up by the employes of the new tube factory. The 200 houses about to be erected by the Pneumatic Tire Company were for their own workpeople. The general public would have to look to the corporation for the remedy. Mr. S. G. Poole

said that during the last four years the corporation had bought at exorbitant prices and pulled down some 300 houses. They had only encouraged speculation in slum property. He cited several instances in which the corporation had gone against private enterprise. The builders had not been building when the houses were most wanted, and therefore it was the council's duty to build. He proposed "That this meeting is of opinion that the time has arrived when the council should put into force the powers they possess under the Housing of the Working Classes Act, 1890, and thus put an end to the disgraceful overcrowding that exists in the city." Mr. G. Newcombe seconded the resolution, which was carried unanimously. The receipt of this communication and of a report from the Artisans' Dwellings Committee led to a prolonged and vivacious discussion at Tuesday's meeting of the Coventry City Council. Complaints were made by members as to the dangerously overcrowded state of the city and the insanitary character of many of the dwellings, it being asserted that in certain areas the death rate is as high as 60 per 1,000. The consideration of the question was eventually adjourned for a fortnight.

The twenty-second annual congress of the Sanitary Association of Scotland was held in Dumfries on Friday, when the annual business meeting was held in the Town Hall, under the presidency of Mr. Gilbert Thouson, C.E., Glasgow. The following gentlemen were appointed to office for the ensuing year:—Mr. Johnstone Douglas, of Comlongan Castle, Convener of Dumfriesshire, honorary president; Dr. G. B. Russell, Glasgow, president; Mr. Gilbert Thompson, C.E., Glasgow, and Dr. A. K. Chalmers, Glasgow, vice-presidents; Mr. George Middleton, solicitor, Glasgow, secretary; Mr. J. C. Stobo, Rutherglen, treasurer. The Council's report showed that they had brought the fact that the diploma of the Association to sanitary inspectors was not recognised under the English Local Government Board before the attention of the Local Government Board, who were now considering the matter. Three examinations had been conducted by the board of examiners; 51 candidates presented themselves, and 34 of these obtained certificates of competency to discharge the duties of sanitary inspector. An expression of regret for the death of Mr. W. Paton Buchan, of Glasgow, one of the board of examiners, was minuted, as well as an expression of the board's indebtedness to Mr. D. M. Alexander, the retiring secretary. It was resolved to hold the next Congress in Dundee.

The Wolverhampton Board of Guardians received at their last meeting a report from a committee relative to the proposed extension of the new workhouse. The committee stated that they had made inquiries as to, and had inspected, various lots of land in the neighbourhood which had been offered for the purpose of providing additional accommodation for indoor paupers, and they recommended the guardians to purchase the Perry Hall Farm, at a cost of £6,700. The property consists of a farmhouse, buildings, three cottages, gardens, and 26 pieces of land, containing altogether nearly 182 acres. Of this, 20 acres is in Short Heath parish, and the remainder in Wednesfield parish. At the nearest point it is 3½ miles from the union offices, and at the furthest about four miles. The estimated cost of erecting a new workhouse, including the price of land, is set down at £92,700, and the cost of erecting infirmary and insane wards is estimated at £48,300. The calculations are based upon information obtained as to the cost of building a new workhouse upon plans approved by the Local Government Board. It was decided to discuss the matter on Friday, October 9.

The Commissioners of Northern Lighthouses have approved of the erection of a new lighthouse and fog-signal station at Blackhead, about three miles north of Portpatrick Harbour, on the east or Galloway coast of the Irish Channel. The Blackhead is a bold promontory overlooking a treacherous range of coast stretching northward to the Galdenoch Point, whence the land recedes to Corsewall and Milleur Point at the entrance to Lochryan. The highest portion of the Head is 200ft. above sea-level, and on the south side of the Head there is a small bay with a sandy beach. The commissioners propose as the characteristic for a light at Blackhead, group flashing, giving two flashes in quick succession every half-minute.

M. DE SELVES, the new Prefect of the Seine,

who exercises bureaucratic control over the municipality of Paris, has just inaugurated a reform that will be watched with interest beyond the borders of France. To keep the Municipal Council of Paris from indulging in vagaries of which future generations may repent, M. de Selves has created a non-elective committee of works, with advisory powers only, its duty being to report to the council on all plans involving the harmony and beauty of the capital as a whole. He proposes to appoint the architects Garnier and Boileau; the painters Detaille and Puvion de Chavannes; the sculptors Dubois and Barrias, and the engineers Denfor, Bourdais, and Badois to act as independent members, with an equal number of official colleagues chosen from the highest ranks of the public administration.

The members of the Newcastle Society of Antiquaries will visit Allendale and the vale of Whitfield on Monday week, the 21st inst.

The town commissioners of Peel, Isle of Man, further discussed at the last meeting the inadequacy of the accommodation at the town offices, and it was decided to take steps for the provincial new public offices, the selection of a site to be dealt with at as early a date as possible by a committee of the whole board.

At the Edinburgh Dean of Guild Court on Friday a warrant was granted for the erection of a new church at Fountain Hall-road. Mayfield United Presbyterian Church—for this is the name by which it is to be known—will be seated to hold 600. Early English in style, the church will consist of an nave, transepts, and a chancel, together with an organ chamber. The plans do not show any gallery. At the back there will be a large hall, a session hall, vestry, and ladies' waiting-room.

The Congress of the British Archaeological Association, which is to be held this year in London, will be opened by the Lord Mayor at the Mansion House on Monday week, the 21st inst.

The church of the Divine Unity in New Bridge-street, Newcastle-on-Tyne, was reopened on Sunday, after improvement. The work undertaken included a new scheme of hot-water heating throughout the building by Messrs. Henry Walker and Son, Ltd., of Newcastle, and a complete installation of electric lighting, put in by Messrs. C. A. Parsons and Co., Heaton. The schoolrooms have been decorated by Mr. G. G. Laidler, while some minor improvements have been carried out by Mr. F. C. Slater, builder, and Messrs. Bainbridge and Co.

Good progress is being made with the new harbour for Hastings, which will be completed in about two years. Mr. A. E. Carey is the chief engineer; Mr. T. W. Barber the resident engineer. The contractors are Messrs. Punchard, McTaggart, Lowther, and Co. The works are to the east of the fish market, and an area of 26 acres, with a low-water depth of 14ft., will be inclosed by two piers, the western one 1,750ft. in length, and the eastern one 610ft. seawards of an existing groyne.

The new Trocadero restaurant, belonging to Messrs. J. Lyons and Co., and situated in Shaftesbury-avenue, has been fitted with three suspended hydraulic lifts, by Messrs. R. Waygood and Co., Ltd., of Falmouth-road, S.E. Two of these, one for passenger and the other for goods service, are fitted with an improved triple-power water-saving apparatus, the advantage claimed for which is that the amount of water used in working is proportionate to the load raised, so that a saving is thereby automatically effected which is not possible with the ordinary arrangement. Both these lifts are capable of raising about 2cwt. on the first power, 6cwt. on the second power, and 10cwt. on the maximum power. The passenger lift travels up to the third floor, a distance of 51ft.; the triple-power goods lift up to the fifth floor, about 70ft.; while the other goods lift, with the ordinary arrangement, travels a distance of about 22ft., and can take up 10cwt.

The first of the five homes for sufferers from consumption, which are being erected by Mr. William Quarrier at Bridge of Weir, was formally opened on Friday by Lady Glen Coats. The building is partly two stories and partly three stories in height. On the ground floor there are a recreation-room, a corridor for exercising patients, and nine wards and single apartments for patients' use, in addition to the matron's parlour and attendants' rooms. The first floor contains a dining-room, a quiet-room, an exercising corridor, and nine wards and single apartments; while the upper floor contains kitchen, scullery, and store-rooms, two wards for convalescents, besides Turkish, Russian, and other baths, and an inhalation room. A new bath, where warm earth will be placed round the patient, is to be erected, and another of the healing agencies is to be a sun bath. The total accommodation for patients provided is forty beds.

Trade News.

WAGES MOVEMENTS.

AMALGAMATED SOCIETY OF CARPENTERS AND JOINERS.—In his monthly report to the members of this society, Mr. F. Chandler, the secretary, states that trade continues in a very satisfactory condition. Members are requested to call upon the branch secretaries at Woking, Bromley, Wolverhampton, Great Yarmouth, Smethwick, Birkenhead, Croydon, Rotherham, Plymouth, Rugby, and Bingley before accepting employment in these places; and also to see either the secretary of the United Trades Council or one of the branch secretaries in the Tyne district before seeking work at Newcastle; and to keep away from Nantwich, Chorley, and Winsford pending a settlement of the trade movements in these towns.

THE POTTERIES.—A meeting of the district branches of the National Association of Builders was held at Hanley on Thursday night in last week, Mr. J. Gallimore presiding. A deputation was appointed to meet the Master Brickmakers' Association in reference to the seven days' notice sent out by them raising the price of bricks about 4s. per thousand. It was stated that these prices, following upon the recent advance in bricklayers' and labourers' wages, and the adoption by the various towns of the model building by-laws, would stagnate the builders' trade, and the result of the rise to some who had taken contracts at the old price of bricks would be serious.

LEEDS.—The strike in the building trade still drags on its weary course, being now in its seventeenth week, and the prospect of an early settlement seems as hopeless as ever. There are now about 300 builders' labourers out of work, all of whom are receiving 10s. a week strike pay. In the event of the dispute being prolonged into the winter months, it is expected that a number of the men will be able to find employment in the gasworks.

CHIPS.

An oil painting, "Jephthah's Rash Vow," by Romanilla c. 1664, has been bequeathed to the Art Gallery at Sunderland.

The Burns chair in the possession of the Queen, which has been contributed to the Glasgow Burns Exhibition, was placed in the exhibition on Monday. The chair is an arm one in the Gothic style, and is highly ornamented. The spandrels support a brass plate, on which is engraved the poem "Tam O'Shanter," and at the base of the back there is inserted in a glass frame an inscription written on parchment, giving the history of the chair.

W. and R. Leggott, Limited, at the general meeting of shareholders, held at the registered offices of the company at Bradford, declared a further dividend of three per cent. for the half-year, making six per cent. for the year.

Mr. Walter A. Ducat held an inquiry at the Mechanics' Hall, Barnoldswick, on Tuesday, relative to an application of the urban council for power to borrow £2,200 for sewerage and sewage disposal, and £1,000 for water main extensions. Mr. Holt, of the firm of Brierley and Holt, of Blackburn, engineers, explained the plans.

On Monday, at the Colne Town Council monthly meeting, Mr. T. H. Hartley, Colne, was unanimously appointed surveyor to the corporation, at a salary of £120 per annum. Mr. John Taylor, of Yeovil, was appointed borough surveyor's assistant, at a salary of £100 per annum. There were 53 applications.

Towards the £1,000 required for the statue of Sir William Grey, to be erected in West Hartlepool, over £800 has been subscribed.

On the invitation of Mr. H. H. Wake, M.Inst.C.E., the members of the Newcastle Association of Students, in connection with the Institution of Civil Engineers, will visit the foreshore works of the River Wear Commissioners to-morrow (Saturday), the inspection including the plant, works, and sand-pump at Roker Pier.

Reopening services were held on Friday in the Free West Church, Perth, which has undergone redecorating, as well as having an organ introduced and a suite of new halls built. The cost of the improvements and additions has been over £3,000.

A new school-chapel, designed by Messrs. Pugin, was opened at Skerton, Lancaster, on Sept. 3rd. The contractor was Mr. Wm. Harrison, of Lancaster.

The principal subject discussed at Tuesday's meeting of the Edinburgh Town Council was the proposal to erect a chief fire-station at the Cattle Market in Lauriston. The question was raised on the minutes, and approved anew by 20 votes to 12. The previous voting showed a bare majority for the proposal—17 votes to 16.

The business in the Estate Market has been very slack of late, the total for last week at Tokenhouse-yard having been only £13,997.

At the last meeting of the Leeds Town Council, the salary of Mr. T. A. Prince, who has been the highway surveyor for the last ten years, was raised from £250 to £300 a year, and that of Mr. George F. Carter, assistant engineer of the insanitary areas department, was increased from £200 to £250.

New board schools in Mawney's-road, Romford, were opened last week. They accommodate 650 children, and have been built at a cost of £10,000, from plans by Mr. Charles Bell, of London. Messrs. J. S. Hammond and Son, of Romford, were the contractors.

On Monday week the foundation-stone was laid of a new church at Vron, near Wrexham. The site has been given by the owners of the College Estate, while the bricks required will be made and given by the Vron Colliery Company. The new building, which is dedicated to St. Alban, will be a plain brick structure, with nave and choir. It will seat 265, and the cost will be about £600.

At Friday's meeting of the Darlington Town Council, Mr. Hawksley, C.E., was instructed to prepare plans for a new gas-holder.

At Friday's meeting of the works committee of Aberdeen Harbour Board, it was resolved that Mr. R. G. Nicol, C.E., should be appointed permanent engineer, and that his salary should be raised from £350 to £500.

The City of Venice has announced its intention of holding a second International Art Exhibition, to contain pictures, sculptures, etchings, and drawings, from April 22 to October 31, 1897. Prizes for the best works to the amount of not less than 40,000 lire will be awarded by an international jury of artists. The Municipality of Venice will grant three prizes of 1,500, 1,000, and 500 lire respectively for the best critical essays on the exhibition, published during the first month after the opening. Artists must give notice of their intention to exhibit not later than January 1.

The organ at the Temple Church, which was built in 1688 by Bernard Smith, is being repaired by Messrs. Norman Brothers and Beard, of Norwich, who are bringing the mechanism up to date by placing pneumatic arrangements for the draw-stops and combination pistons under the keys. The organ is also to be revoiced, and tubular pneumatic action is to replace all the old conveyances. One new stop will also be added. The work is to be completed by October 4.

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LIST OF COMPETITIONS OPEN.

Sheffield—Pupil Teachers' Centre on Corner Site (local compctn.)	£25, £10	J. F. Moss, School Board Offices, Sheffield	Sept. 14
Newport, Shropshire—Agricultural School	£45, £25, £10	C. R. Liddle, Solicitor to Adams' Charity, Newport, Salop	" 25
Farnham—School Infirmary		E. Kempson, Clerk to Managers, 121, West-street, Farnham	Oct. 13
Gorton—Laying Out Cemetery	30gs.	R. T. Holland, Clerk, Town Hall, Gorton	" 24
Belfast—New City Hall (Assessors, A. Waterhouse, R.A., and J. C. Bretnland)	£300 divided	S. Black, Clerk to Corporation, Belfast	" 25
Poplar—Coroner's Court, Mortuary	£30, £20	W. H. Farnfield, Clerk, 117, High-street, Poplar	" 26
Malmö, Sweden—New Gasworks	3,000, 2,000, & 1,500 Swedish crowns	Corporation Gas Works Offices, Malmö, Sweden	Nov. 1
Bootle—North Board School for 1,000 children	No premium	F. K. Wilson, Clerk, Balliol-road, Bootle	" 11
Newport, Mon.—Hospital (£16,000 limit of cost)	£100, £50	J. K. Stone, Secy., 39, High-street, Newport	Dec. 1
Rhos-on-Sea, Colwyn Bay—Laying-out Building Estate.	£100, £30, £10	J. F. Kent, Rhos Abbey, North Wales	" 5
St. Gilles, near Brussels—Town Hall (£42,000 limit of cost).	£160 and two lesser premiums	Municipal Authority, St. Gilles, Belgium	Feb. 1
Sunderland Corporation—Artisans' Dwellings	£50, £30, £20	Town Clerk, Sunderland	"

LIST OF TENDERS OPEN.

BUILDINGS.			
Weston, near Bath—Brewery	Bath Brewery, Limited	G. Adlam and Sons, Engineers, Bristol	Sept. 14
Snaith—Police-Court and Station	West Riding County Council	J. Vickers Edwards, County Surveyor, Wakefield	" 14
Pateley Bridge—Petty Sessions Room	West Riding County Council	J. Vickers Edwards, County Surveyor, Wakefield	" 14
Edinburgh—St. John's Hill Industrial School	Edinburgh School Board	Robt. Wilson, Architect, 3, Queen-street, Edinburgh	" 14
Edinburgh—Abbeyhill Police Station	Town Council	R. Morham, Supt. of Works, City Chambers, Edinburgh	" 14
Llandilo Station—Waiting Rooms	Great Western Railway Co.	Engineer, Neath Station	" 15
Llanganech—Villa		J. Davies and Son, Architects, Corvell House, Llanelly	" 15
Belturbet, Ireland—Convent	Sisters of Mercy	W. H. Byrne, Architect, 20, Suffolk-street, Dublin	" 15
Devizes—Additions to Asylum	Wilts C.C.	C. S. Adye, Surveyor, County Offices, Trowbridge	" 15
Windsor—Widening Viaduct	Great Western Railway Co.	G. K. Mills, Secretary, Paddington Station, W.	" 15
Liverpool—Westminster-road Baths	Corporation	H. E. Clare, Town Clerk, Liverpool	" 15
Whitstable—Coastguard Officers' House	Admiralty Works Department	Admiralty Offices	" 15
Oldham—Extension of Electric Light Buildings	Corporation	A. Andrew, Gas and Water Offices, Oldham	" 15
Chopwell, co. Durham—46 Brick Cottages	Consett Iron Co.	Secretary of Co., Blackhill, co. Durham	" 15
Oxford—Heating Warehouse	Board of Guardians	H. F. Galpin, Clerk, 4, George-street, Oxford	" 15
Barking—Temporary Iron Hospital	Urban District Council	E. H. Lister, Clerk, Public Offices, Barking	" 15
Kingsland-road—Labour Wards	St. Leonard, Shoreditch, Bd. of Gdns.	F. J. Smith, Architect, 178, Great George-street, S.W.	" 16
Gildersome—Parish Schools		J. P. Kay, Architect, 34, Prudential Buildings, Leeds	" 16
Harrogate—New College	Rev. Jno. Haslam	J. M. Fawcett and Son, Architects, 26, Albion-street, Leeds	" 16
Southampton—Additions to Offices, Town Quay	Southampton Harbour Board	E. Cooper Poole, 4, Portland-street, Southampton	" 16
Market Weighton and Driffield Railway—11 Cottages	North-Eastern Railway Co.	C. N. Wilkinson, Secretary, York	" 16
Owenden—Three Houses		M. Hall, Architect, 29, Northgate, Halifax	" 16
Stroud, Glos.—Iron Fever Hospital	Joint Hospital Board	F. Winterbotham, Clerk, John-street, Stroud	" 17
Leeds—Works in City Square	Corporation	W. Bakewell, Architect, 38, Park-square, Leeds	" 17
Halifax—Booth Town Mission Buildings		Jackson and Fox, Architects, 12, George-street, Halifax	" 17
Kensington—Enlargement of Post Office, Young-street	H.M. Board of Works	H. Tanner, 15, Whitehall-place, S.W.	" 18
Criccieth—Timber Groyne	Urban District Council	T. Jones, Clerk, Portmadoc	" 18
Brighton—New Throat and Ear Hospital	Committee	A. Cawthorn, 33, New-road, Brighton	" 19
Highgate and Hornsey, N.—Stables, Stores, and Sheds	Hornsey Urban District Council	E. J. Lovegrove, Engineer, Council Offices, Highgate, N.	" 21
Wakefield—West Riding Asylum and Men's Hospital extension	West Riding County Council	J. Vickers Edwards, County Surveyor, Wakefield	" 21
Blackpool—Waterworks Offices, Hull-street	Fylde Waterworks Co.	E. S. Garlick, Engineer, 33, Winkley-square, Preston	" 21
Cork—15 Cottages at the Glen	W. J. Goulding, D.L.	Robt. Walker, M.S.A., 17, South Mall, Cork	" 21
Kilmacothomas—Additions to Workhouse	Board of Guardians	W. Hunt, Clerk, Kilmacothomas, Ireland	" 22
Mitcham—Wards at Workhouse	Guardians of Holborn Union	C. E. Vaughan, Architect, 25, Lowther-arcade, Strand, W.C.	" 23
Hampstead—Finchley-road Baths	Hampstead Vestry	A. F. Johnson, Vestry Clerk, Hampstead	" 24
Shoeburyness—Additions to Board School	South Shoebury School Board	Burks and Harris, Architects, Southend	" 24
East Hull—Baths	Corporation	A. E. White, Borough Engineer, Town Hall, Hull	" 25
Bodmin—Storehouses at Cornwall Lunatic Asylum	Cornwall County Council	Robt. P. Edgvan, Clerk to Visitors, Bodmin	" 26
Dartford—Heating Fever Hospital	Joint Hospital Committee	J. C. Hayward, Clerk, Sessions House, Dartford	" 26
Farringdon-street, E.C.—Underground Convenience	Commissioners of Sewers	H. Montagu Bates, Guildhall, E.C.	" 29
Durham—Mortuary, County Hospital		C. H. Fowler, Architect, The College, Durham	" 29
Bethnal Green, E.—Infirmary	Guardians	Giles, Gough, and Trollope, Archts., 28, Craven-st., Strand, W.C.	Oct. 6
York—Show Yard	Yorkshire Agricultural Society	Marshall Stephenson, Blake-street, York	" 7
Old Sodbury—Engines and Pumps	West Gloucester Water Co.	J. James, Clerk, 110, Cannon-street, E.C.	" 8
Brighton—Additions to Town Hall	Corporation	F. J. Tillstone, Town Hall, Brighton	" 9

ENGINEERING.			
Southampton—Dredging Harbour	Harbour Board	A. H. Skelton, Harbour Board, Town Quay, Southampton	Sept. 14
Chatham—Covered Service Reservoir	Brompton Waterworks Co.	J. Taylor, Sons, and Santo Crimp, 27, Gt. George-st., Wstmr, S.W.	" 14
Norwich—Work in connection with Drainage Works	Corporation	A. E. Collins, Engineer, Guildhall, Norwich	" 14
Heaton Mersey—400 yards Main Sewer.	Heaton Norris U.D.C.	J. G. Banks, Clerk, Heaton Chapel	" 14
Irvine—Concrete Weir over River	Burgh Commissioners	J. Dickie, Town Clerk, Irvine, N.B.	" 14
Edinburgh—Foundations at New-street Gas Works	Edinburgh and Leith Gas Commisn.	J. M'G. Jack, Clerk, 11, Waterloo-place, Edinburgh	" 14
Cheshunt—Waterworks	Urban District Council	S. Towson, Surveyor, Cheshunt	" 14
Windsor—Viaduct and Station Yard Widening.	Great Western Railway Co.	G. K. Mills, Secretary, Paddington Station	" 15
Leeds—Tramway Rails and Points.	Highways Committee	Committee, Town Hall, Leeds	" 15
Ennerdale Lake—18in. Intake Pipes	Whitehaven Corporation	T. Brown, Town Clerk, Whitehaven	" 15
The Maldens & Coombe, Surrey—Sewage Works Machinery	Urban District Council	W. H. Hope, Eng., Gate House, Portsmouth-rd., Kingston-on-Th.	" 15
Rugby—Pumping Engines, Avon Waterworks	Urban District Council	D. G. Macdonald, Engineer, Waterworks, Rugby	" 16
Southborough—Telescopic Gasholder, Gasworks	Urban District Council	C. Woodall, Palace Chambers, Bridge-street, Westminster, S.W.	" 16
Penshaw Station—Subway and Approaches.	North-Eastern Railway Co.	C. N. Wilkinson, Secretary, York	" 16
Crofthead, Lillithgow—Storage Water Tank at Leversat	Crofthead Water Trust	D. Maxwell, Fauldhouse, N.B.	" 16
Leads—Conveniences and Excavations, City-square	Corporation	W. Bakewell, Architect, 38, Park-square, Leeds	" 17
Whiston—Workhouse Laundry: Boilers and Steam Fittings	Prescot Board of Guardians	A. F. Mann, Clerk, Whiston, Prescot	" 17
Howden—Rebuilding Highway Bridge.	North Riding County Council	Walker Stead, M.I.C.E., County Surveyor, Northallerton	" 19
Craiova—Waterworks	Corporation	The Maire	" 22
Edinburgh—Electric Lighting, Hoist and Hoppers	Urban District Council	T. Hunter, Town Clerk, Edinburgh	" 22
Malden and Coombe—Sewerage	Urban District Council	W. H. Hope, Engineer	" 22
Hythe, Southampton—Redecking Pier	Hythe Ferry Co.	D. Davy, Surveyor, Southampton	" 24
Dublin—20,000 Sleepers	Dublin, Wicklow, & Wexford Ry. Co.	E. M. Cowan, Secretary, Dublin	" 24
Kelty, Fifeshire—Waterworks	Dunfermline Com., Fifeshire C.C.	J. Ross, District Clerk, 147, High-street, Dunfermline, N.B.	" 24
Freswick—Pier	Caithness County Council	J. A. Cronin, Engineer, Wick	" 25
Freswick, Caithness—Rock Excavation and Pier Construction	Caithness County Council	J. J. Cronin, Engineer, Wick	" 25
Farringdon-street, E.C.—Underground Convenience	Commissioners of Sewers	H. Montagu Bates, Guildhall, E.C.	" 29
Hunslet, Leeds—Railway Works	Great Northern Railway Co.	W. B. Myers-Beswick, Engineer, 31, Park-square, Leeds	Oct. 1
Wick—Harbour Improvement	Wick Harbour Trustees	D. W. Georgeson, Secretary, Wick	" 1
Morecambe—Sea Wall, Carriage Way, &c.	Urban District Council	J. Bond, Surveyor, Council Offices, Morecambe-st., Morecambe	" 5
Crossness—Outfall, pipes and valves	L.C.C.	C. J. Steward, Clerk	" 6
Ditto	L.C.C.	Ditto	" 7
Havana—Floating Dock	Spanish Government	Commercial Department, Foreign Office, S.W.	" 14
Leamington—Bore, part steel lined	Corporation	E. de Normanville, Engineer, Town Hall, Leamington	" 14
Whitehaven—Intake Works	Water Committee	J. S. Brodie, Engineer, Town Hall, Whitehaven	" 15
New Malden, Surrey—Machinery for Sewage Disposal Works	Urban District Council	W. H. Hope, Eng., Gate House, Portsmouth-rd., Kingston-on-Th.	" 15
Durham—Subway at Penshaw Station	North-Eastern Railway Co.	C. A. Harrison, Central Station, Newcastle-on-Tyne	" 16
Wellington, Salop—Cast-iron Water Mains, Excavating, &c.	Urban District Council	G. J. Monson, Engineer, 45, Walker-street, Wellington, Salop	" 16
Naj Hamadi, Kinch Line, Upper Egypt—Metallic Bridges	Official	Col. Western, Broadway Chambers, Westminster, S.W.	" 30
North Wales—Pumping out Slate Quarries.		R. Parry Jones, Talsarn, North Wales	"

PAINTING.			
Bury, Lancs—Cemetery and Park Railings	Corporation	Jno. Haslam, Town Clerk, Bury	Sept. 19
Rotherham—Inside Market Hall	Corporation	Borough Surveyor, Rotherham	" 21
Wellingborough—Cemetery Buildings	Burial Board	W. Lewin, Clerk, Wellingborough	" 29

ROADS.			
Chorley—Materials to Sept. 30, 1897	Corporation	J. Mills, Town Clerk, Chorley	Sept. 14
Doncaster—Asphalte Footpath	Rural District Council	F. E. Nicholson, 21, High-street, Doncaster	" 14
Alnwick—Paving	Rural District Council	H. W. Walton, Alnwick	" 14
Rochester—Street Works	Corporation	W. Banks, Surveyor, Guildhall, Rochester	" 15
Romford—Guernsey Granite Spalls (60 tons)	Board of Guardians	W. Smith, Clerk, Romford	" 15
East Ham—York Flags (30,000sq.ft.), artificial stone ditto (8,000sq.ft.), and granite setts (100tons)	Urban District Council	C. E. Wilson, Clerk	" 15

(Continued on page XVI.)

THE BUILDING NEWS

AND ENGINEERING JOURNAL.

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FRIDAY, SEPTEMBER 18, 1896.

COMPARISONS.

THE brief respite of professional activity at this holiday season affords an opportunity of reviewing the architectural "situation," and in making a few comparisons that may be helpful. During the professional recess, architects may have been able to "take stock" of how things are done away from home. Mr. Jones and Mr. Smith, away on their Continental or English tour, are able to "compare notes," and different ways of doing things. At Puddleford the Gradgrinds have their own way. Everything is ordered to a certain pattern; builders and architects work in the same groove that they have done for a generation or more. The same materials have been used, and the same methods of doing work, till it does not seem possible to do anything different. The town hall and other public buildings of the said locality represent the sum total of modern architecture in the eyes of these same worthy members of the craft. They boast of the specimens of brick and stone to be seen in the streets of their town, as if they were unimprovable. The style of house-building has sufficed for the wants of people who have no desire to improve upon domestic arrangements or external design. Even to the treatment of the window-bays, the manner in which the front entrances are designed, and the shape of the roofs, all have followed a conventional or local model of a very commonplace kind. Jones and Smith bring something new and original to their locality. They have seen a different mode of using their bricks and stone, of disposing of their wall surfaces, of disposing the local flint or "rag," and of producing effect by the simplest means which were before unknown to them. Their resources in style have also become extended. Instead of walls all brick or all stone, they have learned how these can be varied to produce a more telling effect; how upper stories can be treated by timber studding or framed work filled with stucco or flint; how, instead of the everlasting parapet or cornice, the fronts of their houses can be broken up by gabled dormers or bays or framed wood verandahs. Instead of the monotonous repetitions of windows and bays of one type, they bring home a variety of features from Belgium or France, and can introduce a freshness into their work without extra cost. These new departures are worth all the trouble and expense bestowed upon them. Take the window. Architects and builders go on repeating the same kind of sash arrangement, the ugly rectangular opening, because it is easy and answers the average householder's taste; but show him something better—a divided arrangement of lights—and he at once appreciates the introduction.

The borough engineer or surveyor does not go away from home without bringing back with him fresh notions. Careful observation in any English or Continental city will remove some prejudices, and give him a larger view of sanitary work and administration. Local urban authorities will find that in some matters, like that of sewage removal, destruction of garbage, sewer and subway construction, many French, Belgian, and German cities surpass us; that a system of subway construction, or collecting sewers with wagon sluices, exists in Paris, Brussels, and other cities, which enables the most effective supervision and cleansing to be carried out; that in paving, road maintenance, and cleaning and scavenging we are far behind some

of our neighbours across the Channel; and that in fire extinction, lighting of our streets, &c., we can no longer claim to be leaders. Again, in the design and building of industrial dwellings much may be learned from other towns. At Liverpool and Manchester, Glasgow and Salford, the municipalities have devoted much time and money to the subject of the housing of the poor. As we reported last week, the Manchester Corporation have been considering a report from their sanitary committee on the utilisation of areas cleared of insanitary dwellings, and have resolved to erect tenement dwellings with shops below, and a block of lodgings for men. Here we find that experience has not justified the corporation in repeating the blocks of dwellings already built, and it has been decided to erect on the site facing the Oldham-road a block comprising a number of shops with two stories of tenement dwellings over, and with a basement under each shop. Each shop is to have an ordinary business entrance in addition to a private side entrance. The offices are placed in the rear. A separate entrance and staircase is provided for each group of tenements, and each group comprises two two-room and two three-room tenements, each self-contained. Each has a sink, boiler, w.c., bunker, and ash-shoot in scullery, and also a balcony in the rear, separated from that of the adjacent building by a brick wall. By this plan it is sought to improve upon the common plan of having one staircase for a number of tenements and only one balcony. Here the object is to form groups of tenements by separate staircases, a stone staircase to each group from the front; a balcony that will form a yard to each; a separate scullery; in short, each tenement is completely isolated, and contains the accommodation of a cottage dwelling. It is impossible, without making a note of these steps in the municipal dwellings development, to take advantage of opportunities as they occur. We have seen the same plans of tenement dwellings repeated in towns because nothing better has been brought to the notice of the local sanitary authorities or their officials; the same plans have often been followed with few variations, and the result is a repetition of failure. We find, too, in other building problems that the wider the experience gained by comparing plans of buildings like schools for technical classes, libraries, museums, public offices, baths, and washhouses, the greater is the efficiency and economy in the erection of these buildings. Why is it the expert is so much in request for buildings of these kinds? Is it not because he has studied his subject in a greater variety of ways? He has travelled far and near with the object of taking stock of what has been done abroad as well as at home. It is not because he is a better designer or architect than the practitioner who has contented himself with what is within his reach at home, but because he has a wider view of the subject as regards plan. In these days it is the expert knowledge of arrangement and fittings that makes the master specialist, not simply the art power of expression, valuable as it unquestionably is.

A comparison may also be usefully instituted between foreign and English buildings of a certain kind. Probably in not a few cases it may prove rather "odious." Take, for one example, the planning and design of our theatres and opera-houses. How badly they compare with those in France and Germany, especially in the matter of staircases, foyers, vestibules, to say nothing of the restaurants and cafés which are attached to many. Few of our London theatres are convenient in these details, and anything but models of good planning. Look, for example, at the miserably cramped entrances to pit and upper gallery; the meagre and draughty staircases, the cramped seats in those parts of the house which are always most crowded,

and, let us say, ironically as it may sound to the ears of promoters and managers, the only parts of the house that ever pay. The builders and promoters of these buildings appear to entertain a poor regard for those who are their best customers. Instead of providing spacious accommodation for those who pay the best, it is generally of the worst description. The gangways are narrow, the seats are miserably insufficient for comfortable sitting, there is no room to pass between the seats and the backs of the row in front. All these points compare most unfavourably with the Continental playhouse, such as that of the Théâtre de Montpellier. The architect has much to learn also of the requirements of a good auditorium. Compare the lines of the boxes of some of our English houses with those of the foreign theatre. In some of the former the fronts of the boxes are placed behind the proscenium wall, or so much set back behind it that the wall quite obstructs sight, and the divisions are not properly radiated to the curve. These and other points have been referred to and illustrated by Mr. Ernest A. E. Woodrow, A.R.I.B.A., in his useful series of articles in our pages. The association of a concert-hall with the theatre is a combination which may well engage the promoters of these buildings, and in this connection the question of the form and acoustical properties of such rooms demand attention.

The modern hotel in its possible future development is a problem that has not yet received attention—we mean the large town hotel, in which the multifarious requirements of life and society, intellectual recreation and amusement in our large cities, can find a home. In the great cities of the United States, the endeavour to make the hotel or residential block more of a club has been made by combining under the same roof a theatre, concert-room, library, baths, and various other attractions, so that visitors may find all they want within its walls. In London, Brighton, and elsewhere this experiment has been followed to a certain extent in a few hotels of modern construction, where social and family life in its varied phases can be enjoyed with the advantage of a good cuisine. The residential block in the same way may combine shops for the supply of provisions, reading-rooms, studies, concert-hall, provision for smokers, billiard players, offices for the conduct of business, in addition to the usual apartments. The idea, in short, of combining home with club life, though hardly to the taste of the typical Englishman, is one that seems to be spreading, and the architect has to take cognisance of the fact. The conditions of life in a large town with its complex ramifications, and the necessity of living some distance from its centre, make it yearly more necessary to build complete dwellings for those who do not care for a suburban or country residence. The promoter or architect of the modern club-house, hotel, or residential mansions will have to bear in mind the increasing need of organisation. He must try to unify his scheme, to embrace within it all the requirements of modern city life, or he will quickly be outdone by other countries.

Besides the opportunities for comparison afforded by a season of rest, the architect has to learn a good deal that relates to the technical matters of his profession. To keep pace with the constantly widening domain of the scientific and constructive is no easy matter. A man trained in the "forties," for example, has to "break new ground"; the old ideas, which he imbibed when he was in his articles, have gradually been ousted by other and more modern ones. Construction in new materials, or rather modern applications of brick, terracotta, iron and wood, and concrete, have made it necessary for him to forget a great deal of what he has already learned. Nicholson and Gwilt, Tredgold

and Barlow, and the older authorities in carpentry and construction have become more or less obsolete with the march of constructive science and modern styles. Even Parker and Rickman have been laid aside for a more thorough analysis of Gothic, while the old Classic tomes have been superseded. Sanitary science has been revolutionised, if, indeed, it had ever been understood before the germ theory of disease became known to practical men. Science generally is studied on new bases. One after another the whole outworks of the profession have been abandoned for a more scientific mode of attack, and the fundamental principles of the art itself have been relaid on what appears to be a sure foundation.

DESIGN IN WALL BUILDING.

THE belief in large surfaces of the same material which seemed to be the result of the introduction of Roman and Portland cement is still strong. The Classic revival had probably something to do in fostering the notion that buildings ought to represent stone or marble in their external architecture. With the reuse of brick some forty years ago, a better era dawned, and for a short time at least we saw such innovations on the prevailing mode as the relief of red brick by black and blue headers, tiles, &c. Under the pseudo-name of "Venetian Gothic" this style of building prevailed for many years; the fine churches erected by Mr. Butterfield and Mr. Street showed to what an extent the leading men of the profession countenanced the movement which Mr. Ruskin's fervid praises of the style did much to advance. Then there came the inevitable reaction, hastened, no doubt, by the grotesque caricatures of Venetian palaces, and the "streaky bacon" fashion of some railway stations. Plain red brickwork came as a relief. The Dutch importation, the Georgian, the "Queen Anne" took possession, and has not yet left us. But like all reactions, we get too much of a good thing. In every part of London and the suburbs, and in all our leading towns, inland and along the coast, the red-brick craze is advancing, so that in another generation there will be little left of the "compo." of our forefathers. Every one who knows anything about building will acknowledge that honesty of construction has been brought about by the change from stucco to brick. But are we making the most of our opportunities? From what we have seen of brick buildings, there is the danger of using it either too much in the way we have used stucco—that is, of employing it everywhere and for every detail—or of making it obtrusive where it ought to be quietly used as a wall material; of building large unrelieved surfaces of brick where no variety is to be obtained.

We must make an exception here. In the quieter forms of building which have been suggested by the old manor house or Queen Anne buildings of the 17th and 18th centuries, brickwork was used mainly as simple walling to set off the wide window frames, the thick barred sashes, and other woodwork. True, we here and there see the bold and admirably cut and rubbed brick cornice with dentils crowning the façade, finely-wrought gauged arches and other ornaments—examples of which may be seen at Rochester, Guildford, Croydon, and many other towns and villages in Surrey and Kent. But most of these buildings are or were set off by trees and foliage, which contrasted and harmonised with the red work, and gave them a value they would not otherwise have. Our modern brick villadom is altogether different. The pretentious-looking buildings in our streets and suburban roads are close to pavements and macadamised roads, the relief of foliage is absent altogether except a few thin limes or chestnuts planted at intervals

along the footway, the flimsy modern casement or sash window is made use of, and the only decorative features are bands of terracotta or stone and dressings of the same material. Proclaiming itself to be a brick building, it is really one composed half of brick and half of stone. The brick surfaces are intersected with the white material till very little of the red is seen in front, while perhaps on the sides and back all is red brickwork, plain and bare and poor alike. A plain red brick wall without projecting members is defensible only when it has the green background, the charm of age to tone its colour and produce a grey or sombre red tone, and is further relieved by the wide window-frame or mullion; but it becomes garish and poor when it forms the back or flank of a modern building like a town hall or villa. The building of brick with stone dressings has been sadly abused. We love to see a solid stone mullioned window or entrance doorway, the stone coped gable and brick walling when toned down by the weather, like we find in many old 15th and 16th-century piles like Hampton Court, and the beautiful old work seen in Norfolk and Suffolk; but we cannot admire the bespotted modern work in which the stone is thin and dotted and striped all over. In one we see breadth of treatment; in the other the two materials appear to contend for rivalry, and produce distraction. It is this sort of admixture which seems to be imitated by the modern brick-and-terracotta builder. The brickwork scarcely asserts itself: it is thrown into panels or wide bands between the lighter dressings. Better much to place the harder material in the lump in an entrance, a bay window, or an arcade, and to leave all the rest in brick, or to place the terracotta all below as a basement to brick in the upper stories. In the new Hôtel Métropole near Folkestone the terracotta has been so distributed, and also in the main windows and balconies of the upper stories. Mr. H. T. Hare has adopted the same distribution in his house at Stafford we gave last week, where sand-faced bricks and Hollington stone dressings are employed; and in some of Messrs. George and Peto's buildings we notice the same artistic combination of the two materials. How to combine brick with stone, terracotta, "rough-cast," timber-work, is one of the many lessons which some men have not yet mastered. Mr. T. E. Collcutt has given us many excellent examples of breadth of treatment in these materials, as in a house at Totteridge we lately illustrated, in which brick and rough-cast are used together, the former confined to the ground story.

Modes of relieving plain brick surfaces have not received the attention they deserve. We may mention two methods used largely in the Eastern Counties and in some places on the South Coast. At Eastbourne, for instance, flint and brick are very effectively used in wall building in villas and boundary walls. In one place flint and red brick are used alternately in the courses, producing a chequer pattern, and in another dwarf wall panels are formed slightly recessed, in which flint in the form of headers is introduced alternately in the courses with buff bricks. The effect is pleasing and decorative. The "flush work" seen on the East Coast, as at Norwich and Ipswich, resembles somewhat this treatment, and deserves the architect's attention. We have referred chiefly to the harder materials of wall-building, and, of course, in good design these should be located in parts which have to face the stress of weather, as in copings, quoins, and window labels. The mistake of employing soft limestones in these situations while the walls are of hard brick is common enough. Easy-worked soft stones and "rubbers" are tempting, and it requires some restraint to use the harder, more durable, and less attractive material. The colour and texture of facing bricks are

matters which architects are beginning to regard. Deep reds and tawny brown shades give the best results when the mortar joints are made to harmonise with them. With white putty pointing the deep red goes best; the white jointing gives a bright and tawdry effect to the brickwork. The Fareham red bricks and rubbers as well as the Berkshire bricks recommend themselves to architects for facings and gauged work, and the very irregularity of their shape and colour are recommendations. But these are technical matters upon which we need not dilate. Our chief object is to dwell on the artistic side of walling, and to point out mistakes. The modern brick builder takes the trade view of his art. He cares little for relief, or texture, or colour; he puts all his rubbed or gauged work on the front. The modern average architect, if he uses terracotta, employs it as he would stone dressings, in a spotty and stripey manner. The side walls are often stinted, and present bare surfaces of brick without relief of any kind. He mistakes blankness and poverty for breadth and simplicity. To obtain breadth the designer must avoid all affectation and effort; he must be natural and simple, so that his plain surfaces may be what they really are—the natural outcome of plan. Here and there he may put his points of interest in finished detail, like a door or a window, or a bit of carving, or relief which will help to give reality and life.

ADAPTABLE SPECIFICATIONS.—IX.*

SPECIFICATION, PART VI.: CARPENTRY AND JOINERY—(Continued).

VI. 57. PIVOTED CASEMENTS (*alternative*).—Each of the pivoted casements, where out of reach from the [hall] floor, is to have strong [wrought iron] [brass] screw-eyes fixed to its top and bottom rails, with a sufficient length of strong white flax sash-line secured to each eye, to reach within 4ft. of the floor. The two lengths are to be in one piece. Provide and fix to each of these casements, at a height of about 4ft. 6in. from the floor, in a position approved by the architect, a neat wrought-iron cleat [value 1s. p.c.] to fasten the cords to. Provide and fix on the centre of the top of the frame of each pivoted casement a neat wrought-iron stop to prevent the casement from opening more than [18in.] at the widest.

VI. 58.—WINDOW-BACKS.—Put to the following windows—namely, those of 1½in. [square-framed] [moulded] panelled backs, elbows, and soffits.

VI. 59. WINDOW-SEATS AND BOXES.—Put round [the bay window of] inch seats, with moulded nosings, with 1½in. panelled and flush-beaded sloping backs, the tops of the backs grooved into the window-board, and form [No. 3] hinged lids in these seats to open upwards, and hang each lid with a pair of 2½in. best brass butts, and provide and fix to each a lock value 2s. 6d. p.c. Line the window-boxes with ¾in. matched boarding, and put inch grooved and tongued bottoms to them, into which their sides and ends are to be tongued.

VI. 60. HEADS OF CURVED SASHES AND CASEMENTS.—Where the glazed openings in the heads of sashes or casements are shown to be segmental, elliptical, circular, or of any other form than square, the tops of the sashes or casements are to follow the same form, as are also the heads of the sash frames or casement frames, into which these curved or shaped heads fit, unless the architect shall expressly direct otherwise. In no case, therefore, will the top of a sash or casement, when open, show a straight upper edge along with a curved lower edge next the glass.

VI. 61. SKYLIGHTS.—To be 1½in. chamfered bar skylights [to drawing], fixed in [10ft. by 2in.], wrought, rebated, and dovetailed curbs, boldly beaded, quirked, and chamfered all round on the lower edge. Put behind each skylight a proper deal gutter lined with 6lb. lead 25in. wide. The skylights to have aprons and flashings of 5lb. lead, 16in. wide, all dressed to the curbs, and close copper-nailed. [No.] of these skylights, where directed, are to be heavy, each with a pair

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of 3 $\frac{1}{2}$ in. best wrought-iron butts, and fitted with a neat wrought-iron rack, with quadrant stay-bar, pulleys, and pin.]

VI. 62. BOXING SHUTTERS.—Put to the following windows—namely, those of 1 $\frac{1}{2}$ in. square-framed boxing shutters, [2] panels in height, the shutters giving the whole visible height of the sash or casement frame, in 3 $\frac{1}{2}$ in. grooved and tongued and beaded boxings, the flaps of the shutters and their junction at the meeting-stiles rebated, and the latter also beaded and quirked. Put to the following windows—namely, those of the 1 $\frac{1}{2}$ in. framed and moulded one side, boxing shutters [3 panels] high, the shutters giving the whole visible height of the casement frame or sash frame, and each half of the shutters being formed in [3] leaves properly fitted together and rebated and beaded at the edges. Provide and fix proper lin. boxings, grooved and tongued and beaded, and hang the shutters with [1 pair of 3in. wrought-iron butts] [1 $\frac{1}{2}$ pairs of 3in. best brass butts] to each leaf.

VI. 63. SLIDING SHUTTERS.—Put to the following windows, namely, those of the 1 $\frac{1}{2}$ in. [square framed] [panelled and moulded one side] sliding shutters, to run up and down like double-hung sashes, including deal-cased frames, 1 $\frac{1}{2}$ in. deal panelled and tongued boxings to receive shutters, best brass-cased pulleys, best white flax sashlines and iron weights complete; and hinged and closely fitting tops to the boxing, moulded on the edge. Provide brass flush rings to the hinged tops, and a stout brass and iron thumb-screw to each shutter, and a fitting to receive it. [Each shutter is to be in panels]. The shutters and their boxings are to go up to the window-soffit.

VI. 64. SHOP-SHUTTERS.—Put to 1 $\frac{1}{2}$ in. movable shop-shutters, framed beadbutt, and square [3] panels high; the width of each shutter not to exceed [14] inches; the shutters to have proper iron shoes, and grooves to be formed in the head and sill to receive them. Provide [15 shillings] for ironmongery connected with them.

VI. 65. REVOLVING-SHUTTERS.—Provide the p.e. sum of pounds to be paid without discount or deduction to any person whom the architect may direct to prepare and fix revolving-shutters to and provide all labour and materials necessary in cutting away or otherwise adapting the building to, and in making it good after, the person appointed shall have fixed these shutters. Also provide for him or give him the use of all necessary scaffolds and ladders to fix his work.

VI. 66. BOSTWICK STEEL GATES.—Provide the prime cost sum of pounds for these gates, and in addition fix them complete, to the architect's satisfaction, to Do all necessary cutting away, fitting, and making good.

VI. 67. WOODEN STEP-LADDERS.—The steps to are to consist of 2in. treads with rounded nosings, strongly housed and tenoned into a 9in. by 1 $\frac{1}{2}$ in. chamfered string at each end, the top and bottom of the strings fitted and well secured to the joists of the respective floors. These steps are to have [on each side] [on the side away from the wall] a plain rounded deal handrail, 3 $\frac{1}{2}$ in. by 2 $\frac{1}{2}$ in., carried by 3in. by 2 $\frac{1}{2}$ in. deal posts at each end, secured to the joists, and, if necessary, blocked off from them, and also supported by 2 $\frac{1}{2}$ in. by 2 $\frac{1}{2}$ in. intermediate posts, not more than 3ft. apart, halved on to the outer side of the strings, and well secured to them.

VI. 68. STAIRS TO—These are to have 1 $\frac{1}{2}$ in. treads with [rounded] [2in. moulded] nosings and inch risers, glued, blocked, and bracketed on strong fir carriages, with cut string and returned mitred nosings. They are to have soffits [plastered and finished in the same way as the ceilings in the same part of the building] [of 3 $\frac{1}{2}$ in. matched, V-jointed, and rebated match-boarding on proper bearers not more than 18in. apart, the boarding being in 4 $\frac{1}{2}$ in. widths.]

VI. 69. CURTAIL STEP.—Put at each of the following places—namely a proper curtail step and riser, to match in all respects the staircase to which it belongs.

VI. 70. HANDRAILS, BALUSTERS, AND NEWELS.—The staircase from is to have a 3in. by 2in. beaded and rounded picked pitch-pine handrail, French polished, and No. 2 inch square-bar balusters on each step, tenoned into the treads and into the handrail. Put to the bottom of the stairs [and to every quarter space on the stairs, and to each place where the raking handrail of the stairs meets the horizontal handrail of a landing, and also to each angle in a horizontal hand-

rail, and to the end of each handrail where it would stop against the wall, a pitch-pine turned, moulded, and shaped newel, value 7s. p.c., to detail]. [The handrail to be ramped and wreathed as the plan of the staircase may require, and the end of it to be stopped and very securely fitted to the wall]. [Provide and fix No. 1in. by 1in. wrought-iron bar balusters amongst the rest, to strengthen the fixing of the handrail].

The staircase from is to have a 3 $\frac{1}{2}$ in. by 2 $\frac{1}{2}$ in. moulded and hollowed oak handrail, French polished, ramped, and wreathed, with a proper wrought-iron core. It is to have at the bottom an oak newel to detail, value £3, and on each step two turned and shaped [oak] [ash] balusters, tenoned into the treads and screwed to the core of the handrail, each baluster to be of the value of [5s.] besides fixing, and to be made to detail.

VI. 71. HANDRAILS, &c., TO STONE STAIRCASE.—The stone staircase from is to have an oak moulded handrail 3 $\frac{1}{2}$ in. by 2 $\frac{1}{2}$ in., finished with an egg-shell polish. Provide and fix on the bottom step a turned shaped and moulded oak newel, 4in. by 4in., to detail, value 40s. This newel is to be fixed by means of a wrought-iron bar, 1 $\frac{1}{2}$ in. by 1 $\frac{1}{2}$ in., going up the centre of it, and being accurately fitted and screwed to the newel. The bar is to be 3ft. long, and the lower end of it is to be strongly let into the stone step and run with lead and caulked. The handrail is to be housed into the newel [and into a similar newel at the top] and is to be carried between by a 3 $\frac{1}{2}$ in. by 3 $\frac{1}{2}$ in. wrought-iron bar baluster on each step, with the upper end diminished and let into the soffit of the handrail, and the lower end bent (to detail) and let into the end of the stone step, and run with lead and caulked. Each pair of balusters is to be connected by a wrought-iron scroll (value 6s. p.c.), and by two wrought-iron collars going round the iron of the scroll and that of the baluster. These collars to be 3 $\frac{1}{2}$ in. by 1 $\frac{1}{2}$ in., and to be supplied and fixed by the contractor, who is also to pay for the packing of the scrolls and for their carriage from [London].

VI. 72. NEWEL TO STONE STAIRS (alternative).—Put at bottom [and top] of the stone stairs a wrought-iron newel, to be made to detail by any one whom the architect may direct, the value of each newel to be (£4) p.c. Fix complete and pay for packing and carriage from [London].

VI. 73. STOPPING SKIRTINGS, &c., AGAINST DOORS.—Wherever a skirting meets a door-frame or architrave the square part of which does not project far enough to entirely stop it [the moulding on the top of the skirting is to be returned vertically down to the floor by the side of the architrave or frame] [the architrave is to be stopped on a chamfered plinth-block, to detail, 2in. higher than the skirting.] [The cappings of dadoes are to return vertically down to the floor on each side of every doorway whose frame or architrave does not project enough to stop them entirely.] This clause applies to cement and other skirtings as well as to wooden ones.

VI. 74. PATENT NOSINGS TO STAIRS.—Provide and carefully fix to each tread of the stairs from 's patent nosing, in conformity with the manufacturer's directions.

VI. 75. PILASTERS, CORNICES, SCREENS, AND ALL OTHER ARCHITECTURAL DETAILS OF WOOD are to be carefully and accurately worked out of specially clean and thoroughly seasoned stuff, together with all grounds, blockings, bracketings, and everything else necessary for forming them in the best manner, whether these things are or are not shown on the detail drawings of the architectural features.

VI. 76. PIPE CASINGS.—Conceal in every part of the building except the water-pipes and plumbers' work usually so concealed by neat beaded casings of 3 $\frac{1}{2}$ in. stuff, the covering piece to be in all cases fixed on by means of brass cups and screws so as to be easily taken off and replaced.

VI. 77. PACKING PIPES WHERE THEY PASS THROUGH FLOORS, &c.—Wherever hot or cold water-pipes pass through a partition or floor, form round them a grooved and tongued boxing of 3 $\frac{1}{2}$ in. stuff, the thickness of the floor or partition. Make good this boxing so that the junction is practically airtight to the plaster or boarding on both sides of the floor or partition, and after the pipes are fixed, stuff the interior of it from end to end in the tightest possible way with silicate wool, so as to make it impossible for cockroaches to pass through.

VI. 78. CASING GIRDERS, BEAMS, AND ROLLED JOISTS.—The girders over, also the wooden beams over, and all rolled or riveted iron or steel joists which would otherwise be visible are to be covered wherever exposed by inch casings, grooved and tongued together, and [beaded] [rebated] [moulded to detail] at the angles between the sides and the soffit.

VI. 79. W.C. FITTINGS.—Put to the w.c., in a proper Honduras mahogany fitting, with inch seat and riser, clamped flap with rounded nosing, holes cut and dished, and small skirtings, all French polished. Put to each school w.c. a proper yellow deal seat and riser with hole cut and dished, and small skirting complete. These seats and risers are not to be painted or varnished.

VI. 80.—LAVATORY FITTINGS.—Put to the a [pitch-pine] [mahogany] [quadrant lavatory fitting small door and shelf, and mahogany French polished top, and brass button and latch to door and hole for basin. Provide and fix to each an enamelled iron basin and plug with a 3in. lead waste-pipe and cast S trap, having brass screw cap for inspection, and put also to the waste-pipe above the trap an inch overflow pipe. The waste-pipe is to discharge into the open channel and gully provided for the purpose.] [. 's lavatory complete, value £4 p.c., and pay for packing and carriage from London, and fix complete with lead waste-pipe and overflow.]

VI. 81. SHELVES AND BEARERS.—Provide and fix where, and in such lengths and widths as may be directed [50] feet super. of inch wrought shelves on proper deal bearers: the shelves, where more than 10 $\frac{1}{2}$ in. wide, to be grooved and tongued together.

VI. 82. DRESSER, &c.—Provide and fix [in the kitchen] a dresser with shelves, drawers, and cupboards [to detail] value [£5]. Provide and fix [over the scullery sink] a proper deal plate-rack [4ft. by 3ft.].

VI. 83. SLIDING PARTITIONS.—The sliding doors [between classrooms] are to be of 1 $\frac{1}{2}$ in. yellow deal with square panels, six in each door. The bottom rail is to be 9in. high, and the other sides and rails 4 $\frac{1}{2}$ in. wide. The panels are to be square. Provide the sum of [30s.] p.c. to each door for raised rounded rails let into the floor, and pulley wheels and plates let into the bottom rail of the door, and fix complete.

VI. 84. BENCHES AND SEATS.—Execute these in specially picked and seasoned [yellow deal] [pitch-pine] [oak] in conformity with the detail drawings [and tenon] [and fix by L irons, 18in. long and 1in. by 1 $\frac{1}{2}$ in., with rounded edges] [to the floors].

VI. 85. HAT CORDS.—Provide and fix under each bench, at such a distance apart as to hold safely and conveniently an ordinary hat, two best white flax cords. They are to be secured by brass screw-eyes to the bench ends, and are to be further supported by passing through brass screw-eyes at least every 3ft. in their length.

VI. 86. TOBIN VENTILATORS.—At the places marked "T" on plan, form an opening 18in. by 9in. in the brickwork of the external walls. Build in it, in cement, a plain cast-iron grating with openings 1in. by 1in., and not larger. Form a weathered cement sill [put a weathered and throated 3in. York sill] to this opening. Inside the opening put neat wrought-iron grounds all round. Make, to drawing, and fix to each opening a [deal] [pitchpine] ventilating trunk, 5ft. high from the floor to the top, of inch stuff, tongued together at the angles, and wrought inside and out, with back, front, sides, and bottom complete. Cut, to correspond with the opening in the wall, an aperture 17in. by 8in., and fit the ventilating trunk to the grounds, so that the junction all round is perfectly airtight. The trunk is on plan to be [oblong, with two splayed corners, 9in. wide, and 6in. deep inside], as shown in the detail drawings [and half octagonal] [and shaped like a quarter of an octagon]. Close to the floor it is to have a small, closely-fitting door, shutting into a rebate, and having small brass hinges and a cupboard lock, to give access to the inside. One foot below the top of the trunk there is to be a valve of 21oz. zinc turning on a pivot to open or close the ventilator. This pivot is to end in a flat brass handle, and is also to have a nut inside the trunk and a head outside, both being at the opposite end from the handle, and the pivot is to be tapped as a screw at this end, so that it can be tightened. The zinc valve is to shut on to a small deal fillet fixed all round the inside of the trunk, but on one half of the trunk, above the zinc valve, and on the other half below it. The top of the trunk

is to be moulded and shaped as shown on the detail drawing.

VI. 87. EXIT VENTILATION.—Beneath the ventilation turret [in the school roof] fix a vertical airshaft of tinned sheet iron [2ft. 6in. by 2ft. 6in.] on plan. This airshaft is to open at the lower end at the ceiling level: it is to be continued up to the external floor of the turret (see detail), and is there to be connected in such a way that the junction will remain airtight, with an extract ventilator, to be selected by the architect. Provide for this ventilator the sum of £., and pay for its packing and carriage from London, and securely fix it as directed. Turn round the base of the ventilator, on the external floor of the turret, a 6lb. lead flat, with 4lb. cover flashings, and make an exit for water off the flat, discharging on to the roof.

Above the middle of the [school] ceiling fix all along a deal air trunk, 24in. wide and 12in. deep, internally, with inch top and bottom, and ½in. sides, all tongued together at the joints, and covered all over on the outside with coarse canvas, stuck on by means of oil paint, and also well painted over afterwards, so as to insure that the joints of the trunk will remain airtight. This trunk is to be wrought inside only. It is to run from each end of the school to the sheet-iron trunk under the turret, which is to be made with two sheet-iron arms, each about 2ft. long, on purpose to receive its two divisions. These divisions of the longitudinal deal air-trunk are not to be fixed level, but each of them is to start at one end from the ceiling level, and to slope up as high as the space inside the roof permits towards the sheet-iron air-shaft at the other end. There it is to be connected, so that the junctions are airtight, with one of the sheet-iron arms formed to receive these trunks. The further ends of the deal air-trunks, at the two extremities of the [school], are to be stopped.

In the centre of each bay of the ceiling form an opening 2ft. 6in. square, properly trimming and putting in [pitchpine] [deal] linings to it. Put round the opening, on the face of the ceiling, a flat margin of ½in. by 1½in. [pitchpine], and a 2½in. by 1½in. [pitchpine] moulding. Provide for each opening the sum of [8 shillings] for perforated woodwork or gratings to detail, and fix such woodwork or gratings with strong screws. Fix above the ceiling to the back of each opening, so that the junction is airtight, a box of inch deal, grooved and tongued at the joints, 2ft. 8in. square inside, and 9in. deep. This box is to be wrought inside. Connect each box with the sloping air-trunk above it by means of a short vertical shaft of inch deal, 12in. by 12in., and wrought inside, and finished in all respects like the longitudinal trunks themselves. Cut the necessary holes in the sloping trunks, and in the wooden boxes to receive these 12in. by 12in. shafts, and make the junctions air-tight, so as to prevent the escape of air into the roof. In the 2ft. 6in. by 2ft. 6in. vertical iron air-shaft, at a height of [4ft.] above the ceiling level, there is to be a ring of four No. 5 gas-burners, supplied by a ½in. pipe, arranged as will be directed, so that it can be regulated from below. Provide for this and the branch-pipe, stopcock, and by-pass to it, the sum of three pounds; and provide for a margin, mouldings, and gratings to the central aperture in the ceiling, under the turret, the sum of two pounds.

VI. 88. EXIT VENTILATION (Alternative).—Trim the ceiling joists in the centre of each bay of [the hall] so as to form a 12in. by 12in. opening. Put round this in each case a 6in. by 1½in. beaded, quirked, and chamfered curb, and fit to each curb an 11in. by 11in. deal air shaft of inch stuff, grooved and tongued at the joints. Carry the air-trunks up to the ridge. Fit them there and also at their lower ends in such a way that no air can escape from them into the space inside the roof; but so that each of them affords a direct vertical passage from the space below the ceiling into the outer air. Provide and fix over the top of each of them a Cooper's ventilating ridge-tile, value 10s. p.c., and pay for packing and carriage. Fix round the inside of each curb in the ceiling a fillet, 1½in. by 1in., forming a rebate into which a hinged flap can shut, and put to each a ½in. yellow pine clamped flap, hinged so as to open up into the shaft and when closed to rest on the rebate. Hang each flap with a pair of 1½in. brass hinges, and provide to each the sum of 6s. for pulleys and cord to open and close it, as will be directed. Cover the top of the fillet all round with a strip of thick hair-

felt an inch wide to lessen the noise caused by the flaps in shutting.

VI. 89. PLATFORM.—The platform in the [school] is to be of pitch pine, and of the size and shape shown on the plans. The floor is to extend under it, and the space below is to be used as a cupboard. It is to be carried by [No. 9] pitch pine posts, each 3½in. square, and shaped to detail, into each of which a 6in. by 2½in. boldly beaded and chamfered curb, going round the platform, is to tenon, just below the platform floor level. The joists (which may be of yellow deal) are to run the shortest way of the platform. They are to be 4½in. by 2in., and are to rest on the curb at each end. The stairs are to have inch pitch pine treads and risers, with rounded nosings, blocked off 3½in. by 3½in. for carriages—with close strings. Put round the bottom of the platform a plinth 9in. by 2in., moulded. Cover the riser of the platform all round with ¾in. rebated and V-jointed matched boarding in 4in. widths, set upright, and grooved into the curb above and the plinth below. Cover the ends of the joists above the curb with a 5½in. by 1in. beaded fascia, and continue this all round the platform, and plant on it a 4in. by 1½in. moulded cornice to detail. The platform is to have a 1½in. grooved and tongued pitch-pine floor in 4½in. widths. Provide for a handrail, balusters, and newels to the platform and its staircase—to be made to details. Form folding doors in two leaves, each about 2ft. wide, and clamped and braced inside, in the matched boarding of the platform riser. Fix 2in. by ¾in. fillets all round for them to shut against. Hang each with a pair of 2½in. wrought-iron butts, and provide and fix two brass flush bolts and a cupboard lock, of the value altogether of 8s. p.c.

VI. 90. IRONMONGERY.—In addition to the ironmongery, window fastenings, gearing, and other goods of the same kind which are specified by name or specially described in notes on the drawings, provide the sum of £. . . . p.c. for additional ironmongery throughout the building, to be selected by the architect, or in conformity with his directions, and fix it complete. All iron butts and other hinges are to be wrought, and not cast.

VI. 91. LIGHTNING CONDUCTOR.—Provide and fix [to the turret] feet run of a copper tape lightning conductor value sixteenpence per foot run p.c. It is to be carefully connected with [the iron rod which terminates the turret] [a three-pointed finial with platinised ends for which the contractor is to provide the sum of £2], and which he is also to fix. The copper tape is to be securely attached to the building by strong copper holdfasts, which the contractor is also to provide. It is to be carried down at a point to be decided on by the architect, and is to be joined by a branch or branches to the iron eaves-gutters, in such a way that the whole of them are in metallic connection with each other and it. At the point in the ground decided on by the architect, dig a dumb well down to a permanently damp stratum of the ground. For the purposes of the contract, this is assumed to be 10ft. below the surface, and any difference between this and the actual depth will be measured and valued. Take the copper tape to the bottom of this dumb well, and then rivet it by copper rivets to a copper grille, value 25s. p.c., which provide. Place the grille on the damp stratum of soil, and cover it and the conductor with four bushels of gas-coke, and fill in the dumb well. An ample length of copper tape must be placed in the dumb well so that it may hang loosely, and may not be broken or torn in the process of filling-in the hole. The coke and earth must not be filled in till the architect has seen and approved of the work.

VI. 92. THICKNESSES OF DOORS, BOARDS, &c.—Throughout this specification, except when expressly stated otherwise, the thicknesses named are the original ones out of which the doors, floors, &c., are made, and not the finished thicknesses after planing and cleaning down.

THE SANITARY CONSTRUCTION AND FITTING OF STABLES, COW-HOUSES, AND PIGGERIES.*

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THE subject of this paper is one of such importance that it is surprising how little it is considered, and what a small amount of reliable literature, or data, is available for reference. Among the few standard works on

horse and cattle management there is hardly one which attempts to deal practically or scientifically with this important branch of the subject. Taking the subject of stables first, it will be found convenient to divide this into two sections—dealing first with essentials of planning, construction, and sanitation; and secondly with the interior fittings, &c., adapted for different classes of horses under varying conditions. It is obvious that the planning of stables must be largely governed by the site obtainable. What might be an ideal scheme as applied to a country house, with ample space available, would be quite impossible in a crowded district or town, and therefore general rules only can be laid down, which must be varied to suit specific conditions. In the planning of large stable buildings, it is a good arrangement to have a quadrangular yard entered by an archway under or by the coachman's residence and forage store, which will form the front elevation of the scheme. On either side of the yard can be a range of stables with stalls or loose-boxes, with a sick-box in one corner and a washing-shed in another corner. The remaining side or end will contain the coach-houses with rooms over for grooms and helpers, for whom separate w.c. and lavatory accommodation must be provided, distinct from that for the use of the coachman's family. Part of the yard should be covered with a light iron and glass roof for washing purposes. Another arrangement would have the buildings on three sides only of the yard, the coach-house and groom's quarters on one side, the coachman's cottage, forage-store, sick-box, &c., on other side, and range of stables at end of yard. In the case of small stables for a few horses, where (as in the case of most town sites), the animals, vehicles, and coachman's residence have to be under one roof, special precautions must be taken to secure hygienic conditions, and reference will be particularly made to this in connection with building and fitting. The site should be a dry one on natural deep gravel, chalk, rock, or firm sandy soil, avoiding all artificial or made grounds where possible; but any ordinary loam or clay, even the wettest, may be made suitable by proper foundations and careful subsoil drainage. In the case of a specially wet clay or other damp soil it is sometimes advisable to artificially raise the site within the walls from 6in. upwards, by a bed of dry, clean, broken brick, before concreting, forming a dry area round outside of walls to the same depth, the site to be deeply trenched and land drained. In all cases of damp or low-lying ground the precaution of subsoil draining should be adopted, as this is a comparatively simple matter if done as soon as the site is cleared; but if it is neglected, or the evil is not discovered until the buildings are erected, it is a most difficult and costly matter to rectify. It is hardly necessary to say that the ends of the agricultural drain-pipes or trenches filled with furnace clinker, broken brick, chalk, or otherwise which may be used, must be carried right across the site so as to discharge into a deeper-graded ditch or channel right outside the walls and under the lowest level of the foundations. These precautions, if carefully followed out, will effectually dry the dampest site, and prepare it for building operations. Having secured a dry situation, by natural or artificial means, the foundations for the walls of the stable building will be prepared by excavation and concreting, and when this is thoroughly consolidated, the building operations will be proceeded with in the usual manner, care being taken to put in a good damp-course of lead, asphalt, slates, and cement, or vitrified tile, at least 6in. above the level of the external ground. The walls should be built of hard well-burnt stock bricks, faced, if desired, with red or other fancy brick and set in good lime or cement mortar, or of substantial masonry, set in cement. Concrete walling has been used with advantage in some cases, but demands much care in securing homogeneity in the material, and should preferably be faced on the outside with hanging tiles or cement slabs, to insure weather-tightness, especially in exposed situations liable to driving rains. The internal face of all brick-work should be neatly pointed or rendered with cement and sand, steel-trowelled; but for the inner walls of a stable, cow-house, or piggery, where expense is not the first object, nothing is nicer than glazed bricks or tiles. These should be of a soft tint or colour, but not pure white, as the animals' eyes are injuriously affected by plain white. White should be particularly avoided at the stall heads or sides, where a soft green, buff,

* Read before the Sanitary Institute Congress.

or grey is very nice in appearance and restful to the horses' eyes. A very usual and economical plan is to terminate the glazed bricks or tiles at a height of 7ft. from the floor at the head of stalls and 4ft. 6in. high round rest of walls, capped with an iron moulding, and the walls above smoothly cemented and painted. If it can possibly be avoided, no rooms or loft should be over the horses' standings, and the roof of the stable should be of open timber work neatly boarded, stained, and varnished. This has two advantages, as it gives extra height and air space, and the varnished surface is impervious, sanitary, and easily cleaned. If circumstances compel the use of rooms over a stable, the ceiling should be in no case less than 10ft. from the floor; but a minimum height of 11ft. or 12ft. should be insisted on wherever possible. It is obvious that if a height of 10ft. is desirable in a room intended for human habitation, the greater height and bulk of a horse demands increased height and more air, so that an allowance of from 1,100 to 1,800 cubic feet should be given to each horse. This is obtained by allowing 9ft. by 6ft. for each stall, which, with 7ft. by 6ft. of passage-way at heel, gives 96ft. superficial of floor space, which, multiplied by 12ft. net height, gives 1,152 cubic feet. For loose boxes a floor space of 12ft. by 12ft. should be allowed where possible, and never less than 10ft. by 10ft., with passage space extra. The construction of the ceiling in question should receive much more care than is usually bestowed. The best form would be a light iron and concrete floor for the loft or rooms over a stable, as this has several advantages. It is fireproof, soundproof, durable, and impervious to the passage of any vitiated air from the stable below. The underside forming the ceiling of the stable can be smoothly cemented and painted or whitewashed. If a wood joist and a boarded ceiling is the only one available, several precautions must be taken. The floor-boards should be grooved and tongued, the joints stopped, and the floor of the upper rooms varnished, the under surface of the joists being carefully lathed, plastered, and painted, to form an impervious stable ceiling. A better plan in many respects, but not quite so neat, would be to form a ceiling of flat iron sheets, butted closely together and nailed to the underside of the joists. This could be painted, and would form a more permanent and sanitary surface than the lath and plaster. If the rooms over must be used for dwellings, under no circumstances whatever must the staircase or any shaft or ladder-way communicate directly with the stable, or all the vitiated air and heat will ascend thereby into the rooms above. Serious illness has been repeatedly caused in this way, and always risk and discomfort to the occupants. An external staircase, or one divided by a brick partition from the stable, should always be provided; and if such an internal stairway is being formed, it is a good plan to make the space large enough to accommodate the hay and corn shoots as well, as fodder is absorbent of foul odours, and should not be in communication with the stable directly, as in the case of a loft over. The stable roof can be of tiles or slates, &c., and does not call for special mention, except that provision must be made for one or more exit ventilators for foul and heated air. If one large exhaust ventilator is to be employed, as in the case of a stable with rooms over, it must be connected with the stable ceiling by means of an airtight metal shaft, passing down hermetically sealed through the upper rooms, and carried along the stable ceiling as a horizontal duct, having ventilating gratings in the bottom at intervals of about 6ft. for the entry of foul heated air, which will travel along and be drawn up the outlet shaft by the exhaust ventilator on roof. If there are no rooms over the stable, one or more ridge or turret ventilators must be provided, with folding or sliding louvres, which can be opened or partly closed by cords or gearing as the temperature may require. Fresh air must be admitted in such a way that each animal gets an ample allowance without draught, as draughts do as much harm as the fresh air does good. This is best obtained by fixing an adjustable louvre or hopper ventilator in the wall at the head of each animal's stall or box, about 2ft. above the top of the stall partition. The advantage of the hopper type is that the current of air does not blow directly on the animal, but is deflected upwards for a short distance, and then falls by gravitation towards the floor, displacing the lighter heated air, and then in its turn, becoming hot and foul, consequently lighter, and

rising by levitation to the outlet ventilators in roof or ceiling, as before described. The Sherringham inlet ventilator is one of the oldest and best, being easily procured, cheap and readily fixed, and it will admit a sufficient supply of air for one horse or cow. The Crosse ventilator is slightly different in form, but very useful in all respects. Some of the adjustable glazed hopper ventilators made by professional stable fitters are also very good and sanitary. The use of a thermometer should always be insisted on in a stable or cow-house, so that an equable temperature may be maintained, cool in summer and moderately warm in winter. Overheating is a thing to be avoided, otherwise the animals are apt to be chilled on going out. As long as they are shielded from damp, from the inclemency of the weather, and from draughts, the heat of their bodies and bedding will keep them comfortable and healthy. This question of ventilation is one of the first importance, and should receive more careful consideration than it usually does. It is often difficult in town stables to get the ventilation at heads of stalls direct from the open air, on account of adjoining buildings; and in such cases it is advisable to fix a horizontal metal shaft along the wall of stable over the heads of horses, with one end freely open to the external air, and the other end continued up from far end of stable as a vertical shaft to above the roof. A current of air will always travel along this, and the inlet ventilator at head of each stall is simply fixed in this air-shaft, from which air will blow in freely. The top sash in every stable window also should have one pane made to hinge or swing on centres, so as to be available for ventilation. In all cases, watch the thermometer. The next important point to consider is the floor, which must be hard, durable, impervious to moisture, but not slippery. Under all circumstances, whether in town or country stables, it is imperative that the entire floor be concreted to a depth of 6in. with good cement concrete, in proportion of one of cement to six of gravel or burnt ballast, laid to proper falls for facilitating the flow of surface drainage and to keep back the ground damp. On this various kinds of paving can be laid. For a first-class stable one of the best pavings is the chamfered adamantine clinker brick, bedded in cement and well grouted with fluid neat cement. It is well coloured, hard, gritty, and durable. The blue Staffordshire paving brick is also a good paving, and largely used; but with any brick paving special care must be taken in grouting the joints thoroughly with impervious cement, otherwise the least crevice will permit drainage to soak in and smell. For this reason large numbers of stables are now laid with patent cement floors, which are formed of a 3in. thickness of Portland cement mixed with pulverised granite, &c., laid *in situ*, on a 4in. bed of dry broken brick, laid to falls and with the finished top surface scored or grooved to give foothold for the animals. When properly laid and well grooved this is doubtless the best and most sanitary paving, as it is homogeneous, and the absence of joints offers no entry for liquids, thus possessing an undoubted advantage over any of the jointed brick pavings. Great care must be taken in securing the best material, well laid and of sufficient thickness. It is obvious that different classes of animals require different strengths of paving. Even a 2in. thickness of granite cement paving will stand light carriage horses, but the writer has seen this thickness stamped right through by heavy dray horses, for which a 3in. thickness is none too much. The all-important question of drainage is now to be considered. It may be at once stated as a cardinal rule that no underground drains should be permitted in a sanitary stable or cowshed. The best plan is to have the paving itself sloped with an even fall of four-tenths of an inch to the foot run, from sides to centre of stalls and boxes and from head to heel, also the same slope from upper to lower end of stable. This will form a valley or depression down the centre of each standing, from head to heel, along which liquid will freely travel, to be collected by a similar shallow gutter along the heels of stalls or range of boxes, falling to the lowest point, where the surface gutter will pass as a half channel pipe through the outer wall of stable, discharging over a trapped gully in the open air. This gully should be a large and deep one, fitted with a removable iron pan or bucket to catch any dung, straw, or solid matter which can be removed every day. By this means all underground drains are avoided within the building; but the objection has been

occasionally raised that the shallow surface channels allow the animals' bedding to become soddened with wet, causing nuisance and discomfort. In the writer's opinion this is a very feeble objection; but to obviate this special iron sunk gutter channels, with movable perforated iron covers, can be fixed half way up each stall and along heels of same, jointed with proper tee and angle-piece connections. The liquids then run through the holes in the covers in the sunk gutter, which can, if desired, be made with sloping bottoms of the same four-tenths of an inch to 1ft. gradient already referred to. By this means the paving can be kept nearly level, the graded gutters carrying all liquids rapidly away. All that is necessary is for the covers to be lifted off and channels swept daily. To make this system still more perfect the draw-off tap for water can be fixed at highest end of stable over shallowest part of gutter, so that the waste water can flush the gutter and the tap be turned on for this purpose. This system will keep the stable sweet and the bedding dry, and is well worth the extra expense of construction. Care must always be taken not to exceed a slope of $\frac{1}{4}$ ths to $\frac{1}{2}$ in. per foot run in any direction for stable paving, as anything steeper than this imposes an injurious strain on the ligaments of the horses' legs while standing in a stall for any length of time. Serious trouble has been known to result from too steep a pitch. The slope of $\frac{1}{4}$ in. to 1ft. may be relied on as the result of years of practical experience in stable paving. The fitments of the stable have lastly to be considered. These should never be wholly of wood, as this is clumsy in appearance, easily damaged, liable to infection, insanitary, and difficult to keep clean. The heel-posts or columns of stalls and loose boxes should be of stout cast iron from 4in. to 6in. diameter, and not less than $\frac{3}{4}$ in. in thickness, otherwise they will be fractured by a kick. They should have projecting flanged bases 12in. square, with holes for bolting to a good stone base 12in. below the ground line, or with 18in. long bases with a double flange for imbedding in a mass of concrete. If such base fixings are carefully made they will stand the hardest wear for years without movement. The post should be capped with a round ball head and rounded mouldings. No sharp corners, mouldings, or projections can be tolerated for a moment in any stable fitting, as serious accidents have resulted from such vagaries on the part of inexperienced foundlers and ironmongers, ignorant of stable requirements. For the same reason no spiked or projecting postheads, brackets, or ring staples should be used. Every hard surface in a stable must be smooth and rounded off, even at the sacrifice of appearance. Wrought-iron posts are sometimes advocated on the score of less liability to fracture, but wrought iron is more easily corroded in a stable; the shafts of stable-posts are simply made of thin wrought-iron gas-pipe with bases and caps cast on, and altogether practical experience favours the use of stout cast iron in preference to wrought iron for posts. The divisions between stalls usually consist of an iron sill at the ground-line, a panel of hard varnish grooved and tongued boarding, about 1ft. 6in. high from post to wall, surmounted by a top panel of wrought-iron vertical-barrel grating, with a strong grooved mid-rail to receive top of boarding, and a rounded top capping, which is ramped from 7ft. high at head of stall to about 5ft. high at post end. This top of grating is 7ft. uniform height all round loose boxes, having a wood panel 4ft. 6in. high at sides of box, but the front grating being rather more open, say 3ft. of woodwork and 4ft. of open ventilating grating. The sides of loose-boxes should always be less open than the front, or the animals will be fidgeted by seeing each other. For this reason a solid panel about 3ft. long is often inserted at the manger end to prevent the horses seeing each other whilst feeding. The doors of loose-boxes should be strongly framed of iron or wood, with a top panel of ventilating grating, and a safety-latch which the horse cannot open himself, and which offers no projection open or shut against which he can hurt himself. The mangers should be fixed about 3ft. 6in. from floor, or slightly lower according to height of horse. For private stables, where loose hay is used, the manger fitment should also contain the hay-rack, so that the horse can feed underneath. It is well also to have a water-pot alongside, which is always handy for giving a mash, even if the horse is usually watered from a bucket. The customary stall fitment consists of an iron top plate the full width of the stall and

supported on a bracket each end, having three large openings with rounded lips. To the opening at one end is bolted the hay-rack, which should have a seed-tray at bottom to prevent waste by dropping. The centre opening receives the manger, which should be wide and deep to prevent the corn being tossed out by the horse in feeding. In some cases it is necessary to put an iron cross-bar at each end to prevent the horse indulging in the trick, leaving space between for him to reach the corn, but no more. The water or mash-pot is fixed at the other end of the fitting, and should have a waste-plug at bottom for quickly letting off stale water into a bucket or down the surface-gutter. Both manger and trough should be of galvanised or enamelled iron, the hay-rack and top-plate being galvanised or japanned. Care must be taken that the edges of all openings are rounded and curled under, or a horse will cut or chafe himself. The front edge of the manger-plate must be carefully curved under, or formed into a barrel, for the same reason. In many cases it is a safe and neat expedient to board in the front of the manger fitting, sloping from under the curved lip right back to the wall just above floor. This prevents crib-biting, prevents a horse getting his bedding pushed under the manger, and prevents danger to the animal in rising from the ground. The loose-box manger fitting is usually constructed on the same principles, but adapted to fit a corner of the box, although in some cases, especially in racing stables, the manger and hay-rack are in separate corners. Overhead hay-racks should be avoided, as the horse in pulling down his food gets dust and seeds in his eyes. In the case of the hard-working horses of 'bus, tram, and carrying companies, contractors, fire-brigades, business firms, &c., it is so generally and successfully the custom to give them chopped hay and bruised corn mixture, that in most cases no hay-rack is used, there being one long open manger, or a manger and gruel pot in each stall. The pan should be deep and wide with cross bars at each end to prevent food being thrown out. In some cases the pans are made to lift out for cleansing, but anyhow, both plate and pan must be of painted or galvanised iron. Much could be said on the subject of halter tyings, harness fittings, cleaning hooks, &c., but space forbids. Corn-bins should be of iron with divisions, hinged lids, and locks. Stable-buckets should be of iron, with wood bottom rims, so as to be clean without being too noisy. With regard to cow fittings, the general rules laid down for the sanitary construction, ventilation, and drainage of stables will all apply to cow-sheds, but a few additional matters have to be considered. It is advantageous in planning a cow-house to arrange the standings so that there is a feeding passage between the heads of the stalls and the back wall, so that the animals can be fed without the necessity for the attendant to push by them to reach the troughs. There will, of course, be a wide passage at heel of stalls, and in many cases the floor of stalls is raised a few inches above the level of passage. The divisions should be entirely of iron, situated 8ft. apart for a double stall to hold two cows, or 5ft. apart for one cow. The divisions usually extend only about half the length of the animal, as this is sufficient. The regulations made under the Dairies, Cowsheds, and Milkshops Order of Local Government Board, 1885-86, give a minimum stall space of 8ft. by 4ft. for one cow, or 8ft. by 7ft. for two cows. A slide and ring is fixed in the middle of each division for attachment of the binding chain. The food trough must be of iron fixed near the floor, or of strong glazed earthenware. If for a double stall, it should have a partition dividing it into a compartment for each cow. The stall division is cut away, so that the water-trough is fixed midway under it sufficient for two cows, but with the division shielding one cow from the horns of the next. The hay-rack is fixed just above the manger, and is usually continuous the whole length of the shed. Nothing but iron should be allowed for the fittings, as it can be cleaned and disinfected. Wood cannot, as it is puerous, absorbent, and a fruitful source of contagion. A separate apartment should be provided for a calving pen, and another one with a copper, hot water supply, and impervious underground pit for grains; also bins for meal, bran, &c., quite separated from cowshed. An ample supply of water should be provided in a covered cistern fixed at least 6ft. above ground with open overflow, providing at least twelve gallons for

each cow, the water being laid on to each cow-trough, which will also have a waste plug. No w.c., urinal, or dwelling-room to communicate with cowshed. All the rules for sanitation, cleanliness, &c., as laid down for stables are even more important as regards cowsheds, on account of the important bearing on food supply. Piggeries should be constructed with as much care and sanitary forethought as either stables or cow-houses. There is no reason why the pig should exist in the usual filthy state. The styes and yard inclosures should be of iron or of brickwork cemented. The styes should have a passage at back for cleaning purposes, with doors of communication. The yards should have the feeding-troughs in the front outer wall by side of the gate, as they are much better in that position than as sometimes placed in the back wall of sty, as the animals in the latter case sloop their food over their bedding in eagerness to reach the troughs. This matters less in the open yards. The troughs should be entirely of iron, with a hinged falling shutter, which can be pushed inwards and bolted, while filling or cleaning the troughs, and secured outwards at other times. The paving should be as described for stables and cow-houses, with surface drainage only. In the case of cow-sheds, piggeries, and country stables, it is economical to convey the surface drainage to an impervious covered catch-pit in open yard, and pump it from there as required for use as liquid manure. In town stables, &c., even with surface drainage, a proper modern system of sanitation must be adopted, thoroughly ventilated and disconnected from sewer. The receiving gully-trap outside stable wall will communicate by a watertight pipe drain, with a proper covered manhole in the yard or mews, not connected to the general house drainage, but running direct to an intercepting manhole nearest to sewer from which it is disconnected by a siphon trap, with fresh-air inlet ventilator and up-east vent-pipe as for house drainage.

THE A.A. "BROWN BOOK."

THE familiar annual "Brown Book" of the Architectural Association, embracing a calendar, time-tables of the studio and classes, list of officers, roll of membership, and syllabus of meetings, has just been issued in readiness for the sixtieth session, to be inaugurated on Friday evening, October 9, by Mr. Beresford Pite's Presidential address. The only new features in the present issue of this concise and well-edited little book are particulars of the architectural classes at King's and University College, while the Guild and School of Handicrafts having been discontinued, is necessarily dropped out.

The annual report of the committee states that the number of new members elected during the session was 74; 6 members were reinstated, and the losses by deaths, resignation, and other causes amounted to 80, the total number of members remaining, therefore, precisely as last session at 1,111. (The roll of membership showed as totals 1,131 in 1894, 1,129 in 1893, 1,125 in 1892, 1,138 in 1891, 1,129 in 1890, 1,094 in 1889, 1,052 in 1888, 993 in 1887, 972 in 1886, 1,013 in 1885, 995 in 1884, 960 in 1883, 884 in 1882, and 863 in 1881.) The committee report that, "In deference to a general desire for the establishment of classes for the study of design in connection with handicraft, the committee established a school of design and handicraft which was attended with considerable success. The question of premises again occupied the attention of the Premises Sub-Committee, and a scheme to acquire galleries at 9, Conduit-street was discussed, but the negotiations fell through. Arrangements have now been made to remain at 56, Great Marlborough-street for the present. The structural alterations and enlargement of the office and library have been completed under the supervision of Mr. F. T. W. Goldsmith, who kindly acted as hon. architect." Afternoon visits were made during the spring to the Tate Gallery of British Art, a house in Park-lane and Aldford-street, New Claridge's Hotel, the Northampton Institute at Clerkenwell, British Institute of Preventive Medicine, houses in Chelsea Embankment-court, the Coburg Hotel in Mount-street, and the late Lord Leighton's house in Holland Park-road. Summer visits took place also on Saturdays to Bickley Park, Audley End, Stanstead Montfitchet, Godalming, the Vyne, and West Wickham. The library has continued to be well used, but the committee regret that the attendance at the ordinary meetings showed a

falling off as compared with the previous session, which, however, was above the average. During the session papers were read by Mr. Talfourd Ely, Dr. G. B. Longstaff, Professor Herkomer, R.A., and Messrs. J. Toomey, H. T. Hare, Nelson Dawson, Sidney H. Wells, Arthur Silver, Hervey Flint, C. Fitzroy Doll, F. E. Masey, and Aldam Heaton, all of which, it may be mentioned, were fully reported in these columns. A conference to consider the condition of architectural education in London was held on March 27. The members' soirée, held at St. Martin's Town Hall on May 15, proved a great success, and the annual dinner, which took place a fortnight later at the Holborn Restaurant, was attended by sixty members and guests.

The annual balance-sheet shows a total expenditure of £1,720 17s. 6d., and an income of £1,578 19s. 2d., the balance on the wrong side being thus £141 18s. 4d. This deficit has been carried to the premises and general fund account, which again profits by a donation of £100 from the R.I.B.A. On this account, after deducting the above excess of expenditure over income, and making allowance for the modest sum of £63 8s. 4d. expended on alterations and furniture, the balance carried forward is £515 8s. 6d., as compared with £612 7s. 2d., the balance in hand at the corresponding period last year. In the general balance-sheet, while there is shown a sum of £18 7s. 6d. for members' subscriptions received in advance, no less than £115 is set down for members' subscriptions in arrear.

SECRET COMMISSIONS.

A LIVELY correspondence on secret commissions to architects and engineers has been started in the columns of the *Times*. The discussion was opened by a letter by the Right Hon. Sir Edward Fry, better known till recently as Lord Justice Fry, who called attention to Lord Chief Justice Russell's recent observations on the evils which flowed from the secret commissions so often claimed and paid in commercial transactions. Sir Edward Fry capped a list of half a dozen forms in which these dishonest practices are alleged to exist with the remark: "Lastly, but not least, bribery in one form or the other riddles and makes hollow and unsound a great deal of business, including transactions in which the professions of engineers and architects are interested. Sometimes the bribery is effected by the payment of a single sum, more often under the name of a commission or by way of percentage; sometimes pickings are secured under the form of a royalty on a worthless patent or stipulations as to the firms from which articles are to be obtained for use in the work to be done. . . . Is it not possible that the great professions of engineers and architects may bestir themselves, and consider whether something cannot be done to check practices which the honourable members of their callings admit and deplore? Is it too much to hope that the great body of honest and straightforward manufacturers and traders who find themselves hampered and vexed by the dishonest practices of those around them can pick up heart of grace to expose and put down what I know harasses them from day to day?" Appended to Sir Edward's letter was one from an unnamed firm in the North of England, who stated that the system of bribery was at the root of a great number of commercial transactions, although it was not easy to get reliable information on the subject, as those who bribed and those who expected to receive bribes did it in such a way that it was difficult to trace. The firm added:—"We have met with serious difficulties in connection with some architects, who will demand a commission from the manufacturers whose machinery is used in cases where they prepare the plans, and who get paid for the same by the owners of the property."

A "Civil Engineer" followed up this letter on Monday by stating that his experience of 20 years as a contractor's agent and as a civil engineer in private practice showed that there were very few contracting firms indeed who do not "provide for the engineer" in every contract they took, unless they knew that it was useless trying to bribe him. A regular order to the writer when pricing out quantities in the former position was, "Put on so-and-so for Mr. Engineer. All the contractors will do it, and if he does not take it, so much the better for us." In the latter capacity he well remembered a visit from a partner of a well-known firm of contractors whose tender had been

accepted by a company for whom he acted. He remarked, "I have provided 2½ per cent. for you." The writer replied, "I do not do that kind of thing; I do not think it is right." His reply was, "Well, Sir, you are hard on us; I suppose you want 5 per cent." For this lamentable state of affairs directors and clients were, he remarks, frequently very much to blame, and, with young engineers especially, many of them through cutting down fair fees have had to pay dearly in numerous ways, which perhaps only became patent to them years after, and which were simply the result of the engineer getting into the contractor's hands. The contractors themselves and fair fees could do more than the profession and all the legislation in the world to put a stop to a practice which Sir Edward Fry rightly characterised as "a disgrace to our civilisation."

As was to be expected, the Secretary of the R.I.B.A. rushed into the fray, quoting the well-known clause in the declaration made by all members of the Institute, in which the candidate for admission promises not to accept any trade or other discounts, or illicit or surreptitious commissions or allowances, and explaining that any member charged with contravening this declaration is liable to suspension or expulsion from the general body. Mr. White continued: "During the 18 years I have held my present office cases have been brought up, considered, and summarily dealt with; and I am bound to add that other cases have also been brought up in which the moral guilt of the parties concerned has been apparent, but upon which no action has been taken, simply because of the absolute refusal of witnesses to give evidence. In other words, because the general public are too willing to ignore their own obligations to society, even where their own protection is concerned."

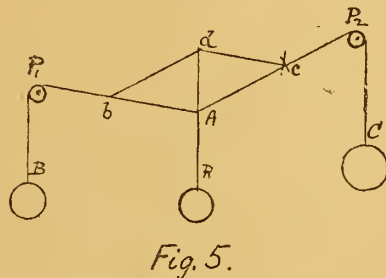
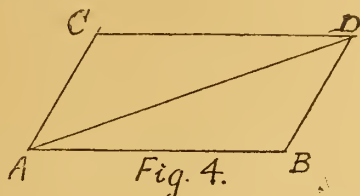
Professor T. Roger Smith, F.R.I.B.A., in repudiating the insinuation of bribery so far as architects of reputable position were concerned, remarked that in his opinion opportunities of obtaining secret commissions do not exist to such an extent among architects as are alleged to be the case in engineering works. He adds:—"May I state my own experience? I have practised for 40 years, and not unsuccessfully, and during that whole time I have never once had an offer, or even an indirect suggestion, that a bribe could be had from any general contractor for works, and only twice from any tradesman furnishing articles used on buildings. Surely if secret commissions were rife I should have heard occasionally during that long period that I could have one if I would take it."

GRAPHIC STATICS.—II.

WITH respect to the question of the motion of the ship, which was discussed at the end of Chapter I., it may be necessary to caution some readers against supposing it possible that any single force acting continuously on a body can produce uniform motion. It should be remembered that it is the force of the resistance of the water to the passage of the ship through it which enables the uniform pressure of the wind to produce the uniform motion of the ship through the water, and, further, that this result is obtained because the resistance is not the same for different velocities of the ship, but increases greatly as the velocity is increased, so that the retarding effect of the resistance ultimately becomes equal to the accelerating effect of the wind, and thus the motion under the influence of continuously acting forces becomes, in such a case as this, ultimately uniform. Again, the reader should notice that the pressure of the wind on the sails of the ship has been supposed to be uniform. This also is not strictly true, since a body going in the direction of the wind receives less wind pressure than if it were stationary or going against the wind. Similar remarks, of course, apply when we consider the motion of the vessel through the air under the influence of the pressure of the current.

In Newton's Second Law the word *motion* means more than merely *velocity*. As an illustration, consider two bodies moving with the same velocity, one body weighing 4lb. and the other 2lb.; then the first would be considered to have twice the *motion* of the other, since the quantity of motion depends jointly on the mass moved and the velocity of the motion. If equal forces act on the same two bodies the *velocity* of that which weighs 4lb. will be half that of the one which weighs 2lb., but the *motions* will be equal.

If different forces act on the same or on equal bodies, the velocities produced are proportional to the forces. Hence, in the parallelogram of velocities the lines which represent the velocities will also represent the corresponding forces to some scale, and all to the same scale. We thus from the parallelogram of velocities deduce the following proposition, which is called the parallelogram of forces.

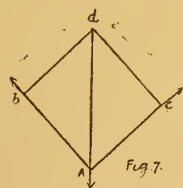
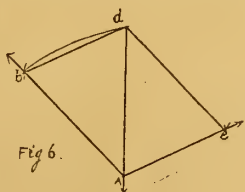


If two forces acting at a point be represented in magnitude and direction by straight lines drawn from* the point, and a parallelogram be constructed having these straight lines as adjacent sides, then the resultant of the two forces is represented in magnitude and direction by that diagonal of the parallelogram which passes through the point.

In Fig. 4 let AB, AC represent two forces which act at the point A; complete the parallelogram ABCD, and draw the diagonal AD; then AD represents the resultant of the two forces.

By means of the parallelogram of forces we see how to find the resultant of two given forces which act at a point; that is, we find the single force which is equivalent to the two given forces. The *equilibrant* of a number of forces is the force which, acting with them, would produce equilibrium. It is evidently equal and opposite to the resultant of the same forces. The forces which have a certain force for a resultant are called the *components* of that resultant force. By the help of the parallelogram of forces any given force may be split up into two components which act in given directions. The force is then said to be *resolved* in these two directions.

Experimental illustration and verification of the parallelogram of forces:—Let P_1 , P_2 , Fig. 5, be two small pulleys which can turn freely, and are parallel to a vertical wall and at the same distance from it. Let three fine flexible strings



be knotted together, A representing the knot. Let weights be fastened to the other ends of the strings, and let two of the strings be passed over the pulleys, and then allow the system to settle into a position of rest, as shown in the figure.

Disregarding the friction of the pulleys and the weight of the string, we shall have the tension the same throughout each string, and acting in the direction of the string. We may say then that the point A is kept in equilibrium by three forces acting along AP_1 , AP_2 , and AR respectively, so that the resultant effect of the weight B acting along AP_1 , and C acting along AP_2 is an upward pull at A just equal and opposite to the vertically downward pull caused by the weight R. Now set off along AP_1 , AP_2 lengths Ab , Ac to represent the forces which act in these

directions: complete the parallelogram $Abdc$. Then it will be found that the diagonal Ad is vertical, and represents, to the same scale, an upward force equal to the downward one caused by the weight R—that is, the diagonal Ad represents the *resultant* of the two forces which are represented by the sides Ab , Ac of the parallelogram. We may find the resultant of the tensions of any two of the strings in the same way, and it will be equal and opposite to the pull of the other string.

In order for the experiment to be possible, we must have any two of the three given weights together greater than the third. To draw the figure (5) without experimental help, when the three weights are given or assumed. (Scale $\frac{1}{10}$ to the ounce.) Let the weights B, C, and R be 19oz., 21oz., and 12oz. respectively. Draw Ad vertical and $\frac{12}{10}$ long; from A with radius $\frac{19}{10}$, and from d with radius $\frac{21}{10}$, describe arcs intersecting at c; join Ac , Ad . Then evidently Ad is one-half of the required parallelogram of forces to the assumed scale. Complete the parallelogram $Abdc$, and the directions of the three strings will then be known.

It is necessary to success in this study to carefully observe every detail in the data. Returning to the experiment represented in Fig. 5, it should be noticed that the three strings are said to be "knotted together" at A. Let us now see how the problem of drawing the figure becomes modified if RAP_1B be supposed to be one piece of string, and A to be a small smooth ring, whose weight may be neglected, fastened to the string at AP_2 , and through which the string RAP_1B freely passes. Let R be given as 11lb., and c as 9lb., and let it be required to find the directions of the two strings AP_1 , AP_2 . (Scale $\frac{1}{10}$ to the pound.)

Since there is no friction to be taken into account at the pulleys and ring, we shall have the tension the same throughout each string; therefore the pull along AP_1 will be equal to the pull along AR ; that is, the weight at B is equal to the weight R. Make then, in Fig. 6, Ad vertical, and $\frac{11}{10}$ long; from A, with radius Ad , describe the arc db ; and from d, with a radius of $\frac{9}{10}$, describe an arc cutting the arc db at b; join Ab , db , and we have half the required parallelogram of the given and required forces. Complete the parallelogram $Abdc$, and we find Ab , Ac as the required directions of the strings. Again, A still representing a ring, suppose the weight R and the direction of AP_1 to be given, and find the direction and magnitude of the pull along Ac . Here the pull in AP_2 must be equal and opposite to the resultant of the two equal pulls in the given directions AR , AP_1 , and the reader will have no difficulty in working the problem.

Next, let us apply the parallelogram of forces to *resolve* a given force into two components which act in given directions. Referring again to Fig. 5, suppose the weight R to be given as 100lb., and suppose the string AP_1 to be inclined at 40° to the vertical, and the string AP_2 inclined at 45° to the vertical. (Take $1''$ to 100lb. as the scale.) Draw, Fig. 7, the vertical line Ad 1" long, and therefore representing the resultant of the two unknown pulls in the strings AP_1 , AP_2 , and complete the parallelogram $Abdc$ by drawing the sides in the appropriate directions. Then it will be found that Ab is $.71''$ and Ac $.65''$ long, and it is thus found that the pull in AP_1 is 71lb. and the pull in AP_2 65lb.

It is possible by repeated application of the parallelogram of forces to find the resultant of any number of given forces whose lines of action lie in one plane, and are not all parallel, as follows:—Find the resultant of two of the given forces, then take that resultant and another of the given forces, and find the resultant of these, and so on. A more convenient method will be described later.

N.B.—By an unfortunate oversight in Chap. I., the line EP is omitted from Fig. 3. Also, in the second paragraph from the end of the chapter, lines 3 and 4, instead of "if EP be parallel to BD," we should read, "if EP be parallel to AB and CD." These corrections will render the paragraph intelligible.

DETAILS OF THE HARRISON BUILDING.

THE *Engineering Record* gives details of the Harrison Building, Philadelphia, Pa. The number continues the constructive particulars of this high building relating to the columns, girders, and roof trusses. At the tenth floor

* Or both may be drawn to the point.

level the upper wall columns are set back 9in. from the centres of those below, and are carried on girders. This setting back was necessitated by the design. Terracotta ashlar is used. Describing the curtain walls of this building, it is stated that they are of hard burned cellular terracotta bricks, with all sides closed in most instances, except through courses directly over the curtain beams and the window sill and lintel courses. The wall is in two thicknesses or double faced. The blocks vary in height from 12 to 28in., and the backing is of hard hollow terracotta blocks, with backs scored for plastering. This backing levels up with each course of the face blocks, and these are one half the thickness of the wall, and have rebated, horizontal, and vertical joints. The face blocks resemble Indiana limestone in colour and treatment, having close joints and tooled surfaces. The specification required that the wind in the face or edges of the blocks should not exceed $\frac{1}{4}$ th of an inch, and this limit has been fairly kept, and straight, shapely blocks with no perceptible winding have been used for the facing of the building. The engineer, Mr. Furber, thinks this wall construction much superior to solid walls of brick or stone, and he is no doubt right. The loads are reduced and the cellular walls are excellent non-conductors of heat, impervious to dampness or water. He also observes the cellular system to be a rational and legitimate method of wall construction for skeleton buildings, excepting when the building is so high or narrow as to require heavy masonry walls to act as a vertical component to resist overturning wind strains. The floors of this building are of hollow tiles 9in. and 10in. deep. Sections of all the four corner columns are given, from which it is shown how the vertical lateral stiffening girder is attached, the web of which is integral with that of the column; also the brace bracket attached. The section of columns that rest on the cantilever girders which support the first story is of heavier construction. All the sections of these columns and of the framing of the roof trusses are illustrated. The architects of the new building are Messrs. Cope and Stewardson, of Philadelphia; Mr. W. Copeland Furber, of the same city, is the designing engineer. The details of this building show a careful study of the requirements of iron construction, and it is noteworthy to remark that the columns from the ground to the upper story have their sectional areas proportioned according to the load in the simplest manner—namely that the increase of area required for the lower stories is obtained by simply thickening the elementary shapes.

WOOD AND ASPHALTE PAVING.

A GAIN the old charge against wood pavement—that it harbours germs of disease—has been revived by the *Revue Technique* in an article based on the data of Dr. Miguel. The bacteria found in the successive layers of the paving have frightened some of the Parisian people. The point which is emphasised is that microbes exist in the upper crust of the blocks, and being disengaged by the traffic, impregnate the atmosphere. Those bacteria which are produced and develop in the broken and putrefying crust of the wood pavement are dangerous. From these facts the author concludes that while wood and asphalt pavements have each technical advantages, that for hygienic reasons the asphalt is superior, in that it presents a monolithic bituminous crust easily cleansed with water, and more sanitary than a material rendered spongy by traffic, and imbibing putrefying germs. But there are other considerations, chief among them being the slippery nature of the ordinary asphalt paving, and the cruelty to horses which have resulted, reasons which have justified the substitution of wood. It is only in the desecrated state of the upper crust that these germs can be dangerous, and the same condition applies to all dry dust on impervious surfaces as well.

THE PROPOSED NEW GOVERNMENT OFFICES.

THE report of the Select Committee of the House of Commons appointed to inquire into the manner in which the sites available for the erection of the new buildings required for Government offices may best be appropriated for that purpose, of which Mr. Akers-Douglas, First Commissioner of Works, was the chairman, has just been published as a Parliamentary paper. The committee are of opinion that it is desirable to

acquire as soon as possible the various interests in the property called the Carrington-house site, which is bounded by Whitehall, Horse Guards-avenue, Whitehall-avenue, and Whitehall-place. It appears that the freehold of all the properties on this site is part of the hereditary estates of the Crown; and the committee recommend that a Bill should be introduced next session providing for the acquisition of this freehold by the Commissioners of Works, for the compulsory purchase of the leasehold or other interests, and for the stopping of any public rights of way within the site. The erection of the War Office on this site is recommended, chiefly because this site could more quickly be made available than any other, and also because, in respect of nearness to the Admiralty and otherwise, it is the most suitable that could be selected.

The committee proceed to state that there are many other departments which stand in pressing need of concentration or extension and improvement of accommodation. These should, they consider, be brought together on the site now being acquired in and behind Parliament-street, on the surplus land belonging to the Government in Spring-gardens, to the north of the new Admiralty and in the neighbourhood of Downing-street. They consider that on these three sites and the Carrington-house site, with the aid of certain rearrangements and exchanges of space in the existing Government buildings, adequate accommodation could be provided for all the departments which it is desirable to locate in the vicinity of the Houses of Parliament. It would, however, be impracticable to obtain the space required for all these departments, as well as for the War Office, without taking the Carrington-house site. Any scheme for additional buildings on the Downing-street site would involve the alteration or demolition of some, at least, of the buildings now standing there. In the cases of the Parliament-street site and the Spring-gardens site important questions of street improvements arise, but as the details of these and the general scheme call for more mature consideration, the committee recommend that the matter should be again referred to them next session.

The dedication festival at the parish church of St. Werburgh, Cheadle, Staffs, took place last week, on the tenth anniversary of the consecration of the chancel. The occasion was marked by the reopening of the organ, which has been rebuilt, enlarged, and fitted with electric action, by Messrs. Bishop and Son, of Marylebone-road, London, the console being placed outside the chancel screen, and the organ itself on a gallery constructed at the west end. By this means the old organ-chamber has become available for vestry purposes, and a gain of about ten seats has been made in the church.

The works of the Great Northern and Manchester, Sheffield, and Lincolnshire joint central station at Nottingham are to be commenced at once. A contract has been let to Messrs. J. D. Nowell and Son, of Westminster; and the contractors will be under the supervision of Mr. H. W. Sadler, of the Great Northern engineering staff. It is proposed to demolish houses in the neighbourhood of Narrow Marsh at the outset. A viaduct is to be built, commencing near Trent-lane, and traversing London-road, Leen-side, Popham-street, and Malt Mill-lane, until it reaches another viaduct already completed by the Manchester, Sheffield, and Lincolnshire Company.

The new church on Lundy Island is fast approaching completion. The architect is Mr. John Norton, of Ridgmount-gardens, London. Messrs. Britton and Pickett, of Fore-street, Ilfracombe, are the contractors, and Mr. Charles Pinn, of Exeter, is acting as clerk of works. The sculptured reredos and large statue of St. Helen (the patron saint of the island), both of which have been made in the studios of Messrs. Harry Hems and Sons, at Exeter, have arrived in the island, and the same firm are executing the altar, pulpit, and font. The two latter are of carved stone, and the former of Devonshire oak.

With a view to developing Towyn-on-Sea, Mr. John Corbett, the owner of the freehold, recently instructed an architect to prepare plans for the erection of some terrace villas, semi-detached villas, and detached villas, amounting in all to eleven, as a specimen of what he required from those who purchased or leased land. Tenders have been received from Messrs. Morris James (Towyn), Jones, Hughes, and Edwards (Towyn), Winnard and Weston (Wigan), R. Morgan (Towyn), George H. Bickerton, John Phœnix (Wrexham), and John Gethin (Shrewsbury), whose contract was accepted at about £15,000. All the work has been intrusted to Mr. Gethin, who will commence operations without delay.

BOOKS RECEIVED.

American Society of Civil Engineers. Proceedings, August (New York). No. 6 of the *Proceedings* of this Society contains full reports of the Society affairs, memoirs of deceased members, and papers on "The Suspension of Solids in Flowing Water," by Elsom Huntington Hooker, Ph.D.; "The New Waterworks at Havana, Cuba," by E. Sherman Gould, M.Am.Soc.C.E.; "The Reconstruction of Grand River Bridge," by W. A. Rogers, jun., member; and illustrations accompanying these papers.—We have also received the illustrated booklet, giving process-views and a description of *Clevedon*, issued by the Clevedon Town's Interest Association.

CHIPS.

The town council of Torquay have decided to seek Parliamentary powers to acquire the water sheds of the Totford and Trenchford streams in connection with a new water supply, the estimated outlay being £40,000.

A new board school in the Garden Fields, St. Alban's, was formally opened last week. It has been built from plans by, and under the supervision of, Mr. S. Flint Clarkson, of Bloomsbury and St. Alban's, the contractor being Mr. Miskin, of the latter city.

Progress is being made with the waterworks for Portrush, now in course of construction for the Coleraine rural district council. Mr. A. D. Williamson is the engineer, and Messrs. Maxwell and Co. are the contractors.

Various improvements are about to be made to the chancel of Holy Trinity Church, Bury, Lancs, from plans by Mr. Oakley, of that town. The works will include the repairing of the whole of this portion of the building with marble, the erection of a new chancel screen, and the raising of the altar.

The plans for the erection of a new church at the corner of King's-gap and Stanley-road, Hoylake, the site having been given by Lord Stanley of Alderley, have been prepared (and adopted by the general committee) by Mr. E. Kirby, of Liverpool. The estimated cost is £6,000, towards which about half has already been promised.

At the last meeting of the Manchester Corporation, it was announced that a new 30in. water main was about to be laid down from the reservoir at Godley, and that it had been arranged to supply with water the North Cheshire Water Company at a fixed rate; for this purpose the corporation would lay down a new main at a cost of £19,900, the water company to pay $4\frac{1}{2}$ per cent. on the outlay.

Plans were passed by the Motherwell Dean of Guild Court recently for the proposed extension of Dalziel parish church. Additional accommodation inside the building is to be provided by the erection of a chancel, and commodious halls and ante-rooms are to be erected at the rear of the building. The total estimated cost is about £5,000.

The scheme for holding an exhibition at Newcastle-on-Tyne, the profits to be devoted to the rebuilding of the general infirmary, has been abandoned; but in response to an appeal for subscriptions towards meeting the cost of reconstruction on a fresh site made by the mayor of the city, some £15,500 has been promised.

The City Council of Coventry have received a report from Mr. G. E. Jenkins, the assistant borough surveyor, stating that during the past year plans for buildings have been sanctioned to the value of £110,732, against £31,204 the value of those erected in 1891, when the present building by-laws came into force.

It has been decided to construct a light railway in Montgomeryshire, from the Cambrian system near Four Crosses, between Llanymynech and Welshpool, to Llanfair Caernion. Mr. J. E. Thomas, Wrexham, has been appointed engineer, and will at once commence the preparation of plans, sections, and estimates.

The foundation stone of a new Baptist chapel was laid on the 10th inst. in Heaton-road, Byker-on-Tyne. The chapel, which will cost about £4,000, is being built from plans by, and under the superintendence of, Alderman W. H. Dunn, of Gateshead.

The new buildings for King Edward the VI.'s Grammar School, Southampton, were formally opened on Wednesday week. They have been built on a site in the West Marlauds, at a cost of £12,240, and are Elizabethan in style. Mr. A. F. Gutteridge, of Southampton, was the architect.

Much interest is being taken in Nelson, Lancs, in consequence of the proposal of the town council to spend about £5,000 in building a municipal public-house in the Bradley district. The subject is being fully considered by a sub-committee.

OBITUARY.

THE death of MR. CHARLES ANDERSON, a member of the York City Council, occurred on Friday at the Temperance Hotel, Lendal, York. The deceased gentleman, who was an architect and surveyor, was the proprietor of the above hotel, whilst until recently he also conducted the Coney-street Café. In 1889 he was elected as a representative of Bootham Ward in the Council, and he had sat continuously since that year, having twice been re-elected. Some months ago Mr. Anderson had a severe stroke which prostrated him for a time, and he never shook off the effect of the seizure. Mr. Anderson leaves a widow and small family.

MR. GEORGE MAIDWELL HOLDICH, a well-known organ builder, died recently at Forest Hill, S.W., in his eightieth year. Among the instruments he constructed were those at Lichfield Cathedral, Croydon and Islington parish churches, and the English Church at Jerusalem. He was the son of the Rev. Thomas Holdich, for many years rector of Maidwell, in Northamptonshire, where he was born in 1816, and was educated at Uppingham, afterwards studying for the musical profession. He devoted himself, however, to the study of organ constructing, and established himself as an organ builder in Greek-street, Soho, whence he subsequently removed to Judd-place, Euston-road, and finally to Liverpool-road, Islington. Some three years ago he retired, and the business passed into the hands of Mr. Eustace Ingram.

CHIPS.

A special meeting of the Warminster Urban District Council was held on Friday to appoint an expert to advise the council as to the adoption of a scheme of sewage disposal in place of the late Mr. R. W. Peregrine Birch, M.I.C.E. The clerk reported that Mr. Peregrine Birch, who had been engaged to advise the council as to the adoption of a practical scheme for the disposal of the town sewage, had unexpectedly died in Invernesshire, and after some discussion it was decided to employ Mr. Chatterton, of London.

The members of the Wingate School Board have just approved of plans prepared by Mr. Garry, architect, West Hartlepool, for the schools to be erected on a site adjoining the present boys' school, to accommodate 300 infants. The present infant school will be added to the girls' department on the completion of the additional schools.

The factory of Mr. E. C. Street, wholesale and export cabinet manufacturer, in New Inn-yard, Curtain-road, Shoreditch, was destroyed by fire on Sunday evening.

The town council of Birkenhead unanimously decided at their last meeting to raise salary of Mr. Charles Brownridge, the borough engineer and surveyor, from £500, the sum given on his appointment 5½ years ago, to £600 per year.

At Aughebrach, near Donagheady, the foundation stone of a new Roman Catholic church was laid last week by the Bishop of Derry. Mr. John Harkin is the contractor.

Arrangements have been made with the Bridges Committee of the County Council to lay the mains of the East Kent Water Company through the Blackwall Tunnel in order to provide against any future water famine in East London.

The Primitive Methodist chapel at Agden, near Whitechurch, Salop, was reopened last week after renovation, including the erection of a new pulpit, the substitution of benches for the high pews, and painting and decoration. Mr. Hopley, of Tybroughton, carried out the works.

The paper mills at Culter, near Aberdeen, are about to be enlarged and extended, from plans by Messrs. Jenkins and Marr, of Bridge-street, Aberdeen.

A scheme of water supply has just been carried to completion at Henley-in-Arden. Mr. J. E. Willcox, of Birmingham, was the engineer, and Mr. Griffin the contractor.

The town council of Heywood have instructed the water engineer to prepare plans and estimates for the erection of a new embankment in connection with the upper storage reservoir at Naden, and he is authorised to obtain such clerical assistance as may be necessary for the purpose. It was stated that the cost of the embankment would probably reach £20,000.

The corporation of Liverpool have received the sanction of the Local Government Board to the borrowing of £17,500 for the purpose of carrying out certain alterations, improvements, and decorations at St. George's Hall, the town hall, and the municipal offices.

Building Intelligence.

BEAULIEU.—The parish church was reopened on Sunday week after having been closed for some weeks for the purpose of removing the high pews which had marred the beauty of this ancient and beautiful building, and replacing them with open oak seats designed by Sir Arthur Blomfield, A.R.A., and Son. The pews just removed were placed in the church by the late Lord Montagu of Broughton, and were then considered to be an immense improvement on the enormous boxes and unsightly galleries which disfigured the interior. There was then also what is generally known as a three-decker pulpit, which stood opposite the present beautiful stone pulpit, the arcade leading to it being covered by a huge wooden gallery, and occupied as a pew by the housekeeper of Palace House. Some years ago Lord Montagu, as Lord Henry Scott, beautified the church by erecting a reredos of glass and gold mosaic behind the altar, and paving the sanctuary with encaustic tiles, copied from the ancient tiles found about the ruins of the old abbey. The altar-table was made some years since from a walnut-tree which grew in the cloisters, and was constructed by Mr. G. Collins, the present clerk of the Beaulieu Estate Works, from a design of Sir A. W. Blomfield. While reseating the church, the opportunity has been taken advantage of to lower the floor of the nave by 1ft., thus giving extra height and dignity to the chancel. A dwarf stone wall with a plinth on the top, designed to carry a light iron screen, now divides the chancel from the rest of the church. The sills of the windows have been lowered to their proper level, and the old string-course has been restored from a pattern found some years ago, and the plaster string-course which had been put in its place removed. This work has brought to light remains of the old paintings of the mouldings of the windows, which, though rather rough in execution, are very harmonious in colour. The beautiful proportions of the ancient stone pulpit have been enhanced by the removal of the pews which obstructed the view of it, and by lowering the floor of the church, which even now is quite a foot above its ancient level. This pulpit was the rostrum from which the brother or Bible clerk read passages from the Lives of the Saints or Homilies during meal-times, for the present church was the ancient refectory of the abbey, and only came into its present use for the parish when the abbey (of which the foundations are now marked out with white gravel on the green turf to the north of the cloisters) was pulled down. The work was commenced soon after the dissolution of the monastery, and both Calshot and Hurst Castles are built out of the materials of the ancient church.

BIRMINGHAM.—The new meat market and slaughterhouse in Bradford-street, Sherlock-street East, and Cheapside, is approaching completion. The frontage to Sherlock-street East is occupied by a two-story range of official buildings. The Bradford-street corner is occupied by a tower. This contains the superintendent's, inspector's, and collectors' offices. Adjoining are the caretaker's residence, and a circular archway forming the main cattle entrance, beyond which are vanhouse and stables, the block being completed by a range of sheep lairs on the first floor. Another tower in Bradford-street will rise to a height of 100ft., and will contain five water-tanks. The style is a modification of the Spanish Renaissance, and roofs covered with Major's interlocking tiles and overhanging eaves, projecting some 4ft., and the facing materials are red bricks, with bands and mouldings of buff terracotta. From the wholesale yard inclined planes lead to the cattle lairs, which are in the upper story. These lairs are above the twenty wholesale slaughter-houses. These slaughter-houses will be divided by iron grilles into separate stalls, in which two men may work at a time; while additional space is provided for the slaughter of sheep and calves. The wholesale meat market is the central building. Its length is 365ft., and its width is 88ft. On the ground floor it forms one large apartment, with a single-span roof, whose ridge is 64ft. from the pavement. The roof has hipped ends. The upward slope of the four sides is broken by two ranges of continuous dormers, with intervening asphaltic flats. Over these dormers, as at the wall-plates, the eaves project considerably. There are four public doors to the market, each 8ft. wide. Part of the

basement of the market will be available for the engines and dynamos of an electric-lighting installation. Adjoining is the engine-room allotted to the Linde Company, and their cold store, chilled rooms, and freezing rooms. The Meat Market will have 80 butchers' stalls, all provided with permanent fittings, and with lifts and overhead travelling-gear connecting them with the cold stores. Divided from the market by traversing roadway will be a range of slaughter-houses for the retail butchers, 40ft wide, divided into two slaughter-halls, 240ft. and 96ft. long respectively. The whole of the building will be fitted with sets of overhead rails. On these will run little trolleys, from which depend hooks to hold the carcasses. A building of two floors, divided from the retail slaughter-houses by a yard, will comprise pig-lairs, a hide, skin, and fat house, and slaughter-men's mess-rooms. On the upper floor are triperies. In another range of buildings will be provided lairs and special slaughter-houses for condemned animals, and an apparatus for the consumption by fire of condemned carcasses and meat. This department is divided from the retail slaughter-houses by an open space 40ft. wide. All the drains will be open, and the drainage system will have no direct connection with the sewers. The slaughter-halls will be paved with stone slabs, the market hall and cattle lairs with a granolithic surface, and the floors of the pens and the drain-channels will be of concrete. The whole establishment when completed will occupy some 11,000 square yards, and, including the site, the total cost will be something over £90,000. Messrs. Essex, Nichol, and Goodman, of Birmingham, are the architects, and Mr. John Bowen is the builder.

CANTERBURY.—The restoration of the Cathedral is making progress. The work in the crypt, which was commenced in the time of Dean Payne Smith, is now approaching completion. The bases of the columns, which have been covered with earth for centuries, have been uncovered, and by this means some of Ernulf's finest work is disclosed to view. With improved drainage, a concreted floor, and glazed windows all round, there will be no danger of the flooding which led to so much disfigurement in the past. The beautiful work of the Lady Chapel is left intact, and in the Norman portion of the crypt the spot where a Becket's body was hidden is now indicated by a stone slab in the shape of the original coffin lid. The interior of the Chapter House is wholly occupied by scaffolding, it being intended to have this part of the restoration completed in readiness for the great gathering of next year in connection with the thirteenth centenary commemoration of King Ethelbert's baptism. The stonework of the large windows at the west and east ends was crumbling, and it was found necessary to put entirely new jambs and coping above, but the original tracery of the windows and the mullions are to be preserved. The work is almost completed at the west window, and the other will be commenced shortly. Two out of four other windows which were blocked up have been opened. The restoration fund at present amounts to about £12,500.

CARDIFF.—A new temperance hall, the gift of Mr. John Cory, J.P., D.L., in memory of his late father, Mr. Richard Cory, was opened at Cardiff on Wednesday, the 9th inst., by Sir Wilfrid Lawson. The building has imposing elevations to Station-terrace and Edward-street, and is constructed principally of Bath stone, relieved between the columns with Llanarnam red brick. The upper part of the building comprises a main hall, 73ft. by 70ft., and 45ft. high, with a broad gallery on three sides, and in the basement are club rooms and a smaller hall. The architects are Messrs. Jones, Richards, and Budgen, of Cardiff, and the contractors E. R. Evans and Bros. The main hall is lighted by a powerful sunburner on the Stott-Thorp principle, and the whole of the lighting and ventilation has been carried out by James Stott and Co., of London, Manchester, &c., under the superintendence of Mr. J. W. Wilkinson, their Cardiff representative.

CLIFTON, BRISTOL.—Large numbers of workmen are engaged in constructing the new hotel and hydropathic establishment which is to be attached to the Clifton Spa, and it is hoped that the work will be completed by next March. The three large houses, Nos. 12, 13, and 14, Prince's-place, which adjoin the pump-room, are being converted into the hotel, and are practically being

rebuilt, while two additional stories are to be constructed. The dining-room, which is to be on the ground floor, will be 50ft. by 9ft., and a feature of the building will be a spacious billiard-room. Wide corridors will traverse the whole of the structure, and an elevator is to be provided. The hundred men whom the contractor, Mr. S. Roberts, of Plymouth, has employed, have already gutted the three houses, and are commencing to transform them in accordance with the plans of Mr. Ewen Harper, the architect, and Mr. C. Croydon Marks, the engineer. Mr. H. P. Hoskins, of Darlington, has been appointed clerk of the works. At the back of the hotel, and overlooking the gorge, there is to be a suite of baths. The excavations for these have already involved the removal of 7,000 loads of earth, and much more still remains to be done. The baths are being constructed at a lower level so that the view from the hotel windows will not be interfered with, but the roof will be flat, and will afford a promenade. The roof will be surrounded by a low stone balustrade, and visitors to the hotel will be able to step out on to it in a moment. The front elevation of the baths will be at right angles to the pump room. The baths, which will include a Turkish suite, will be about 180ft. long and 100ft. broad. At a later date it is intended to construct a subway and terraced walks to the gardens lower down the slope, and the scheme also includes the conversion of a house on the corner of the cliff into a place for invalids to lodge in.

LEEDS.—Improvements are in progress and in contemplation at Oxford-place Wesleyan Chapel, Leeds. If the scheme is carried out in its entirety, almost every trace of the existing chapel, erected in 1831-5, will be swept away, and a new structure erected in its place. Before this is undertaken, however, the schools, which are in an insanitary condition, will be reconstructed, at a cost of £4,000. The new schools will be built from designs by Mr. W. H. Thorp, of Albion-street, and Mr. G. F. Danby, of Great George-street, in Leeds, and will include accommodation not only for 800 or 900 Sunday scholars, but also large vestries for the use of classes. There will likewise be girls' parlours and rooms for young men's clubs. The new chapel, from designs by the same architects as the schools, will be built over a synod hall, but on the level when approached from Park-lane.

LEITH.—The new Public Health Hospital was opened on Saturday. Situated on East Pilton estate, the frontage of the hospital is to Ferry-road, and the site consists of nine acres. About £4,000 was the price paid for the ground, and the cost of the buildings has been £45,000. The buildings, which are brick, consist of a gate-keeper's lodge, an administration block three stories in height, an isolation ward block, four ward pavilions, a patient discharging block, a blanket and clothes block, a disinfecting and laundry block, a coachman's house, stable, ambulance, and a mortuary block. All the buildings have been placed north and south. The isolation ward block is really a combination of two small hospitals, containing two wards each, and capable of holding ten adult patients. The four ward pavilions are similar in arrangement, and each contains one male and one female ward. The wards are capable of accommodating ten patients, with 2,000-cu. ft. of space and about 200 superficial feet of floor area per patient. There are two main wards and two smaller apartments. Each ward has attached to it a large bath-room and sanitary conveniences. The latter are disconnected from the wards by a cross ventilated passage. Between these wards is situated the nurses' duty-room. In connection with this block there is also a waiting-room, a ward kitchen, a scullery, a set of discharging rooms, and other accessories. The wards are all heated on the hot-water low-pressure system, and special designed coils are placed between each bed, whereby the outer air can either be admitted at its outside temperature or may be warmed by being directed over these coils. The ward grates are a modification of the Galton ventilating grate. A special feature of the hospital drainage is that each individual block is drained separately and directly into the main sewer, and special flushing arrangements have also been provided, both for drains and main sewer. A drain has been laid from the hospital direct to the sea—a distance of about two miles—and extends to beyond low-water mark. All the walls and ceilings are painted with Duresco and finished with enamel in as great a variety of tints as possible. The first plans for

the hospital were drawn out by the late Mr. James Simpson, but the work has been finally completed by the present architect of the burgh, Mr. George Simpson, son of the original architect. The masonry and brickwork have been done by Mr. James Kinnear, Leith; the carpenter and joiner work by Messrs. Drysdale and Gilmour, Leith; the plumber work by Mr. Patrick Knox, Edinburgh; the painting work by Mr. Charles Mitchell, Leith.

MAIDENHEAD.—A new school of science, art, and technical instruction was opened last month. It contains, on the ground floor, science lecture room and laboratory, two science classrooms, modelling-room, manual instruction room, and cookery classroom, in addition to a secretary's room, and cloakrooms and lavatories. On the upper floor are elementary and advanced drawing-rooms, classrooms, and master's room. Provision is made in the basement for the caretaker and heating-chamber, &c. The building is erected in brickwork, the facing bricks being supplied by Messrs. Lawrence and Sons, of Bracknell, and the terracotta dressings executed from the designs of the architect. The roofs are covered with permanent green slates, with terracotta ridges and terminals. The contractor for the main portion of the work was Mr. T. Martin, Mr. W. Peart being employed as clerk of the works. The whole of the work has been executed from the designs of Mr. E. J. Shrewsbury, A.R.I.B.A., of Queen-street Chambers, Maidenhead.

PORT ERROLL, N.B.—The directors of the Great North of Scotland Railway Company have just accepted contracts for the erection at Port Erroll, on the new railway in course of formation from Ellon to Boddam, of a new hotel. The building will stand in its own grounds, 15 acres in extent, and will command a view, looking southward, of the Bay of Cruden, with the rocky Skares and bold coast line, and northward, of the sea-girt Erroll Castle and the precipitous cliffs of the Bulters of Buchan. The ground floor of the hotel will be elevated about 3ft. above the soil level; and a terrace, about 20ft. wide and approached by a broad flight of steps, will surround the elevations of the building. The building has been designed by the company's architect, Mr. John J. Smith, A.R.I.B.A., of Aberdeen. It is in the Scottish Baronial style, the leading feature being a massive battlemented square tower, flanked at each corner by the characteristic turrets of that style. The tower rises from the ground over the doorway to a height of 84ft., and provision is made in it for the reception of a wrought-iron tank containing 4,000 gallons of water. The central elevation consists of three stories and an attic, and is flanked by loftier wings, roofed transversely and finished with crow-stepped gables, beneath which are carried up wide oriel bays. The walling is of Peterhead granite with Kennay granite dressings and cornices. The rooms on the ground floor, approached by a covered vestibule, are, on the right, reading-room, 27ft. by 16ft.; drawing-room, 28ft. 6in. by 23ft.; writing-room, 23ft. by 13ft.; and billiard-room, 25ft. by 24ft. On the left, on this floor, are a breakfast-room, 27ft. by 16ft., communicated by folding doors, with coffee-room, 43ft. by 23ft.; golf-room and lavatory, 41ft. by 21ft.; and at the rear is a one-story mews, containing kitchen, larders, and offices. All the public rooms are to be laid with pitch-pine block flooring, an oak border being carried all round. It is proposed to pave the hall and corridors with mosaic, and all the other floors will be paved with tiles or wood-block flooring. The walls of the garden entrances, corridors, kitchen, and hall will be lined with dadoes of coloured tiles of various patterns for 5ft. above the floor level. The ceilings of the billiard and reception-rooms will have moulded cornices, panelled and enriched, and painted and picked out in various shades. The basement is divided off into cellars, and there is also a boiler-room. A staircase 13ft. wide, leads to the upper floors. On the first floor there are 19 bedrooms, with baths and other conveniences, and offices for the staff. In a wing to the rear are servants' bedrooms, linen store, workrooms, &c. At each end of the building, facing the front also, there are on this floor two parlours, 23ft. by 13ft., and lighted by bay windows. On the second floor there are 23 bedrooms, and, in addition, bedroom accommodation for the staff, baths, and other conveniences. The third story has also 23 bedrooms for guests. Lifts will be provided, and the whole hotel will be lighted by electricity.

STAMFORD.—The new market-place, which occupies the site of the George Hotel Paddock adjoining the Midland Railway Station, was formally opened by the Mayor last week. The cost, exclusive of the site, has been nearly £6,000. There has been carted to form the foundation nearly 5,000 tons of broken stone and concrete. About 900 tons of granite paving has been used, and over 170,000 bricks have been utilised in the walls and buildings. The site comprises about 7,000 square yards. The outer walls of the market and offices are built of white Arsley bricks, with blue Staffordshire footings to plinth course. Five offices have been erected for the auctioneers, in addition to which there are a large settling-room, clerk's weigh-office, with inclosed weighbridge for cattle, and a shed for pigs and calves. The whole space for cattle and roadways is paved with 3in. granite sets from the Groby Company's quarries, and bedded on about 13in. of broken stone and 6in. of concrete over the whole area, the sets being run in with hot pitch and tar. Spaces between the sheep and pig-pens are paved with adamantine clinkers on edge, and grouted in cement with channels to each pen. The work has been carried out from the plans and designs of Mr. James Richardson, the borough surveyor, and under the superintendence of Mr. Ward, architect, Ironmonger-street, Stamford, who has acted as clerk of the works. Mr. John Woolston, builder, of St. Peter's-street, Stamford, was the contractor.

STRADBALLY.—On Sunday week the dedication of the new Roman Catholic Church of the Sacred Heart took place at Stradbally, Queen's County. The church has been built by Mr. John Walker, Castlecumber, from the designs of Mr. William Hague, F.R.I.A.I., Dawson-street, Dublin. It is built near the centre of the town in an inclosure opening off the main street. The nave front is 40ft. wide by 60ft. high to the ridge of the roof. It is flanked by spirelets of cut limestone ending in finials, and with canopied niches at the springing of spirelet. The front is crowned by a carved stone cross. The body of the building is in rock-faced ashlar with cut limestone dressings. Its total height is 126ft. The width of the building across the transepts is 73ft., the transepts being each 16ft. 6in. deep and 34ft. wide; the roofs are of high pitch. Interiorly the church is divided into chancel, nave, and transepts. The nave is lighted by six lancet windows at each side. The transept gables are pierced with triplets of lancet lights. Some three-light traceried windows are placed in the east and west façades. The former of these is filled with stained glass, with figures of the Saints. The peculiarity of the narrow windows is that the simple lancet head is replaced by foliated arches. All the windows are filled with tinted cathedral glasses and with ruby borders. The main roof is open-timbered, having moulded principals. There is a high altar, 16ft. wide and 21ft. in height, and two side altars. The three altars, including steps and predellas, are all made of marble; they are designed in the Decorated Pointed style, in strict keeping with the architecture of the church.

WEST KIRBY.—A new hydropathic establishment in Banks-road, overlooking the estuary of the Dee, was opened on Monday. The buildings have been erected, at a cost of over £6,000, from the designs of Mr. Alfred Darbyshire, F.S.A., F.R.I.B.A., and Mr. F. Bennett Smith, F.R.I.B.A. The site contains an area of nearly two acres, with a promenade frontage to the sea of 110 yards. The grand staircase hall is 30ft. by 24ft., and corridors are arranged right and left. The corridors on the right lead to the dining-room, 30ft. by 26ft., and an assembly-room, 40ft. by 28ft. The drawing-room adjoins the dining-room, and is 52ft. by 18ft. The left-hand corridor on the ground floor leads to the reception-room, office, and doctor's apartments, and at the end of this corridor is a smoke-room, furnished in oak, 26ft. by 18ft. A wide and short flight of stairs from the central hall leads to the billiard-room, 37ft. by 28ft. The baths are in close proximity to the hall; they include a cooling-room, fitted up with couches, a plunge-bath, shampooing-room, needle-bath, and three hot rooms, fitted up with marble slabs. There are also private slipper-baths and dressing-rooms, a German bath and dressing-room, a vapour-bath, and Sitz bath. On the first and second floors are the private sitting and bed rooms. The decorations have been carried out under the direction of the architects by Mr. Brookes, of Birkenhead. The general

contractors were Messrs. Thornton and Sons, builders, of Liverpool, with Mr. Russell as foreman. Mr. Ewing, Liverpool, has had the plumbing contract, and Messrs. Tanner the slating and plastering.

CHIPS.

The town council of Heywood have received a report from a committee stating that the new works of sewerage, which are on the eve of completion, have cost about £20,000.

New technical and art schools are about to be built at Lowestoft for the corporation, from plans prepared by Mr. George W. Leighton, Prince's-street, Ipswich.

Mr. W. M. Thornton, B.Sc., of University College, Liverpool, has been appointed lecturer and senior demonstrator in engineering at University College, Bristol, in place of Mr. H. A. Garratt, who has been appointed head of the engineering department at Holloway Polytechnic.

At St. Paul's Church, Rhos-es-mor, a new pulpit, constructed from old oak pews recently removed from the tower of the mother church at Northop, was formally dedicated last week. It is hexagonal in form, and stands on a base of Cefn stone. The work was carried out by Mr. Robert Edwards, of Mold.

The county council of Sutherlandshire have adopted a scheme by Mr. John J. Cronin, C.E., of Wick, for the supply of water to the village of Bonar Bridge.

A serious fire took place on Sunday at the corner of Essex-street and Kent-street, Birmingham, a new building erected for Mr. J. Hough, cabinet maker, but not yet stocked, being gutted, and a large quantity of timber in the yard being destroyed.

Dr. J. Glaister, Deputy Medical Officer of Health for Islington, has been appointed Medical Officer of Health for Clerkenwell, in the place of Dr. Griffith, who has retired on a superannuation allowance. There were 39 applicants for the post.

At the parish church of Creeping St. Mary, a new organ, built by Messrs. M. C. Gildersleeve and Co., of Bury St. Edmund's, was used for the first time on Thursday in last week. It occupies the old vestry on the north side of chancel, has three manuals and 900 pipes, and is inclosed in an oak case.

Letters of administration of the personal estate of Mr. Anselm Nicholson, of 55, Parliament-street, architect and surveyor, and of 20, Aldersmead-road, Beckenham, who died on June 22 intestate, without child or parent, have been granted to Mrs. Lizzie Nicholson, the widow, and Miss Elizabeth Nicholson, the sister, the only next-of-kin, the value of the personal estate being £11,703 19s. 6d.

St. John's Episcopal Church, near Pitsligo, N.B., was reopened last week after internal decoration and the provision of new heating apparatus. Messrs. Milne and Robb, of Peterhead, were the contractors.

Within the past eighteen months a sum of £2,500 has been spent in enlarging and decorating and erecting a new organ in Didsbury Parish Church. The enlarged fabric was opened by the Bishop of Liverpool last November, and the new organ was brought into use on Sunday. This instrument has been built at a cost of nearly £600 by Messrs. Jardine and Co., of Manchester, and has a carved oak front case, erected from a design of Messrs. Preston and Vaughan, architects, of Manchester.

It is stated that a survey of the Isle of Wight is about to be made by the Government, with a view to the establishment of a number of large forts, so as to completely guard Portsmouth Harbour and Southampton Water.

The new north dock at Dunkirk, which completes the harbour engineering work begun in 1861, and realises the far-seeing plan conceived by the engineer Vauban in 1683, was inaugurated on Sunday. It has been under construction for seven years past, and will accommodate the largest ships afloat.

During the storm, on Tuesday week, the shingled spire of Lamberhurst Church, near Tunbridge Wells, was struck by lightning. The shingles were stripped off, the timbers much damaged, and the masonry shaken.

New schools at Bourne End, South Bucks, erected by the Woodburn School Board, were opened last week. They accommodate 253 scholars in three departments, the main schoolroom being 55ft. by 18ft. The walls are of red brick, and the roofs are covered with brown tiles. Mr. Thos. Thurlow was the architect, and Messrs. Loosby, Son, and Pearce were the contractors. The cost has been £2,000, exclusive of site.

A sawyer, named Levi Platt, met with a shocking death in the works yard of Milton Hall, Peterborough, the residence of Mr. G. C. W. Fitzwilliam, on Saturday. He was sawing timber, when his foot slipped, and he fell across the saw. His body was cut almost instantly into two portions.

Engineering Notes.

NEW YORK AND PHILADELPHIA SHIP CANAL PROJECT.—The report of the Canal Commission which has been considering the proposal to unite New York and Philadelphia by a ship canal, has just been issued. Two surveys were made by the direction of the commission, but by either route vessels would use the Delaware river from Philadelphia to Bordentown. Thence a canal would be cut across New Jersey, entering the sea at Sandy Hook. The distance between the two cities would thus be reduced from 274 to 92 miles, of which 31½ would represent the canal. It is estimated that the canal, if 150ft. wide and 20ft. deep, would cost £2,852,920, or £1,778,940 if 184ft. wide and 28ft. deep. In the first case an additional sum of £187,172 would be required to deepen the river approaches to the canal, or £625,140 to obtain a 28ft. channel. The surface of the canal would be 56ft. above sea-level, and there would be three locks at each end. The soil to be excavated consists of sand, gravel, and clay. The tonnage which would annually pass through the canal is estimated at 7,000,000; and less than half that tonnage would suffice to pay expenses and 5 per cent. on the £1,000,000 capital which would have to be raised for a 20ft. canal.

PONTYPRIDD.—The new gasworks which have been erected by the Pontypridd Urban District Council alongside the Newport and Caerphilly Railway at Treforest, were formally opened on Wednesday week. The old gasworks in Pontypridd were purchased four years ago by the council for £35,000, and in order to meet with the requirements of the rapidly-increasing district it was decided to build new works, which are estimated to cost £40,000. The telescopic gasometer contains about 350,000c.ft., being three times the capacity of the two old gasholders. It is 100ft. in diameter, and has two lifts 24ft. deep. It was supplied by Messrs. C. and W. Walker, London. The retort house is 115ft. by 64ft., with a coal stores 30ft. long immediately adjoining. The retort has four benches and 64 mouthpieces. The ironwork was done by Messrs. Dempster, of Newton Heath, Manchester, and the masonry by Messrs. Wm. Ives and Co., Shipley, whilst the retort settings were fixed by Messrs. North and Vale, Stourport. The exhausters were supplied by Messrs. Waller and Co., London; condenser and scrubber washer (the tower being 50ft. high) by Messrs. Clapham Bros., Keighley; the boiler by Messrs. Renshaw, Stoke-on-Trent, and the meter and governor by Messrs. J. and J. Braddock, Oldham. The new works were erected from the designs of Mr. Newbigging, consulting gas engineer, Manchester, and the manager is Mr. H. Barker.

At the Edinburgh and District Water Trust meeting held on Friday it was reported that the Talla estate had been purchased from the Earl of Wemyss. The Gameshope estate having been acquired from Sir Graham Montgomery some time since, the trustees have now absolute control of the whole of the area draining into the Talla reservoir. The total cost has been £36,000, or just £6 per acre.

The Richard Cory Memorial Temperance Hall, in Station-terrace, Cardiff, was opened by Sir Wilfred Lawson on Wednesday week. It has been built from plans by Messrs. J. P. Jones, Richards, and Budgen, of Cardiff, Messrs. Evans Brothers, of Moy-road, in the same town, being the contractors. The external walling is of panelled Bath stone. The hall is 73ft. by 70ft., and 45ft. in height. In the basement are a minor hall, 70ft. by 30ft., and 12ft. high, and a suite of five club-rooms. The steel roof (which is, for acoustic properties, hidden by a ceiling) was constructed by Messrs. J. Williams and Sons, and Messrs. Stott and Co., of Manchester and Cardiff, carried out the lighting and ventilation.

An installation of electric lighting was inaugurated by the corporation of Birkenhead on Monday. A central generating and storage station has been built in Bentinck-street. The total capital expenditure on the scheme up to the present has been £21,000. The plant which has been laid down in Birkenhead by the engineer (Mr. Schoolbred) is designed on the three-wire system for a voltage of 460. For a commencement two Willans engines of 80H.P. each will be used, and these will be supplemented by batteries or accumulators equal to another engine. The present scope of operations does not extend beyond Hamilton-square, Hamilton-street, Market-place, Market-place South, the Haymarket, Conway-street (in part), Grange-road, Charing-cross, and Brandon-street.

ARCHÆOLOGICAL.

EXCAVATIONS AT FURNESS ABBEY.—By permission of the proprietor, Mr. Victor Cavendish, M.P., extensive excavations are being made at this Cistercian Abbey, under the superintendence and direction of Mr. W. H. St. John Hope, assistant secretary to the Society of Antiquaries. The excavations are being made under the auspices of the Cumberland and Westmoreland Antiquarian and Archaeological Society. Some hundreds of cartloads of soil have already been removed, and a large portion of the original foundations laid bare, some interesting discoveries having been made. One portion Mr. St. John Hope believes to have been the Abbot's house, which must have been rebuilt at some subsequent date, owing to the necessity for increased accommodation. There are appearances of a small spiral staircase, and the excavators are at present uncovering a stately staircase, supported on massive masonry, by which the Abbot had access to the upper floor. Many carved stones and other relics have been found. The block at the south end of site, which has hitherto been identified as the Abbot's residence, was, according to Mr. Hope, the infirmary and chapel, while the so-called refectory seems to have been the working apartment of the Novices. Excavations are also being carried on between the church and the hotel. We published a plan and conjectural restoration of Furness Abbey, by Mr. R. W. Johnson, in our issue of Feb. 17, 1888, and measured drawings of the chapter-house, by J. F. Wilkinson, of Kendal, in our number for Oct. 21, 1887.

On Friday, Dr. Danford Thomas held an inquest at the Islington Coroner's Court concerning the death of John Leal Moggeridge Hillier, aged 52 years, a master builder and decorator, 7, Ambler-road, Finsbury Park, which occurred from injuries received through falling from a ladder on the previous Tuesday. It was proved that the ladder, a 44-rung, had broken at the 13th rung from the top, it was believed through having been exposed to the weather while disused, and a verdict of "Accidental Death" was returned.

The Garrison Church at the Cavalry Depot, Canterbury, was, on Saturday, consecrated by the Archbishop of Canterbury. The church was built twelve years ago, and besides being used for the military services on Sundays has also served the purposes of a day and Sunday school. The children have now been sent to the schools at the Infantry and Buffs' quarters, which have been added to for their accommodation. The interior of the church has been entirely redecorated and resealed, the chancel floor raised some 14in., and the altar elevated 7in.

The monthly report of the Labour Department for August states that the building trades are still busy, and show some improvement, the percentage of unemployed in unions making returns having fallen from 1·8 in July to 1·1 in August. The percentage for August, 1895, was 1·8. The furnishing trades, as a rule, continue well employed. The percentage of unemployed union members at the end of August was 2·1, compared with 2·0 in July and 2·4 per cent. in August of last year. The changes in rates of wages reported during the month affected about 23,000 workpeople, over 22,000 receiving increases and less than 1,000 sustaining decreases. The estimated effect of all the changes was an advance of 1s. 6d. per week in the wages of the total number affected. About 2,000 building trade operatives received increases.

The dedication service in connection with the new Unitarian chapel in Fitzalan-street, Glossop, was held on Saturday. The chapel, which is of stone, has been built from designs prepared by Mr. J. Lindley, of Hyde, by Messrs. S. Robinson and Son, also of Hyde. A feature is a stained-glass five-light window filling the east end. The subjects are taken from the Old and New Testament. The central figure is that of Christ as the Good Shepherd. On either side are figures of Moses and Elijah, and on the extreme left and right are representations of Christ as the Carpenter and the Good Samaritan. The work has been carried out by Messrs. Swaine, Bourne, and Son, of Birmingham. The total cost of the building has been £5,000.

On Thursday in last week, by direction of the Local Government Board, an inquiry was held by Major-General H. D. Crozier, R.E., at Saxmundham, East Suffolk, with regard to the application by the Plumegate Rural District Council for the board's sanction to borrow £4,000 for works of sewerage and sewage disposal for the parish of Saxmundham. Mr. H. J. Wright, of Ipswich, the engineer, explained the scheme, and stated it was proposed to adopt Messrs. Shone and Ault's system of ejectors.

ARCHITECTURAL & ARCHÆOLOGICAL SOCIETIES.

DURHAM ARCHÆOLOGICAL SOCIETY.—Some forty members of the Archaeological and Architectural Society of Durham and Northumberland paid a visit, on Saturday, to Hutton Rudby, Crathorne, Kirkleavington, and Yarm. The party met at Potto Station, amongst their number being the president, the Rev. Canon Greenwell, and the secretary and treasurer, Mr. John Geo. Graddon. They drove at once to Hutton Rudby, which is picturesquely situated on the banks of the Leven, and there inspected the church, the tower of which is Late 15th-century work. A tomb of a priest is placed in a niche in the south wall. The shafts of the arches in the south arcade of the nave are of 13th-century work. In the vestry are some remains of the old carved oak which at one time occupied positions in the church itself as rood-screen and pews. The party proceeded to Crathorne. The most interesting feature of the church was the monument on the north side of the chancel to the Crathorne who was killed at Neville's Cross. The old parts of the church were the north and south walls, the rest having been rebuilt. The south wall was about a hundred years older than the north wall. The churches at Kirkleavington and Yarm were also visited.

CHIPS.

The Great Western Railway Company have decided to proceed forthwith with some important extensions at Ruabon, involving an outlay of several thousands of pounds.

In the ventilation of the Walker Sunday-school, Walker-on-Tyne (Messrs. Hicks and Charlewood, architects), the "Climax" patent direct-acting turret ventilators have been used and supplied by Messrs. Cousland and Mackay, ventilating engineers, Glasgow.

The reopening of St. Stephen's Church, Newtown-row, Birmingham, took place on Saturday. For some time the red sandstone, of which the fabric is composed, has been in a decaying state, and various repairs of a minor nature have been carried out. It was, however, at length found necessary to pull down the whole of the west front of the church. This has been rebuilt, to the plans of Mr. W. H. Bidlake, M.A., of Waterloo-street, Birmingham, of red brick, with terracotta facings. The interior of the church has also been cleaned and decorated. The cost of the work has been about £500.

Two board schools in Harwich, which will accommodate 458 children, one situate on the main road to Dovercourt, the other at Bathside, were opened by Mr. James Round, M.P., on Thursday in last week. Mr. J. W. Start, of Colchester, was the architect of both groups; Mr. E. Saunders, of Dovercourt, was the builder of the Main-road schools, and Messrs. Smith, Beaumont, and Lawson, also of Dovercourt, of those at Bathside.

St. Michael's Church, Bamford, near Rochdale, was reopened last week after renovation and internal decoration. Mr. Reuben Bennett, of Manchester, has carried out the decorating work; Mr. S. Barker, of Heywood, has done the joinery; and Mr. G. Whatmough, of Hopwood, has repaired the fabric.

The Secretary of State for India has accorded sanction to an estimate amounting to £1,830,000 of the cost of construction of the section of the Mandalay-Kunlon Railway from Myohoung to the Salween River, a length of 224 miles.

The old Wesleyan chapel in Hamplon-road, Peterborough, which was built in 1852, has undergone such an alteration and extension as to transform it into a mission hall, capable of accommodating 450 people, and it will henceforth be known as the Wesley Hall. The designs were made by Mr. T. O. Cowburn, and the work was carried out by Mr. Bridgefoot. The work cost about £500. Reopening services were held on Thursday in last week.

The ninth annual exhibition of the South Wales Art Society will be opened at the new gallery, Queen-street, Cardiff, by Lord Windsor, on Saturday, Oct. 3rd.

An organ of three manuals and 1,736 pipes has just been placed in the new Wesleyan chapel at Wolstanton, Staffs. The builders were Messrs. Steele and Keay, of Burslem, and the cost has been about £700.

It was announced on Friday at the closing meeting of the fiftieth annual congress of the Cambrian Archaeological Congress, which was held last week at Aberystwith, that good progress is being made with the Pembrokeshire section of the archaeological survey of Wales, which is being carried out for the Association under the direction of Mr. Edward Laws, F.S.A., and Mr. Henry Owen, F.S.A.

COMPETITIONS.

EDINBURGH: THE REBUILDING OF NORTH BRIDGE-STREET.—In the competition for plans for the reconstruction of North Bridge-street, Edinburgh, three premiums were offered—the first of £250, the second of £150, and the third of £100. Ten sets of plans were sent in by August 1, and these have been hung on the walls of the gallery of the premises in High-street acquired by the corporation from the Messrs. M'Laren. Mr. Alfred Waterhouse, R.A., was appointed assessor, and he visited Edinburgh last week to examine the site and the designs. He has since made the following award:—1st premium, Design No. 2, Mr. J. N. Scott, 4A, St. Andrew's-square, Edinburgh, and Mr. J. A. Williamson, principal assistant to the city architect, Edinburgh; 2nd premium, No. 6, Messrs. Gibson and Russell, London; 3rd premium, No. 7, Messrs. Lauchester, Stewart, and Riccards, London. The total area to be dealt with is something like two acres in extent. It is divided into nearly equal halves by the street, which, like the new bridge, will be 78ft. in width. On the west side the area extends from Market-street to the High-street, with the Fleshmarket-close for western boundary; and on the east side from Jeffrey-street to the High-street, with Carrubbers'-close for eastern boundary. The nature of the ground called for considerable variety of treatment. An effective elevation had to be provided on the side facing the Princes-street valley, and there had to be kept in view the combination of decorative features with suitable business accommodation on the shop level and upper flats of the houses on Bridge-street, and the utilisation to the best advantage of the large space below the level of the bridge, and in Carrubbers'-close and the Fleshmarket-close. There were no mottoes affixed to the competitive plans, which were hung in the order in which they arrived. They have only that number affixed to them now.

The *Scotsman* says that Design No. 1 shows buildings in the French chateau style, with corner turrets and Mansard roofs. No. 2 (placed first) is Jacobean in style. One of the points about this design is that on the lower level it shows a large fruit market entering from Market-street, and lighted from above by well lights. At the bridge level on the west side there is a balcony running half-way along the depth of the ground and terminating in a stair leading down to Market-street. The design suggests an arcade between North Bridge-street and Cockburn-street, a series of shops beneath warehouses and sets of flats to North Bridge-street, High-street, and Cockburn-street, and an hotel at the corner of Market-street and Fleshmarket-close. The cost, as estimated by the authors, is £170,000. No. 3 is plainer in style with high dormers and square and round-headed windows to Bridge-street; the decorative features are of a Flemish character. No. 4 is in the Tudor style, and with oriels and angle towers. A feature of No. 5 set of plans is the bold towers which flank the block on each side of Bridge-street. Alternative designs for this part of the work show a different treatment of towers. The general architectural features are Late Scottish. No. 6 (which takes the second premium) is Classic in style, with towers on both sides of the bridge recessed on the floors above the bridge level, and showing open balconies and balustrade. No. 7 (put third) is in the Late French Renaissance, and also shows angle towers and high-pitched roofs. At the back are a number of open courts, which have received from the architect names associated with places in the locality—such as Cockburn-court, Fleshmarket-court. No. 8 has been sent in in an incomplete state; one of the points about it is the great frontage of glass shown to North Bridge-street, with skeleton pillars dividing doors and windows. The outstanding features of the elevations of No. 9 set of plans are angle towers and shaped gables. It shows also a roadway from the middle of the west side of Bridge-street, in the line of the present poultry market, running through to Cockburn-street, where in one or two of the other plans there is only an arcade. No. 10 is Classic in style, with Renaissance rusticated treatment of the lower levels and ornamental gables, oriels, dormers, and a balustrade for other architectural features. Most of the plans show saloons carried from the shop fronts back to Carrubber's-close on the one hand and to Fleshmarket-close on the other. Varied treatment has been accorded to the upper floors and to the buildings towards the closes just named. It is estimated that under whichever plan may be adopted the reconstruction

of North Bridge-street on both sides will cost from £170,000 to £200,000. This is exclusive of the price of the acquisition of the land and the old buildings.

KESTIVEN.—The committee of visitors have appointed Mr. C. H. Howell, F.R.I.B.A., of Lancaster-place, Strand, as assessor, at a fee of sixty guineas, in the projected competition for a new lunatic asylum to be built for the district on a site recently purchased from the Marquis of Bristol. It has been agreed to extend the time originally fixed for sending plans by a month. In the mean time the old workhouse at Grantham is being converted into a temporary asylum; the alterations are being carried out by Messrs. Rudd, of Grantham, under the direction of Mr. H. Kirk, the county surveyor.

PADIHAM.—The plans sent in for the proposed Liberal Club were on Tuesday submitted to Mr. Beaumont, architect, of Manchester. He has awarded the first prize of £25 to Messrs. Hitchen and Pritchard, of Burnley, whose estimate was £2,900; and the second, £10, to Mr. Quarmby, of Burnley. The new premises will be three stories in height. Lock-up shops are to be constructed on so much of the front of the ground floor as is not required for an entrance to the club, and a caretaker's house will be placed at the back of the premises. On the ground floor will be a room for one billiard table, and a smoke room in connection with it. Provision is made for four additional billiard tables on the second floor. There will be an assembly-room capable of seating about 400 persons. This will either be a separate room, or by provision being made for throwing two or more rooms into one. There will be a balcony to the front over the main entrance, and bay windows to all the rooms on the first and second floors fronting to the main street. There will also be an open tower over the main entrance.

WREXHAM.—The open competition for public baths to be erected in this town has just been settled, and the design of Mr. Harold T. Burgess, of Great James-street, Bedford-row, has been accepted. This gentleman was the architect of the Coventry Baths, and is now building some more public baths at Chester, also won in competition. The Wrexham establishment will cost between £3,000 and £4,000.

Newhall Hill Unitarian Church, Birmingham, which has been closed for some months for extensive structural alterations and the erection of a new organ, was reopened on Sunday. An apse has been added, in which a memorial window has been placed, the work of Messrs. Hardman and Co. The designs were made by the late Mr. John Powell, and represent "Christ Blessing Little Children." Beneath this window is a new reredos and altar in carved oak, with ruby velvet altarcloth embroidered in gold and silver. This is the work of Messrs. Jones and Willis, who also designed and executed the carved-oak front of the organ, which is placed on the right of the altar. The organ is by Messrs. Nicholson and Co., of Worcester. The total cost has been about £1,500.

Colonel Hasted held an inquiry at Colchester last week with reference to a proposal of the town council to borrow £15,000 for electric lighting purposes. Mr. Massey, the engineer, gave some details as to the cost at which the light could be supplied. The system to be employed was the low-tension three-wire system worked with a current of from 225 to 240 volts. The engines, which would be three in number, each being 180H.P., were coupled directly on to the dynamos. It was proposed to erect machinery for 4,000 lamps, but the switchboard and buildings would be provided for a larger number in view of extensions.

The Lord Provost of Edinburgh inaugurated on Friday the work of converting the present street tramways into a system of cable haulage. This work will be completed in the course of eighteen months, and by that time, it is hoped, the entire tramway system, barring the Tollcross and Gilmore-place lines, will be placed under a system of cable traction at a cost of about £300,000. The work, which was started on Friday at the southern extremity of Craigmillar Park, will be continued in a direct line into the North Bridge, and next week a start will be made from the Braid Hills Hotel along the route into Princes-street, and also at the municipal boundary at Gorgie, and at Murrayfield. The last section to be taken up will be that of Leith-walk. The work will be carried out from plans by, and under the superintendence of Mr. W. N. Colam, M.Inst.C.E., and Messrs. Dick, Kerr, and Co., Limited, are the contractors, and Mr. James More, jun., the chief engineer.

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HOTEL DE CLUNY, PARIS.—STATIONERS' HALL.—PROPOSED NEW BANK AT DONCASTER.—"THE CLUB," CAMPBELTOWN.—CHAPEL OF HOUSE OF RETREAT, CLERKENWELL.—HOUSE AT HASTINGS.—CAERDEON CHURCH, NEAR BARMOUTH.

Our Illustrations.

HOTEL DE CLUNY, PARIS.

"LE MUSÉE DE CLUNY" is too familiar, of course, to need more than a few words of description by way of introduction to the architectural reader, and no one who knows the contents of the building can fail to welcome the series of folios, now being published by Messrs. Morel under the direction of Messrs. May and Motteroz, in illustration of the most valuable works of art stored within its walls. The subjects of the plates in these albums are to be classified under stonework, marbles, terracotta, woodwork, &c. The first folio representing the first material comprises 64 sheets of photographs, including several details of the Museum buildings, which were built between the years 1490 and 1514 by Jacques d'Amboise on a relatively small, irregularly-shaped triangle, located in one of the most busy parts of Paris. The cockle-shells and bells, as well as the Pilgrim's staff and hat, introduced into the ornamentation of the design refer to St. James of Compostella, the patron of the builder, who was the Abbot of Cluny and Bishop of Clermont. The palace which once stood on this site was called the Palais des Thermes, and the Roman Emperors in Gaul lived here in the 4th century, while in later days Frankish monarchs made a home in the old place, which as we now see it is very much curtailed in extent, and the gardens were much diminished by the alterations carried out by Philippe-Auguste. The Hotel was never a religious house, though it belonged to the Abbey of Cluny, and the Kings of France lived there as tenants till the property of the Church was taken away and, so to speak, "nationalised." Du Sommerard, the famous antiquary, who died about the middle of the present century, bought the property, and founded the existing collection some few years earlier. The site was brought, towards the end of the 15th century, by the Abbot de Charles for the Abbey of Cluny, and the palace was commenced by Abbot Jean de Bourbon, bastard of John Duke of Burgundy. Bishop Jacques d'Amboise, the Abbot of Cluny, already mentioned, finished it. The Abbots seldom, however, visited Paris, and so they let off the house to royalty and other distinguished persons. Mary of England, widow of Louis XII., for example, after living there for some years, married from thence Charles Brandon, Duke of Suffolk. James V., of Scotland, was wedded to Madeleine, daughter of François I., at this hotel. The Nuns of Port Royal inhabited the place previous to its purchase by M. de Sommerard, and on his death the State bought the building and its far-famed contents. "La Chapelle," on the first floor, forms part of the most ornate wing of the premises, and it is approached from the hall by a highly-elaborated staircase, with a very

rich door filled with figure sculpture in traceried and canopied panels. The Flamboyant inclosure of this stairway we illustrate to-day. The chimneys, dormers, and parapets are also of marvellous richness and beauty of design. The crowned K, introduced repeatedly in the ornamentation, has reference to Charles VIII. (Karolus). In this beautiful old house all the rooms are now occupied by an archaeological and artistic museum of inestimable value, the building and its contents being in perfect keeping. The publication * to which we have thus drawn attention will comprise illustrations from photographs of a large selection of the objects of interest in this unique museum, and a plan of the building, together with an explanatory index, accompanies the plates. When finished these books will furnish an unquestionably useful work of reference. We may add that we illustrated the Courtyard of Cluny in our issue of October 30, 1885, and both the Courtyard and Gallery in that of June 7, 1895.

CITY GUILDS, NO. XXVII.—THE STATIONERS' HALL: THE COURT ROOM, AND THE BUSINESS ROOM.

WE published an interior of the hall of this famous City Company, with an account of its history, in the BUILDING NEWS for June 28, 1895. The buildings stand on the site of Abergavenny House, which was destroyed by the Great Fire. Sketches of some of the fittings of the hall then accompanied our description. There is not much to add by way of letterpress on this occasion. The Court Room has a wide coved extension of the cornice proper, enriched with freely-treated ornament in the style of Chippendale, the over-mantel being a particularly ornate example of plaster-work of that period. The top-lighted alcove at the end of the room, where the Master sits, gives an air of dignity to the apartment. Round the room portraits of Past Masters and other persons of distinction add interest and richness. The Business Room, much more to our taste, is wainscoted in oak of Georgian times. Over the door and chimney-piece is some very good carving done after the fashion set by Grinling Gibbons. The Chippendale chairs are in harmony with the room, which has a suitable ceiling. Our views were specially taken for the BUILDING NEWS by Mr. J. T. Sandell.

NEW BANKING PREMISES, DONCASTER, FOR THE YORK CITY AND COUNTY BANKING COMPANY, LIMITED.

THESE premises (commenced a year ago on the site of the old City and County Bank) are being built of Portland stone, and are now nearly ready for the roof, which will be covered with green Westmoreland slates; the dome with stout sheet copper. The basement comprises clerks' room, strong and stationery rooms, cellars under shop and offices, boiler-house, &c. The ground floor has a large banking room with groined ceiling, and all the fittings are of mahogany. The accommodation includes a strong room, manager's room, and lavatory. Adjoining is a lock-up shop and offices, with a separate staircase and entrance. The first floor contains seven large offices, with lavatory and w.c.'s. Some spacious show-rooms are located over the shop. The second and third floors provide similar accommodation, and over the shop is a caretaker's residence. The builder is Mr. William Aneley, of Doncaster, and the architects are Messrs. Demaine and Brierley, of York.

"THE CLUB," CAMPBELTOWN.

THE new premises for "The Club," Campbeltown, which we illustrate, will occupy an excellent corner site in the main street. Red freestone is to be used for the external face of walls, and the roof covered with green slates. The corner oriel will have a cement rough-cast frieze and a lead roof. Internally wood panelling will be largely used for the walls, and the billiard room will have an open timber roof. The architect is Mr. H. E. Clifford, of St. Vincent-street, Glasgow.

HOUSE OF RETREAT, CLERKENWELL.

THIS building was erected in 1892 for the "Sisters of Bethany," by Messrs. Maides and Harper, of Croydon. Our illustrations are of the chapel. The materials are stone and plaster inside, with a whitewashed boarded vaulted

* Le Musée de Cluny La Pierre, Le Marbre, L'Albatre, La Terre Guite. Sixante-quatre Planches Reproduisant pres de Chêne et Longuet. Paris: Ancienne Maison Morel. 2, Rue de Mignon. 1896.

ceiling, and the exterior is in grey stocks and Portland stono. The screen and stalls, &c., are of unpolished birch. The sacristies are under the sanctuary. The drawings reproduced were exhibited at the Royal Academy this year. The architect is Mr. Ernest Newton.

"HILL CREST," HASTINGS.

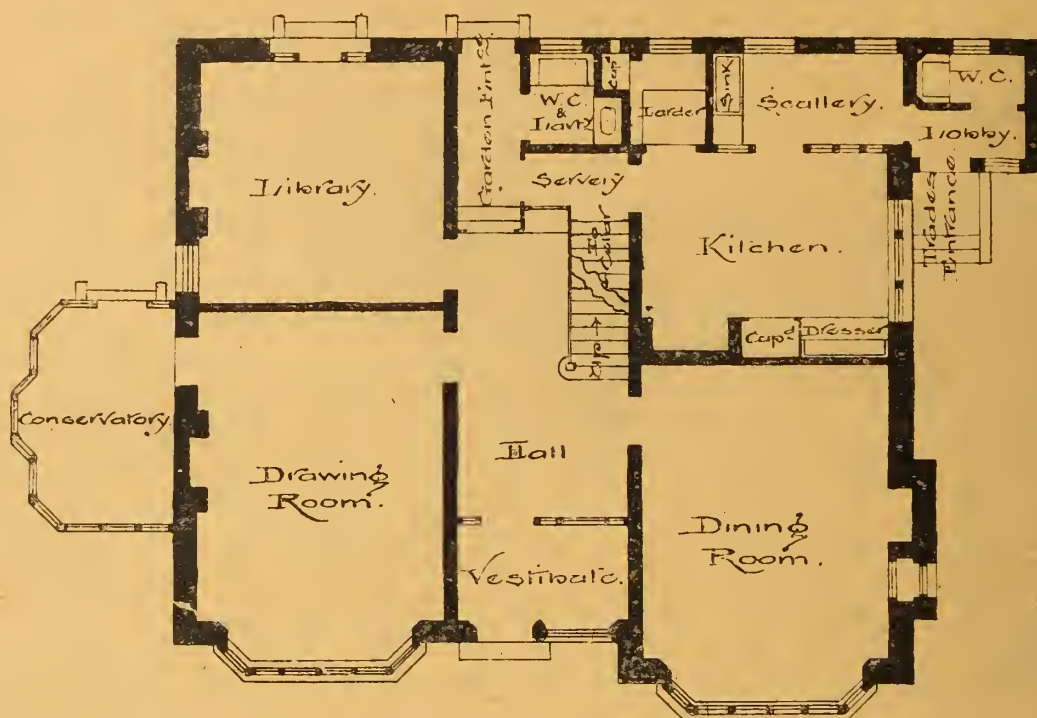
THIS house has been recently erected upon the Cornwallis Park Estate, on a site commanding the most extensive views to be obtained in the neighbourhood, for Mr. Arthur D. Thorpe, solicitor (deputy town clerk for the borough of Hastings). The colours of the materials have been carefully studied in carrying out the design, the bricks being Lawrence's best deep red with Bath stone dressings, the hanging tiles are bright red, and those for the roof are deep strawberry Broseley tiles. The work was carried out by Mr. W. Small, of Ore, the architect being Mr. Henry Ward, A.R.I.B.A., of Hastings.

CAERDEON CHURCH, NEAR BARMOUTH.

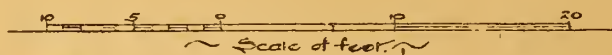
WE are indebted to Mr. Charles H. Holden, architect, of Bolton, who recently sketched this quaint and unpretentious mountain church, which was erected in 1862 in imitation of an Italian hill-side chapel by the Rev. W. E. Jelf, M.A., of Caerdeon House, who also, in co-operation with other members of his family, provided an endowment for the church which he built. A costly lawsuit distinguished the early history of this building, between the founder and the rector of Barmouth concerning the control and patronage of the cure. An Act of Parliament was in consequence passed giving the bishop of the diocese the right of sanctioning the erection of a new church, notwithstanding rectorial rights in the matter. Subsequently the property of Caerdeon and its church passed into the hands of the late Mr. Samuel Holland, some time M.P. for the county of Merionethshire, who was a benefactor of the church. The east window has been dedicated to his memory. In his time the church was consecrated, and a district was attached to it by order of the Queen in Council in 1887, so that since then Caerdeon Church has been the parochial church of the chapelry of Bontddu [Blackbridge], which extends some four miles along the famous estuary of the Mawddach, the village of Bontddu lying midway between Barmouth and Dolgelly; the Rev. D. R. Lewis is the present vicar. For appropriateness of design to its surroundings the little building seems to be eminently distinguished. Its rusty-coloured stone, roughly split in long beds in thin courses, enhances its scale and quaint simplicity. In spite of the wide joints in the masonry there are no signs of decay or damp. The green Welsh roof-slates are slightly tinted with green verdure, and age is adding a charm to the whole fabric. The stone is not adapted to delicate detail, which in so exposed a situation would be singularly out of accord with the site. A corbel table along the eaves gives a constructional decorative feature and piquancy of effect. The columns to the parvise porch are built up of thin courses, and the bell turret spans the chancel arch. "Copy or no copy, Italy or Wales," adds Mr. Holden, "this building is perfectly suitable to its situation, and should be a lesson to many of the building friends of Barmouth and the BUILDING NEWS."

A small, but costly, cenotaph, has just been erected in the Wrey Chapel, in the south transept of St. Peter's Church, Tavistock, in memory of the late Lady Wrey. It is of oval form, and of Classic character. The main part is of Castellino marble, whilst the carved work is all in white statuary marble. The whole is mounted upon a background of veined grey Dove marble. Above the inscription a full-blown rose is carved, shown as broken off sharply from its supporting stem. All around the tablet is a border of continuous ornament, twisted around a central stem, while below the superscription itself is a crown of glory. The memorial was designed by Miss Florence Wrey, daughter of the deceased, and has been carried out in its entirety by Messrs. Harry Hems and Sous, of Exeter.

A sub-committee of the Lord Provost's Committee of the Edinburgh Town Council met on Tuesday discussing matters associated with the selection of a site for the Usher Hall. Twelve sites were under the consideration of the meeting, and as the result of the deliberations only five were retained on the list. In respect to these it was resolved to obtain full information in view of another meeting to be held to-day (Friday)—information as to size, probable cost, &c.



Ground Floor.

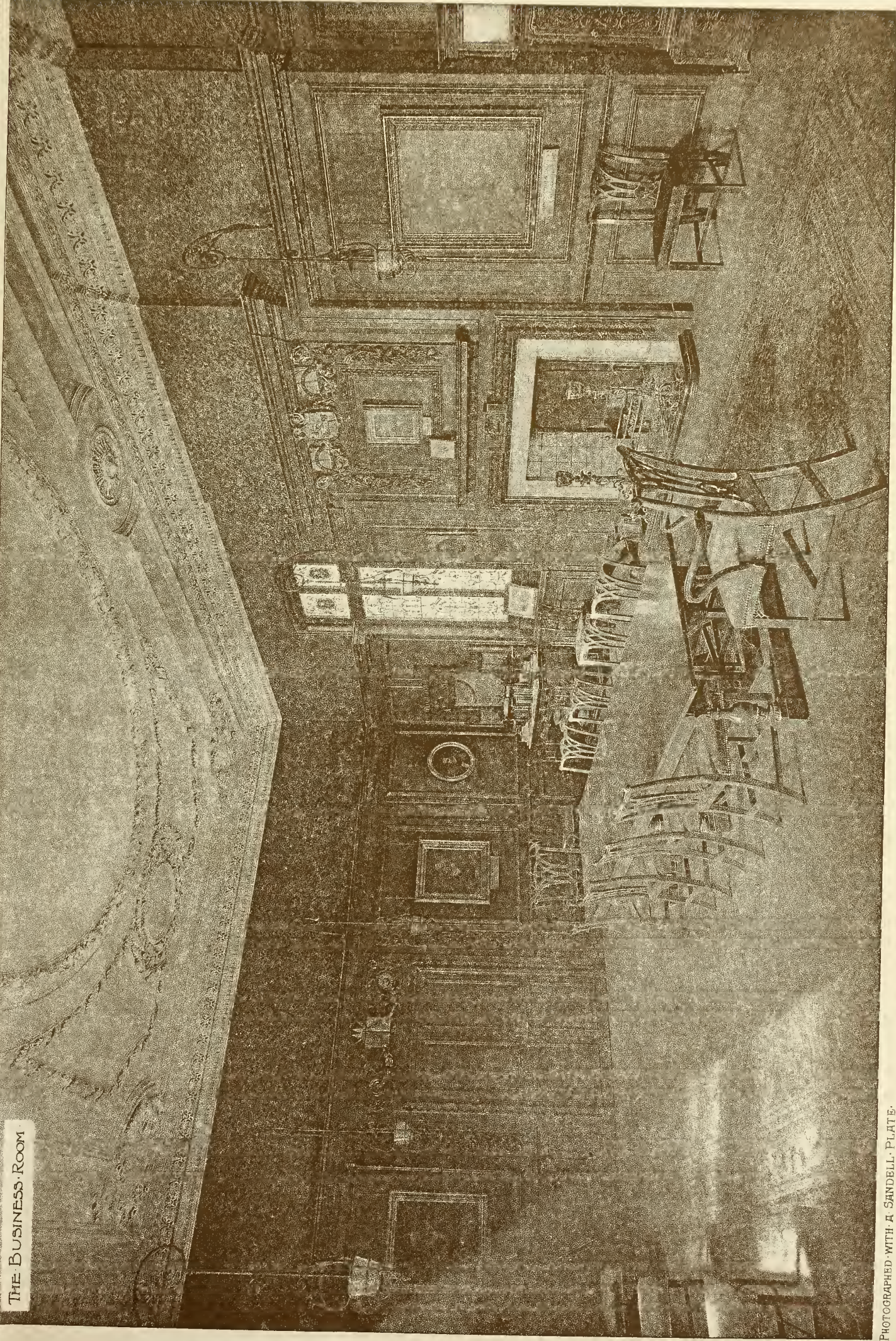




THE COURT ROOM.



THE BUSINESS ROOM.

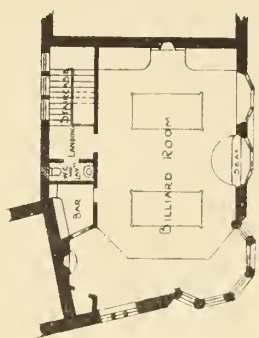
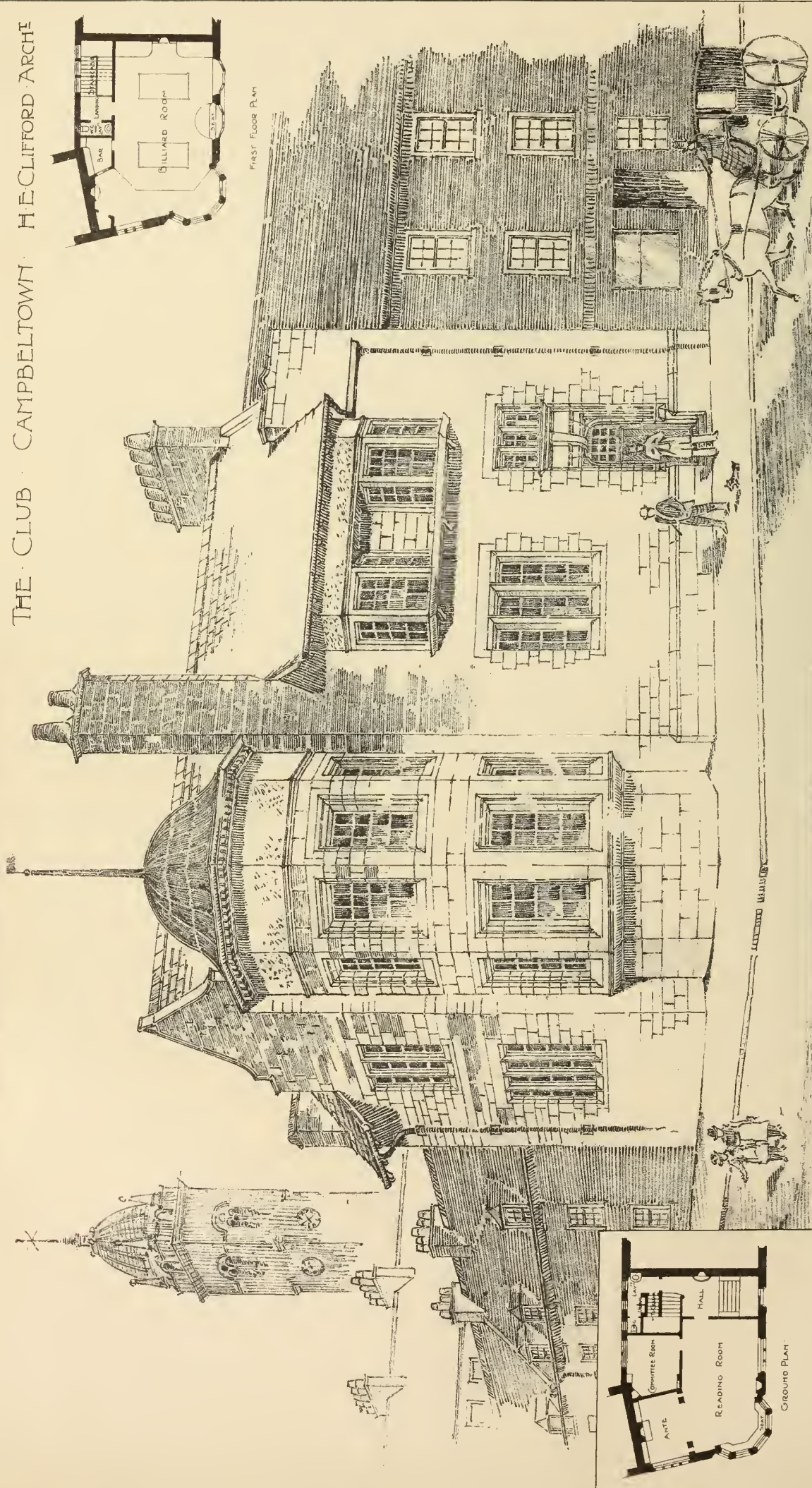


PHOTOGRAPHED WITH A SANDELL PLATE.

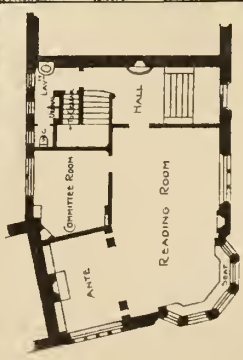
PHOTO-TINT BY JAMES AKEMAN & QUEEN SQUARE LONDON W.C.

THE CITY GUILDS NO 27. THE HALL OF THE STATIONERS' COMPANY.

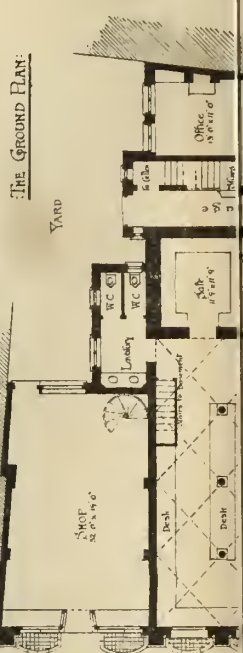
THE CLUB CAMPBELTOWN HECLEIFFORD ARCHT



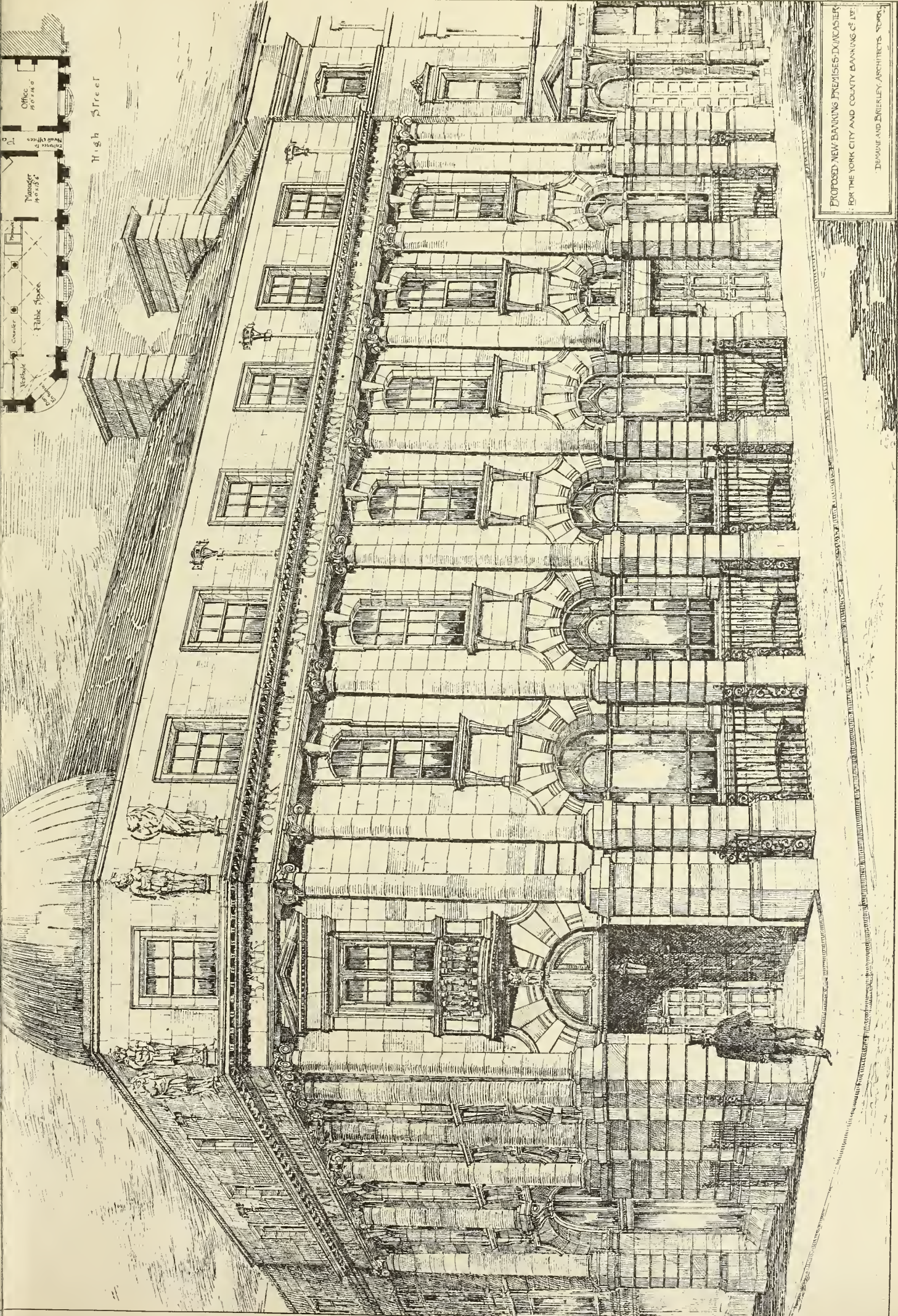
FIRST FLOOR PLAN



GROUND PLAN



THE GROUND PLAN



PROPOSED NEW BANKING PREMISES, LANCASTER.
FOR THE YORK CITY AND COUNTY BANKING CO. LTD.
DESIGNED AND ENGRAVED BY J. H. B. AND W. J. ALLEN, 6, J. STREET, LANCASTER.

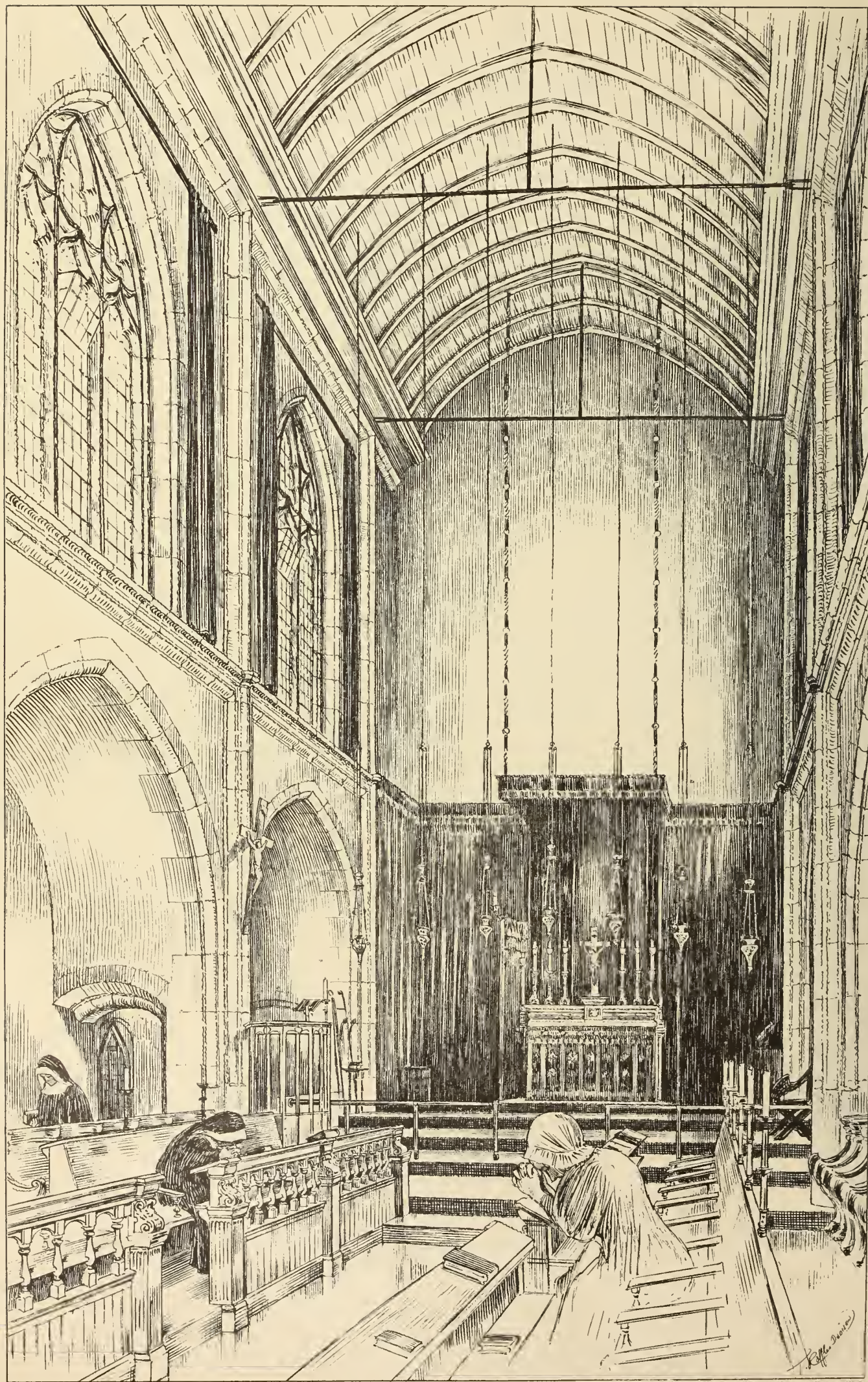


Photo Engraved & Printed by James Akerman, 6 Queen Square, W.C.

CHAPEL OF HOUSE OF RETREAT, CLERKENWELL. LOOKING EAST

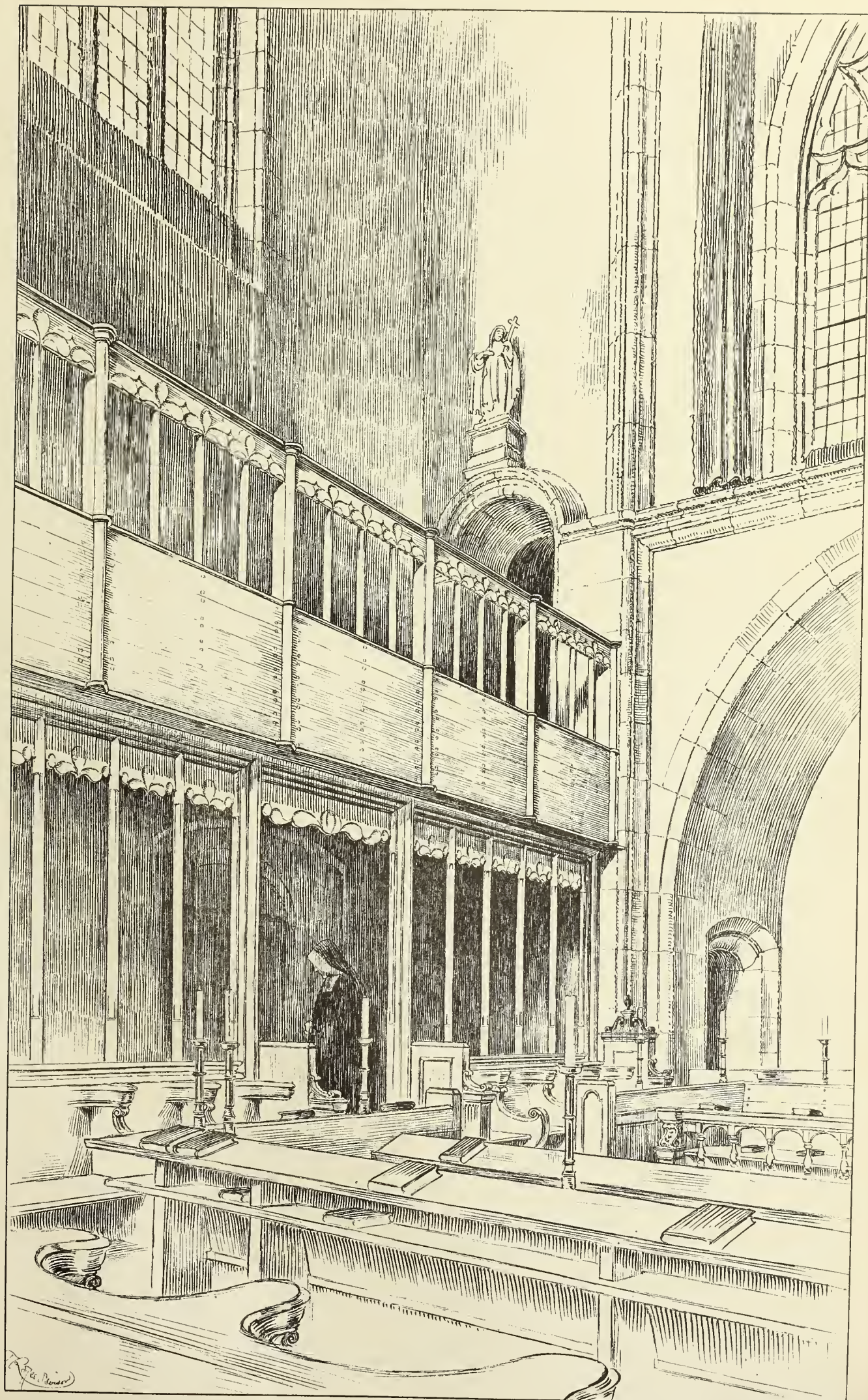
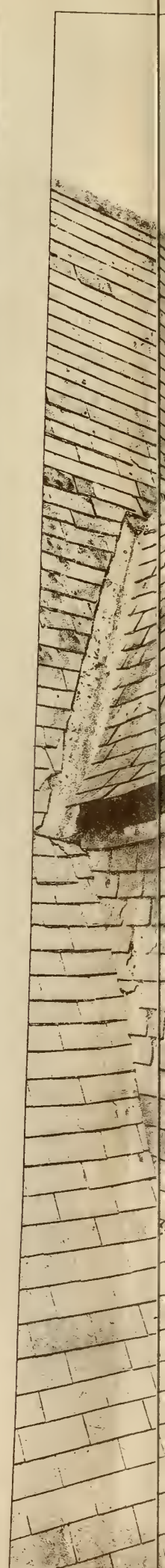
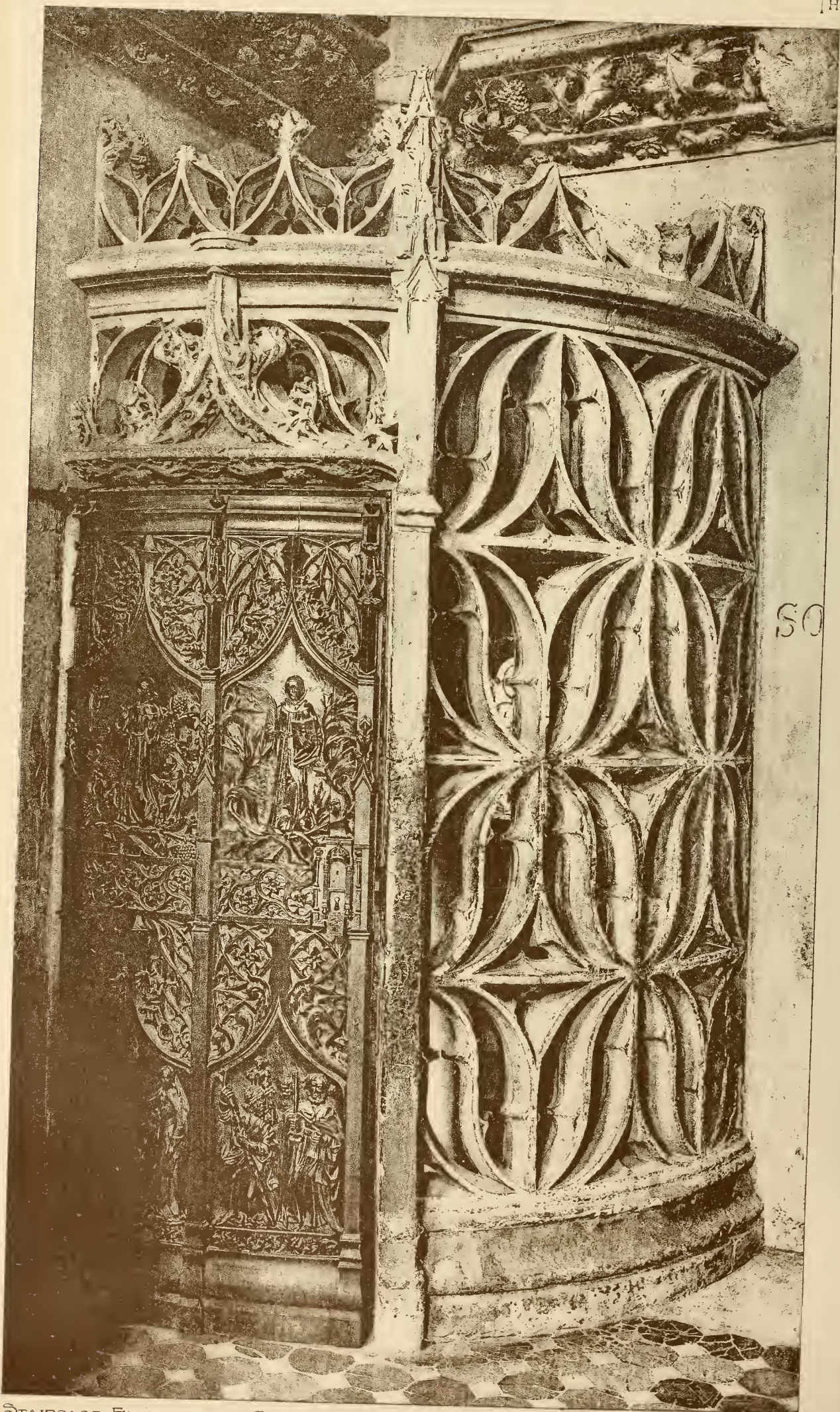


Photo Lithographed & Printed by James Akerman, 6, Queen Square, W.C.

CHAPEL OF HOUSE OF RETREAT · CLERKENWELL · LOOKING WEST ·

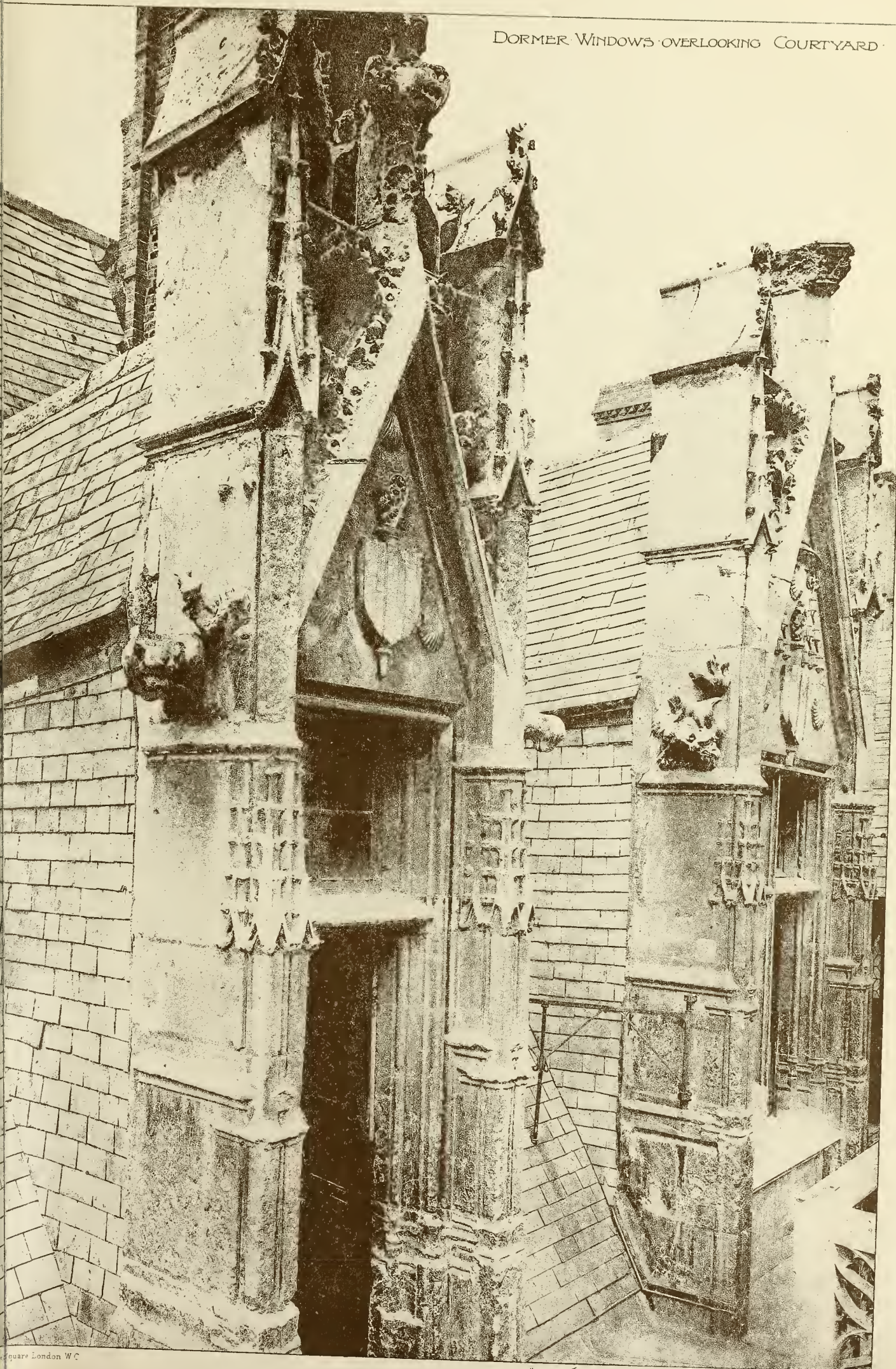


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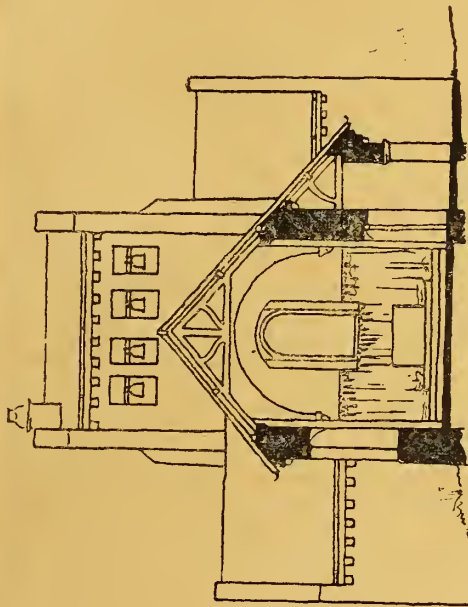
STAIRCASE ENCLOSURE IN CHAPEL -

SEPT 12, 1896.

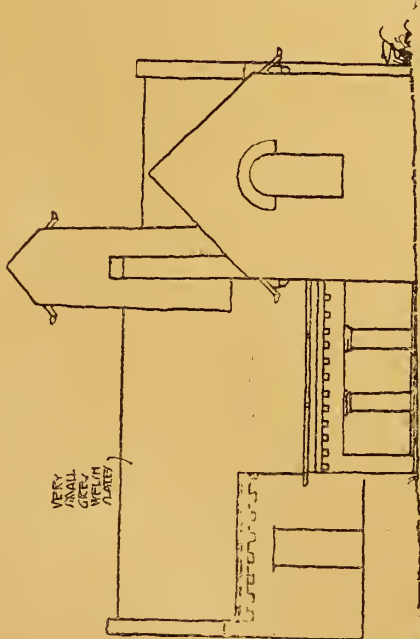
DORMER WINDOWS OVERLOOKING COURTYARD



A HILLSIDE
CHURCH AT
CARDIFF
NEAR BAY
MOUTH OF
WALES



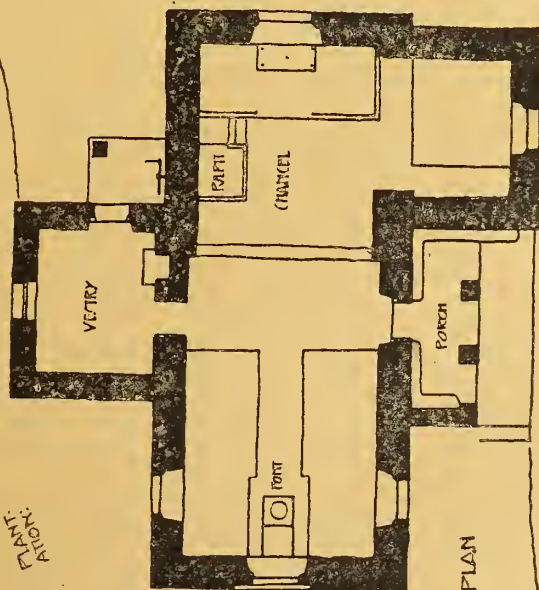
SOUTH
ELEVATION



NORTH
ELEVATION

A LARGE
ROMANIC
CHURCH
IN THE
BAY OF
CARDIFF

VERY
SMALL
GREAT
WELLS
PLATES



PLAN

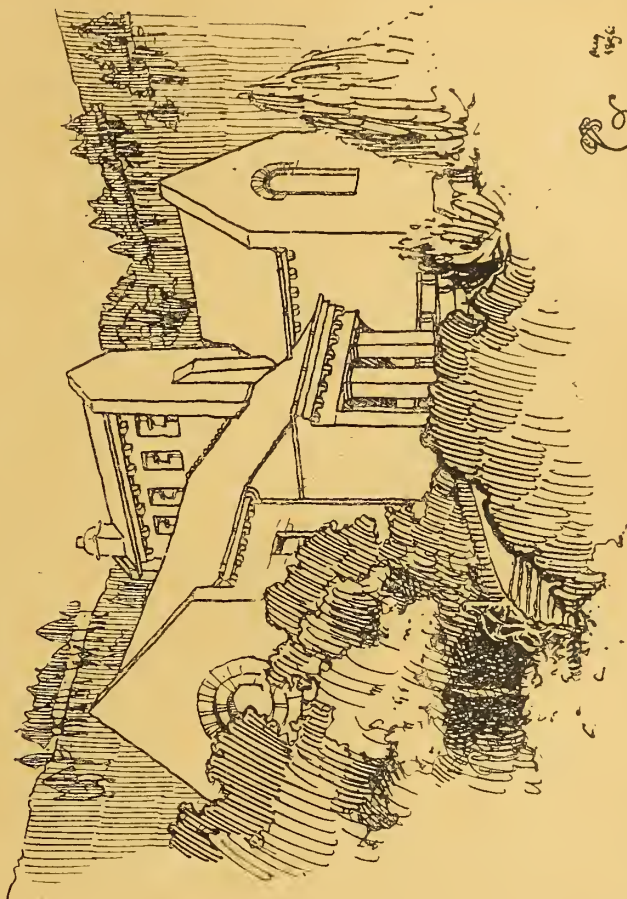
DEEP
GLEN
CROSSED
BY RAIL
BRIDGE

RAIL
STEPPY
TO
BRIDGE

GRAVE YARD

PATH

OPEN FIELD



Aug
1896

TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. All communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondents.]

It is particularly requested that all drawings and all communications respecting illustrations or literary matter should be addressed to the EDITOR of the BUILDING NEWS, 332, Strand, W.C., and not to members of the staff by name. Delay is not unfrequently otherwise caused. All drawings and other communications are sent at contributors' risks, and the Editor will not undertake to pay for, or be liable for, unsought contributions.

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Front-page Advertisements 2s. per line, and Paragraph Advertisements 1s. per line. No Front-page or Paragraph Advertisement inserted for less than 5s.

Advertisements for the current week must reach the office not later than 3 p.m. on Thursday. Front-page Advertisements and alterations in serial advertisements must reach the office by Tuesday morning to secure insertion.

SITUATIONS.

The charge for advertisements for "Situations Vacant" or "Situations Wanted" is ONE SHILLING FOR TWENTY-FOUR WORDS, and Sixpence for every eight words after. All Situation Advertisements must be prepaid.

NOTICE.

Bound copies of Vol. LXIX. are now ready, and should be ordered early (price Twelve Shillings each), as only a limited number are done up. A few bound volumes of Vols. XXXIX., XL., XLI., XLVI., XLIX., LI., LII., LIV., LVIII., LIX., LX., LXI., LXII., LXIII., LXIV., LXV., LXVI., LXVII., LXVIII. may still be had, price Twelve Shillings; all the other bound volumes are out of print. Most of the back numbers of former volumes are, however, to be had singly. Subscribers requiring any back numbers to complete volume just ended should order at once, as many of them soon run out of print.

SURVEYOR.—PLANS.—BY-LAWS.—This question was answered last week, but, by an oversight, was put into another paper. It seems to me, on a strict construction of the by-laws, that the local authorities are correct on both points. At any rate, the points would be far too risky to contest, and against such a force.

G. R.—BOUNDARY FOR BUILDING.—I am of opinion that in the case quoted A is not legally justified in building to the extreme limit of the boundary, as indicated in the question.

E. E. W.—FIXTURES.—The galvanised sanitary dust-bin purchased by this tenant can, of course, be taken away. As to the other articles, it is doubtful, and depends upon their depth and way they are fixed; but I should take them, and risk the consequences.

RECEIVED.—N. D. and Co.—Quant. Surv.—B. E. R.—G. Edmonds.—W. H. (Carlisle).—B. M. and Co.—F. P.

Correspondence.

ANOTHER GENEROUS OFFER.

To the Editor of the BUILDING NEWS.

SIR,—In reply to "Tynesider's" letter in the BUILDING NEWS of September 11, headed, "Another Generous Offer," allow us to state that we have been established over the tinsorial artist's shop for a number of years, and several years at another address previous; and if "Tynesider" would consult new directories, and not old ones, he will find the name of the architectural firm he has been looking for. What does it matter what kind of a shop architects have their offices over? The cloven foot of professional spite seems to appear through "Tynesider's" production. Possibly as a firm we have done more good work than he has been honoured with.

We are glad to say that we are not the first Newcastle architects who have offered their services free on behalf of pure philanthropy, and for the credit of the profession we hope we shall not be the last.—We are, &c.,

PLYLE AND BLACKBURN,

Architects and Surveyors.

13 and 15, Pilgrim-street, Newcastle-on-Tyne, Sept. 14.

THE DECORATION OF ST. PAUL'S—ALARMING RUMOUR.

SIR,—Under the above heading the following occurs in one of this morning's dailies:—"All who have watched the decoration of the choir of St. Paul's Cathedral—an operation still going on under the direction of Mr. W. B. Richmond, R.A.—must have felt (says the London correspondent of the *Manchester Guardian*) that the work was destined to last for generations, because, in the first place, of its magnificence and costliness, and, in the second place, of the prolonged disturbance it causes in the cathedral. For about four years workmen's scaffolds and sheets have disfigured the choir, with the likelihood of continuing to do so for another year or two. It is therefore alarming to be told that the decoration is in some respects being done with materials which will not last. There is an immense amount of painting and gilding in the work, and it is alleged that zinc white is the preparation for the former. It is, of course, a pure white, but where permanency is desired, worthless compared with white lead. What is said of the gilding is worse—namely, that it being done with the common French leaf, and will have practically disappeared in ten years. It is only fair to own that the workmen themselves, on being interviewed, denied that the gold was other than the best; but they did not contradict the statement about zinc white."

When, at the Church Congress held at Exeter in 1884, Mr. Richmond read a paper entitled "Art, as regards Architecture and Decoration," in no measured terms he held the profession up to scorn, and assured his clerical audience that architects, artworkers, and artists alike were unitedly and individually a pack of dunderheads, who did not know what they were doing. The inference drawn was, it was left to R.A.'s, such as himself, to redeem the artistic reputation—in things architectural—of this country.

Can there be any actual truth in the paragraph quoted above? If it is incorrect, then it should be officially contradicted. Messrs. James Powell and Sons' artificers, who are, I assume, doing the actual work under Mr. Richmond's direction as artist-architect, have had an excellent schooling at Whitefriars, and it hardly seems feasible they would consent to paint or gild mosaics at all—let alone with inferior materials!—I am, &c.,

Sept. 11.

CRAFTSMAN.

[Professor W. B. Richmond has contradicted the rumour that the materials employed in the decoration of the choir of St. Paul's Cathedral are unsound.—Ed. "B. N."]

The new Samaritan Hospital for Women in Victoria-road, Glasgow, was opened on Friday. It consists of two floors, and on each floor there is a ward accommodating ten patients, and a couple of wards each for two patients, besides a convalescent-room, ward scullery, and linen-room. The administrative block, which is three stories in height, contains the board rooms, matron's room, and accommodation for nurses and servants. The total expenditure has been £12,000.

The foundation-stone of a Baptist chapel in Heaton-road, Newcastle-on-Tyne, was laid on Friday. The plans were prepared and estimates supplied by Ald. W. H. Dunn, of Gateshead, and on June 8 the contract was let to Mr. W. A. Laws, of Heaton. The new church, which is to be built in red brick with stone facings and mouldings, is of the Early Gothic style; it will seat 750 persons, and will cost £3,435. The total cost, including heating apparatus, glazier's work, and furnishings, fees, will be £4,000.

Mr. G. W. Willcocks, M.I.C.E., held an inquiry at the town hall, Kingston-on-Thames, on Tuesday week, in reference to the application of the town council to the Local Government Board for sanction to borrow £6,000 for the provision of public baths in Back-lane. At their last meeting the council accepted the tender of Mr. William Cunliffe at £6,000 for carrying out of the work, which will comprise a swimming pool and 16 slipper baths.

The London and North-Western and Lancashire and Yorkshire companies have this season had under consideration the construction of a new line from Kirkham to Blackpool, and last week surveying operations were commenced. The new line will branch off the present one at Kirkham north signal cabin, rejoining at Cowgap-laue Bridge, South Shore, taking a straight cut. The length of the whole will only be five or six miles, whereas the distance from Kirkham to Talbot-road is now eleven miles, and to the Central Station, Blackpool, 13½ miles. Two or three years may elapse before the first train is run upon the line, but the work will be pushed on as rapidly as possible.

Intercommunication.

QUESTIONS.

[11548].—Sound-Waves.—Will the rafters of a building which are placed about 2ft. apart, and are not lathed and plastered, hinder sound-waves? If so, would a lath-and-plaster ceiling or a boarded one be best?—PUZZLED.

[11549].—Quantities.—Will some kind reader state if there are any classes held during the winter, in London, on "Quantities" (Banister Fletcher's system preferred), and give particulars?—LEARNER.

[11550].—Ironwork.—Will one of your experienced readers oblige me with the titles and publishers of some works on the design and construction of architectural ironwork? and oblige—STUDENT.

REPLIES.

[11540].—Levels.—Your correspondent is rather pointed in his remarks as to my acquaintance with levelling. Allow me say that theory is very different to practice. My knowledge is not based on books and theory, which I can very soon prove, as I have been engaged by prominent engineers on important works. If Mr. Johnson wishes for an interview, I shall be quite ready to meet him.—SYDNEY N. GLASS, 41, Old Queen-street, Westminster, S.W., Sept. 14th.

CHIPS.

The Ayr Model Lodging House, the erection of which is to begin immediately, is to cost about £10,000.

The Jowett memorial organ, erected at St. Paul's School, West Kensington, was played for the first time on Saturday. The organ, which has cost £1,027, has been presented to the School by Old Paulines, in memory of the late Dr. Jowett. It is at present unfinished, but when completed will contain 27 stops. It is blown by Willis's hydraulic patent.

The oil-paintings, "A Village in Fifeshire," by J. Lackhead, of Glen Cottage, near Glasgow, and Mr. Henry Bisbing's "On the Beach," on view in the Berlin International Art Exhibition, have been bought by the Prussian Government.

The Battersea Vestry have sealed a contract with the Southwark and Vauxhall Water Company for the purchase of land at Nine Elms for the erection of baths and washhouses.

An official announcement has been made by the directors of the South-Eastern Railway Company that Port Victoria Pier will be closed from Sept. 30 until further notice for repairs. The pier has only been constructed about 15 years, but the weight of the trains running on it has caused the structure to settle, so that it requires re-piling.

The parish church of St. Michael and All Angels, Bampton, near Barnstaple, is about to be restored. The works will include repair of all masonry, the relaying of floors of nave, north aisle, and chancel, re-seating with open pitch-pine benches, and erection of oak choir stalls. Messrs. Bryant, of Barnstaple, are the contractors.

Col. G. F. O. Boughey, C.S.I., Royal Engineers, has been selected as one of the commissioners under the Light Railways Bill, which lately passed the House of Commons. He was until recently manager of the North-Western State Railway.

Major General Crozier, one of the inspectors of the Local Government Board, held an inquiry on Friday into the application of the Shoreditch Commissioners for Public Libraries for permission to borrow a sum of £6,500 for the provision of a new public library in Pitfield-street, Hoxton. The total sum required for the erection of the new library is £13,000, and of this amount permission has already been obtained to borrow £4,500 for the purchase of a site. Mr. J. Passmore Edwards has given £2,000, and the commissioners are now applying for power to borrow the remaining £6,500 required for the undertaking. The Haggerston division of Shoreditch already possesses a free library in the Kingsland-road, and there is opposition to the present scheme on the ground that one such institution is sufficient for the needs of the locality.

The Hoylake and West Kirby District Council will consider, on Monday next, the question of applying to Parliament for a Bill authorising the expenditure of £70,000 on improvements. These include a promenade from Hoylake to West Kirby, the deepening of the Hoyle Lake, and the construction of a marine lake at West Kirby. The chief item of expenditure will be the promenade, the sum involved being £52,800; but it is not intended at present to spend more than £22,600 in making a promenade from Church-road to King's Gap, Hoylake, and from Riversdale-road to Sandy-lane, West Kirby.

When the building of the Tower Bridge was entered upon, the annual cost of maintenance was estimated at £6,000. The actual sum expended in 1895 was £17,150 14s. 5d., and so far there has, of course, been no outlay for repairs.

LEGAL INTELLIGENCE.

IN RE B. EVANS, OF CARDIFF.—A meeting was held on Thursday in last week at the offices of Mr. T. H. Stephens, the Official Receiver, Cardiff, of the creditors of Benjamin Evans, of 41, The Walk, and 1A, Railway-street, Cardiff, builder and contractor. The gross liabilities are £6,143 9s., of which £2,214 3s. 7d. is expected to rank. The net assets are £945 2s. 10d., and the deficiency £1,269 0s. 9d. Debtor attributes his failure to loss on contracts. The estate remains in the hands of the Official Receiver as trustee.

SERIOUS CHARGE AGAINST A BIRMINGHAM BUILDER.—At West Bromwich Police Court, on Monday, Thomas Butler (61), builder, late of Herbert-street, Small Heath, was charged on a warrant that in 1892 at West Bromwich, he being the trustee of certain money, deeds, and instruments in writing—for the use and benefit of Emily Bradby, of Sheepwash-lane, and others—unlawfully appropriated it to his own use. It was stated that prisoner was a trustee under the will of Mr. Joseph Whitehouse, a boat-builder, of Horseley Heath, Tipton, and was asked to furnish certain accounts, but failed to do so. Proceedings were instituted in connection with the will, and it was found that the accused had considerable defalcations. Prisoner decamped, and a warrant was issued. On Saturday night he was arrested in Birmingham. Mr. Caddick applied for a remand. For the defence it was denied that the accused had fled from the district, and contended that he had been moving about Birmingham and district daily for the last two or three years. Mr. H. Walker, solicitor, of West Bromwich, gave evidence as to the proceedings in the High Court of Chancery, and also added that prisoner could not be found. The prosecution alleged that prisoner had been guilty of misappropriating moneys to the amount of £3,000 or £4,000 at the very least. When a summons was issued against the accused he left his home the same night. Prisoner was remanded, bail being refused.

MANCHESTER CORPORATION AND THE SEWAGE DISPOSAL DIFFICULTIES.—The Manchester Corporation were summoned before the County Justices on Wednesday, under two informations laid by a sub-inspector of the Mersey and Irwell Joint Committee, charging them with polluting the Ship Canal by passing liquid sewage into it at Davyhulme. The corporation, through their counsel, were willing to accept an order against them, calling upon them to cease the pollution within twelve months, and the circumstances under which the pollution took place having been briefly sketched, Mr. Rhodes, on behalf of the corporation, said the delay in providing an efficient scheme for disposing of a portion of the city sewage arose partly from the failure of some of the contractors, and partly from the fact that since the scheme was adopted 6,000 acres had been added to the city area. The corporation, moreover, had very recently empowered their rivers committee to take steps to carry out a plan for conveying the effluent to the estuary of the Mersey. The corporation had already spent £600,000 on sewage works, and proposed to spend a very considerable sum in addition, besides a charge of £17,000 per annum for treating the sewage before it was turned into the canal. The chairman of the bench imposed a fine of 20s. in the first case and 1s. on the second information, with ten guineas costs, this being necessary according to counsel for the prosecution in order to secure their costs.

IN RE H. D. EARL.—A sitting was held in London on Tuesday for the examination of H. D. Earl, of Edinburgh and London, an architect and surveyor, who was for some years professionally engaged by the Government in connection with prison building in Scotland. The bankrupt applied to pass upon accounts showing gross debts £2,739 18s. 9d., of which £1,332 12s. 11d. is unsecured, and assets £1,420, showing a surplus of £80 1s. 5d. In reply to Mr. Brougham, Official Receiver, the bankrupt stated that he commenced business at 15, Shandwick-place, Edinburgh, in 1879, and was engaged professionally as consulting surveyor for the prison establishments in Scotland by the Government. He was paid by fees and not by salary, and at the same time he practised privately as an architect and surveyor. After the Government business concluded, some three years since, he left Edinburgh altogether and practised only in London. His private practice was not sufficient to enable him to keep up his office in Edinburgh. The main cause of his failure was the non-success of an action brought by him to recover money alleged to be due to him for services rendered in connection with the Safe Deposit Construction Company, and in expenses incurred in connection with a patent weighing-machine, and also for a patent improved road paving. The surplus returned in his accounts was subject to the satisfactory realisation of his interest in the various patents. It was to this fact that he largely attributed his failure. Prior to his Government engagement he had been engaged superintending, as resident surveyor, the building of the Cathedral, Edinburgh, on behalf of the contractors. The examination was concluded.

STAINED GLASS.

WORCESTER.—On Monday week was dedicated at the Cathedral a new stained-glass window, erected by Rear-Admiral R. F. Britten to the memory of his father and mother. The window completes the embellishment of St. John's Chapel, on the south side of the choir, which was recently restored and inclosed by an oak screen, by the generosity of Earl Beauchamp. The south windows of the chapel were already of stained glass, and the new window takes the place of the plain glass of the east window that was partly hidden by a reredos when the chapel was restored. The window illustrates incidents in the history of St. John the Baptist in relation to the Saviour, from His birth to the ascension.

CHIPS.

Until the Dean and Chapter of Peterborough have, according to their recent resolution, obtained a second opinion from a leading architect on the stability of the west front, all work must be at a standstill. The underpinning has been finished, and there will be nothing to do, as the superstructural operations cannot now be touched until further orders. Consequently there is a complete deadlock, paralleled in the history of the restoration by the rupture in the work which was caused by the High Tower or Low squabble, when the Primate was called in as arbitrator.

The municipal engineer of Mandalay, Burmah (Count Calderari), has now completed plans and estimates for his proposals for a water-supply to the town. The main features are that the supply is to be obtained from the old bed of the Irrawaddi, situated a short distance west of Dyer's Brewery, near the Shwetchung. A series of tubular wells will be sunk into this bed, and the water will be pumped from the wells to a reservoir built on the side of Mandalay Hill at a level high enough to allow of distribution by gravity alone from the reservoir to the various houses. The project is estimated to cost about 12½ lakhs.

The repairs and restorations in the great timber and lead roof of the cathedral of Winchester proceeds rapidly under the hands of Mr. John Thompson's staff of expert craftsmen, superintended by Mr. Russell, the lead being melted by Mr. W. P. Moreton, of Winchester.

It is proposed to erect on a portion of the Old Cloth Hall estate in King-street, Leeds, a new hotel to be known as the Metropole. The building will be Renaissance in style, and faced with red brick and terracotta, and will contain a dining-saloon seated for 200 persons, coffee-room, smoking-room, reading-room, drawing-room, and commercial-room, all on the ground floor, and on the floors above some 150 bedrooms. Messrs. Chorley and Cannon, of Leeds, are the architects.

The urban district council of Weston-super-Mare received, at their last meeting, a recommendation from a committee that the council advertise for plans for the erection of the proposed pavilion on the site selected at Knightstone, to seat at least 2,500 persons, and that premiums of £50, £20, and £10 be offered for competitive plans. Several members objected to so important a project being so hurriedly decided, and it was resolved to defer the consideration of the matter till another meeting.

A monument to the memory of the late Mr. Thomas Chirgwin, five times Mayor of Truro, has recently been placed in the first (partially erected) bay of the north side of the nave of Truro Cathedral. It is fixed under the western light of the window lately filled with stained glass, as part of the same memorial. The inscription is cut in Early English letters, gilded, on a slab of delicately-tinted alabaster, from quarry belonging to Lord Windsor. The slab is framed in a moulding, decorated with rosettes and fleur-de-lis. The whole is backed by a piece of Ashburton marble. The work was executed by Mr. Clark, of Llandaff, from the design of Mr. Silvanus Trevail, F.R.I.B.A., M.S.A., of Truro.

At Skerton, near Lancaster, a new Roman Catholic school chapel, built from designs by Messrs. Pugin and Pugin, of Westminster, was opened last week. It is faced with Lancaster stone. As a school it will accommodate about 250 children, as a chapel it will seat 160. In the façade, facing the road, is a life-size carved stone figure of St. Joseph, below which are the Coulston arms. The benches in the central hall are of pitch-pine, the upper part being movable, so as to form desks for the children. The altar is of Bath stone, and the three panels in the front of the altar are filled with figures representing the Salutation. The tabernacle, with its ornamented silver door, is surmounted by a stone canopy, forming a niche for the reception of a statue of the B.V.M., the panels on each side of the reredos being filled with groups of life-like figures representing the Nativity and Flight into Egypt respectively. This altar is intended for the Lady chapel of a future new church to be built in the vicinity.

WATER SUPPLY AND SANITARY MATTERS.

BELFAST.—The special committee appointed by the corporation to inquire into the high death rate of the city has held another meeting. A member of the Trades Council was examined, and described the condition of certain property off Durham-street. The drainage in that locality was effected by a surface channel, and the offensive stream ran wherever it chose in front of the houses, and into them sometimes, for there were no door-steps. In another district off Barrack-street the sanitary conditions were equally bad. The houses in Millfield-place and Millfield were quite unfit for human habitation. The secretary of the Belfast United Trades and Labour Council was examined. The sanitation in factories, he believed, required more careful supervision. In his opinion, the cause of the present high death-rate was due to the insanitary condition of the city prior to the main drainage scheme, and also to the nature of the employments of the people. Another witness, asked if he took a street of houses built a few years ago and applied the smoke test, how many of them would stand it, said he did not think more than half of them would. He thought that in consequence partly of the subsidence of the ground and partly of bad plumbing, a very large portion of the more recently built houses would not stand the smoke test. The chairman said if any additional evidence were necessary another meeting would be convened; but, in the meantime, the inquiry might be considered as adjourned for the purpose of considering the report.

DOUGLAS, ISLE OF MAN.—At a special meeting of the Douglas Town Council, held on Friday, the question of the carrying out of a scheme of sewerage for Douglas was discussed. It was proposed that the carrying out of the work be entrusted to Mr. T. G. Taylor, borough surveyor, with Mr. E. H. Stevenson, who designed the scheme, as consulting engineer. This proposal was strongly resisted on the grounds that Mr. Stevenson's eminence as an engineer demanded that he should carry out his design, and have the sole responsibility of executing the work, and that the borough surveyor had plenty of other work to attend to. The proposal was rejected by a large majority.

DOVER.—Some important water springs have been discovered near Dover, in the course of operations by Mr. Edward Easton, of Westminster, the engineer to the Dover Undercliff Reclamation Scheme, by whom it is calculated that at least five to six million gallons of the finest spring water are wasted daily—six times as much as is pumped for the whole town of Dover. The water issues from fissures in the cliffs, and is derived from the same rainfall and gathering area which supplies the great flow of water on the shore between Dover and St. Margaret's. Mr. Easton has been engaged in sinking headings for waterworks for a portion of East Kent, at Martin, near Dover. After striking a new heading, they had only proceeded some few feet when the water burst in upon them in such quantities that the workmen had to leave the shaft, and had not even time to save their tools. Two or three years ago the neighbourhood was visited by some commissioners in connection with the London water supply, with a view to reporting as to the water-sheds of the county.

LEICESTER WATERWORKS.—The Mayoress of Leicester opened, on Friday, the new waterworks at Swithland, in Charnwood Forest, which have been constructed by the corporation at a cost of about £360,000. Until this was completed the borough was mainly supplied from two reservoirs. One was constructed in 1854, at a cost of £108,081, and was supplied from a watershed of 2,860 acres. The second, that at Bradgate, was completed in 1870, at a cost of £181,000, and had a watershed of 4,400 acres. Owing, however, to the rapid growth of the population, and the decline in the average rainfall from 28in. to only 20in., both supplies have proved altogether inadequate. The quest for a fresh supply began in 1880, but it was not until 1889 that the present Swithland scheme was adopted. The corporation purchased 275 acres from the Earl of Lanesborough at a cost of £52,303. The detailed plans were prepared by Mr. J. B. Everard, C.E., of Leicester. In April, 1894, the corporation accepted the tender of Messrs. Aird and Sons for the construction of the reservoir, filter-beds, &c., at £133,511, and in the following July the first sod was cut. The reservoir covers about 200 acres, and is comparatively shallow, but it will store 530,000,000 gallons, and be fed by a watershed of 3,500 acres. It will yield 2,000,000 gallons per day, and will supply 1,000,000 at the rate of 20 gallons per head. The aggregate supply will thus be raised to 6,000,000 per day, and accordingly suffice for a population half as large again as the present. In addition a service reservoir has been constructed out of the solid rock at Hallgates, at a cost of about £15,000. This will hold 2,000,000 gallons, will materially improve the supply to the high-level districts of Leicester, and save about £1,500 a year in pumping. The stonework throughout is of an ornamental

character, and the entire waterworks constitute a prominent feature in Charnwood Forest. Among the contractors have been Messrs. T. Blakeborough and Sons, of Brighouse, Yorkshire, who have supplied the whole of the valves, &c., for the new Swithland works at a sum of £8,372.

NEWCASTLE-ON-TYNE.—The new filter-beds of the Newcastle Waterworks Company, at Whittle Dene, were inaugurated by the mayor of that city last week. These are to form a set of eight, six of which are now usable, another being nearly finished, and the last of the set well advanced towards completion. The dimensions are 200ft. long by 135ft. wide, and each filter-bed will hold approximately 3,000,000 gallons of water, and the set should purify and pass 24,000,000 gallons daily. Mr. Forster, the assistant engineer, explained the method of working, describing the sinking of the water through the strata of the beds from the finest sand to the stone course at the bottom, and showing how the cleaning of the filters was affected at intervals of possibly three weeks. These filters are intended to filter the water supply for the 410,000 people on Tyneside who draw their water supply from the company.

NORTHALLERTON.—The Northallerton Urban District Council have adopted plans prepared by the Oxygen Sewage Purification Company, Limited, for the purification of the town sewage. The process is that which is at present in use at Dundrum Criminal Lunatic Asylum, and which has been adapted by the Board of Works of Ireland for the Chapelized Police Barracks. It is based on the researches of Mr. W. E. Adeney, F.I.C., F.C.S., with whom Mr. W. Kaye Parry, A.M.Inst.C.E., of Dame-street, Dublin, has been associated in the practical features of the system. The Northallerton District Council do not intend to apply for a loan for the purpose of erecting the works. They intend to strike a special rate for one or two years, and to pay for the whole of the cost of the installation, including works and plant within this period. The very inexpensive character of the tanks, buildings, and machinery required for the oxygen system render this method of payment practicable. The works have been designed by Mr. W. Kaye Parry, and they will be carried out under his supervision.

ROCHDALE.—The formal opening of the new precipitating tanks and sludge-pressing plant, constructed for the corporation at Roach Mills, took place the other day. The sewage of the borough is discharged on to the farm by two outfalls, the principal one being for the Roach Valley and its tributaries above this point, and the minor one for the Sudden Valley. When the whole of the sewers tributary to these outfalls are completed, the estimated dry-weather flow will be respectively 1,800,000 gallons and 500,000 gallons per 24 hours. The sewage from the Sudden outfall has, since October, 1890, been dealt with in three precipitation tanks having a total capacity of 300,000 gallons, and in order to deal with an increased volume in the future, an additional tank of 100,000 gallons capacity is about to be erected. Since June, 1888, the sewage from the Roach outfall has been dealt with on the areas laid out for intermittent filtration without previous treatment in tanks; but the volume has so increased, that the corporation have recently acquired an additional area of land, 11½ acres in extent, for filtration purposes. The works inaugurated on Thursday week are the precipitation-tanks and plant for dealing with abstracted solid matter. The tanks consist of two roughing-tanks, each of 105,000 gallons' capacity, and six precipitation-tanks, each of 200,000 gallons. The sewage first passes through a detritus catch pit, thence through a fine screen, and next receives the precipitating medium (which consists for the present of Spence's aluminio-ferric), and is immediately subjected to agitation by mixers. From this point the sewage passes through the roughing-tanks, and thence into the precipitation-tanks. It is intended to work the tanks on the system of continuous flow; and during storm-flow the tanks can be worked in two or more sets. The tanks have also been designed for adaptation at any future date to the quiescent system of precipitation in conjunction with purification by artificial filters. The clarified sewage on leaving the tanks passes to a regulating chamber, from whence it is distributed on to the filtration areas. After all clear water is drawn off, the remaining sludge passes by gravitation into a channel common to all the tanks, and thence is raised into an elevated sludge tank. Here, after settlement, it is further drained, and passed into a mixer, where slaked Buxton lime is added, and pressed into cake. The whole of the work has been carried out from plans prepared by Mr. S. S. Platt, the borough surveyor, and under his direction. The consulting engineers for the electric-lighting plant were Messrs. Peers and Co., of Manchester. The excavation, drainage, stonework, concreting, road-making, boundary walls, and laying of pipes has been executed by corporation workmen, under Mr. Joseph Thorley, clerk of works; and the contractors are as follow:—Labour for brickwork in tanks and buildings, Messrs. Cropper and Howarth, of Rochdale; valves and penstocks, Messrs. J. Blakeborough and Sons,

Brighouse; sludge-pressing plant, Messrs. Goddard, Massey, and Warner, Nottingham; boiler, Messrs. J. and W. Barlow, Rochdale; electric-lighting plant, Messrs. Simpson Brothers, Hapton, Burnley; Shone's ejector and mains, Messrs. Hughes and Lancaster, Raubon; iron pipes, Stanton Iron Works Company, near Nottingham, and Staveley Iron Works Company, Staveley, near Chesterfield; iron-founder for buildings, Mr. E. Wood, Manchester; carpenter, Mr. T. Wilkinson, Rochdale; slater, Mr. Robert Woolfeuden, Rochdale; plumber, Mr. J. Tonge, Rochdale.

SHEFFIELD WATER SUPPLY.—A voluminous report of the water committee came before the Sheffield City Council at their meeting on Wednesday week for consideration. Mr. Eaton, the engineer of the waterworks, who has been in receipt of a salary of £1,200 per annum, having intimated his desire to retire that he might commence practice at Westminster, the committee recommended that he be retained as consulting engineer for the existing works at a retainer of £250 per year, and as engineer in chief to the works about to be commenced at a commission of 4 per cent. on the engineering cost of such works. The committee further recommended that Mr. W. Terrey, the manager of the water department, be appointed general manager, with a salary increased from £600 to £800 per year; and that Mr. L. S. Marsh, the present resident engineer, be promoted engineer to the department, with a salary increased from £450 to £600 per year. It is necessary to proceed with very extensive works under the Act of 1896 as early as possible, both in order to fulfil the engagements of Sheffield to Rotherham and Doncaster, and also in the interests of Sheffield itself. The works first to be proceeded with will be the railway from Stocksbridge to Langsett, the Langsett reservoir and necessary works, and the pipe lines from Langsett to Rotherham and Thrybergh. The committee advised that steps be taken at once to acquire the necessary lands and easements.

The Liverpool Corporation will purchase for addition to their permanent collection in the Walker Art Gallery an Oriental subject by Talbot Kelly, R.B.A., entitled "The Pursuit," hung in the current Autumn Exhibition in that city.

The new sewage disposal works at Wellingborough are now practically complete, and the new pumping machinery has been formally set in motion. The cost of the farm (259 acres) was £18,000, and the contract for the engineering work was £9,100, this having been carried out by Messrs. Siddons and Freeman, of Oundle. The engineer to the urban council was Mr. Geo. Hodson, M.Inst.C.E., of Loughborough.

A high school which has been established at Duns by Berwickshire County Council, was formally opened on Tuesday. The premises, formerly a villa residence, in Newtown-street, have been purchased and fitted up at a total cost of upwards of £2,500, after designs by Mr. R. A. Brydeu, architect, Glasgow. On the ground floor are two classrooms, each fitted up for 40 pupils, and on the second floor a drawing classroom, to accommodate 20 pupils, and a chemistry room, with benches and apparatus for ten students.

At a meeting of the Strand District Board of Works, on Wednesday night, Mr. Walter Emden (chairman) presiding, a long discussion took place on an application from the treasurer of the Middle Temple, on the subject of constructing a subway or underground passage between the Temple and the Royal Courts of Justice. Mr. Harris, in moving the adoption of the report of the works committee, which recommended that the proposed subway be not made or allowed, said that in 1882 a similar application had been made, and at that time the board decided to grant it subject to certain conditions. No response was made at the time, and the subject had been allowed to drop for 14 years. Mr. Gamble proposed that the application be granted; but the majority of the board voted in favour of the recommendation of the committee that the application be not entertained.

The great lock on the Sault Ste. Marie Canal, which connects the American lakes, has been opened. It is one of the largest works of its kind in the world, and has taken seven years to construct. It is 800ft. long between the gates, and 1,100ft. over all, 43ft. high, 100ft. wide, and will accommodate boats drawing 21ft. of water. Its giant centrifugal pumps, driven by compound Westinghouse engines, can fill the lock in 13 minutes, and empty it in eight minutes.

A company has been formed for taking over from the Brussels municipality that portion of the river Rupel comprised between the Pout Léopold and the town of Rupel, with its dependencies, and turning it into a ship canal; making a seaport, with all its accessories, including docks, quays, lifts, and cranes, and working the above as well as the present basins belonging to the Brussels municipality. The capital (£1,343,200) has been subscribed.

Our Office Table.

THE 39th annual report of the trustees of the National Portrait Gallery refers with satisfaction to the opening in April last of the new buildings in Charing Cross-road. The list of 564 donations, bequests, or loans, as given in former reports, has been brought up to 609. In December, 1895, Mr. G. F. Watts, R.A., offered to the Director to transfer at once to the new National Portrait Gallery any portraits from his collection which the trustees might think suitable. The following 17 portraits were selected by the director, and at once handed over by Mr. Watts to the trustees as a gift to the nation:—Matthew Arnold, Robert Browning, Thomas Carlyle, Sir Andrew Clark, M.D., Sir Charles Hallé, the first Lord Lawrence, Sir A. H. Layard, the first Earl of Lytton, Cardinal Manning, John Stuart Mill, Sir Anthony Panizzi, Dante Gabriel Rossetti, the Earl of Shaftesbury, Viscount Sherbrooke, Sir Henry Taylor, Lord Tennyson, and Thomas Wright (the Prisoner's Friend). The further donations include portraits of William Gifford, Sir Edwin Landseer, R.A., Charles and Mary Lamb, Ford Madox Brown, Cardinal Newman, Dr. Darwin, Lord Palmerston, Robert Louis Stevenson, Sir W. J. Hooker, Carlo Marchetti, R.A., Dr. Lardner, Dr. Livingstone, Rev. F. D. Maurice, Rev. John Keble, Samuel Rogers, and Lord Leighton (painted and presented by Mr. G. F. Watts, R.A.). The purchases have been increased by seven, which include a series of 47 small copies in water colours of Speakers of the House of Commons, Samuel Richardson (the author of "Clarissa Harlowe"), the busts of Colley Cibber and Mrs. Hemans, and portrait of Lord Byron. The rearrangement of the whole collection of portraits in painting and sculpture has been completed, the classification being, as far as possible, chronological. The actual number of pictures on the walls of the National Portrait Gallery is 905, that of works in sculpture 116, and miscellaneous portraits exhibited in cases 29, making a total of 1,050 portraits exhibited. The trustees point out that the available space is almost entirely filled, and that an extension of the building is inevitable in the future, the only possible site being the land to the west, now occupied by the barracks.

THE Local Government Board have issued circulars to the local authorities calling attention to the provisions of various Acts of Parliament passed in the last session. One of them includes copies of a Memorandum on the subject of the Light Railways Act, setting forth the powers conferred on county councils by this Act. The Local Government (Determination of Differences) Act provides that certain differences arising under a Section of the Act of 1888 between a County Council and a District Council with reference to the maintenance and other matters connected with a main road, may be referred to, and determined by, arbitration of the Local Government Board. The later Act amends the preceding one by providing that the Board may decide any such difference, either as arbitrators or otherwise, at their option.

THE Working Men's College reopens on Saturday, 26th inst., with a meeting, to which the public are invited. Their programme seems fuller than usual, and among the classes and lectures are included courses by Mr. Tom Mann on "Social Problems," and by Mr. T. F. Hobson on the "History of London." It is to be noted that this institution has so arranged its programme as to indicate a complete course of instruction, so that anyone who has received even a merely elementary training may, by steady but not inordinate application, obtain an educational position which will enable him to pass the London matriculation examination, and thus place him on the high road for a University degree. In this way the institution seeks to justify its name of college. The list of Saturday popular lectures, through which the college is so well known, does not seem to be as yet complete, but among those who have promised to lecture in the course of the coming winter are Sir E. Maunde Thompson, Dr. Richard Garnett, Sir Hugh Low, Sir Alfred Lyall, Sir G. Baden-Powell, Sir Howard Vincent, Professor Hales, and Dr. Tom Robinson.

THE South-West London Polytechnic Institute, Chelsea, was only opened last October, and already some 1,400 students have availed themselves of its advantages. The work hitherto has been mainly in the evening, but on Tuesday week,

Sept. 29, the Institute will be opened to day students in architecture and building construction, mathematics, mechanics, mechanism, drawing, office-work, workshops, electrical technology, physics, physical and electrical laboratories, chemistry, chemical laboratory, and applied art. The hours will be from 10 a.m. to 1 p.m., and from 2 p.m. to 5 p.m., on each working day except Saturday, when the hours will be from 10 a.m. to 1 p.m. The student may, for a moderate fee, go through a complete course of electrical engineering, mechanical engineering, architecture, technical chemistry, applied art, and colonial training in two years, provided he can devote his whole time in the day to the work. If he cannot devote his whole time in the day to the work, the classes are so arranged that he may nevertheless go through a precisely similar course in three, four, or more years; and as similar courses are provided in the evening, the opportunity is afforded him of shortening the period by attending evening as well as day classes.

THE Newcastle-on-Tyne Town Improvement Committee have passed plans for important building extensions in the Jesmond district. The improvements are embraced in two distinct schemes, and there is no doubt that both will be carried out. The first site is land now vacant near Manor House-road and Grosvenor-road, close to Jesmond Dene, and here from 100 to 150 houses in flats will be built. The flats, however, will be of a superior class, with three rooms downstairs and seven upstairs, counting the attics, and there will be baths in all the flats. The rents will be about 8s. per week for the downstairs flat, and 10s. per week for the upstairs rooms. The other scheme is on a larger scale. The site is on some of the land reaching from the North-road to St. George's-terrace, commencing close to St. Andrew's Cemetery, and taking in the fields up to the North-road to beyond the railway bridge. Streets are to be laid out, and already the plans for seven thoroughfares, with about 450 houses, have been passed; but when the work is fully completed there will be about 1,000 houses and shops. A large number of the houses will be in flats, with four rooms downstairs and five upstairs, and bay windows to each. It is expected that each flat will bring £20 per year and rates. Some of the houses, however, will be large and self-contained, and it is intended that those immediately facing the Moor shall be of that character.

As requested by the Secretary for Scotland, the Sheriff of the Lothians and Peebles held an inquiry in the Sheriff Court-house, Edinburgh, on Wednesday, with reference to the scheme proposed by the North British Railway Company for providing houses for the labouring class, in lieu of the labouring-class houses removed for the enlargement and improvement of the Waverley Station. The company propose to erect ten tenements of houses at Pleasance, about a quarter of a mile from New-street. The situation is considerably more elevated, better ventilated, and healthier than New-street, Macdowal-street, and North Back of Canongate, and more convenient for the working classes, being nearer to a number of important public works. The site has been occupied by a large cart-yard, by another large joiner's yard and workshops, and by a laundry. The number of new houses proposed to be erected is 120, as follows:—Houses of two apartments fronting St. John's-hill, 48; houses of two apartments fronting Pleasance, 26; houses of one apartment fronting internal courtyard with access from St. John's Hill, 44; houses of one apartment in Pleasance, two. All the one-roomed houses are fitted for two beds. All the houses have pantries, coal-closets, and w.c.'s, except in the case of the one-roomed houses, which have a w.c. common to two houses. There are six common bathrooms provided for the houses, and 18 common washhouses, with fixed earthenware tubs and clothes-boilers.

An exhibition of metal-work is to be held under the auspices of the Glasgow Institute of Architects from the 12th of October till the end of that month. The exhibits will include cast and wrought-iron, brass and copper-work, ormolu, lead, silver, or other metals capable of decorative treatment. Contributions of old examples are invited, as well as the best class of modern work. Drawing and photographs of metal-work will be included. All articles intended for exhibition must be delivered at 187, Pitt-street, Glasgow, on Thursday, Friday, or Saturday, the 1st, 2nd, and 3rd of October. Each article should have

securely attached to it a label with the exhibitor's name and address, the name or a short description of the article, the date and country where produced if the article is old, or the names of the designer and maker if it is modern. The convener of committee should also be advised by letter containing a duplicate of the description of all articles sent. The price of articles for sale may also be marked on the label. The committee and the institute do not take charge of sales, and no commission will be charged on sales effected by means of the exhibition. No work sold can be removed until the close of the exhibition. As the space is limited, no large exhibits can be received.

THE opinion pretty largely prevails that the supply of landed estate in the market during the autumn will be above the average. The frequency of late of sales by private treaty after the property has been offered at auction has, no doubt, tended to increased activity on the part of those landowners who wish to reduce their acres. Towards the end of the present month the Earl of Ancaster, who has already disposed of Gwydyr Castle, his seat in the Vale of Conway, to Earl Carrington, intends to sell a large outlying portion of the estate, and early in October nearly 1,000 acres of the Combermere estate in Cheshire and Salop will also be put up for sale. In the south, Viscount Ebrington has announced his intention of disposing of a big slice of his South Devon estate, while portions of the Membrand and Flete estates, also in Devonshire, will be brought to the hammer. It is significant that almost in every case the property will be offered for sale in lots, arranged as far as possible so as to give the tenants an opportunity of acquiring the freehold of their holdings.

THE design of steel skeleton structures is a subject that has provoked some discussion in American professional papers as to the earlier instances or suggestions of this kind of structure. Several architects and engineers claim to have been the first to have thought of the thin wall stiffened by a skeleton construction, according to the correspondence in the *Engineering Record*. It seems rather late in the day for anyone of the present generation to lay claim to the idea, when skeleton structures of timber and iron for factory-sheds, exhibitions, drill-halls, railway stations, and other purposes have been known for many years. During the annual shows of a few years ago, many of our exhibition buildings, like those at South Kensington, Earl's Court, &c., were practically constructed on the skeleton system, the walls being filled in with brick or timber. The Crystal Palace is a huge skeleton of iron filled in with glass, and planned on a multiple system of rectangles or parallelepipeds of certain ratios; and the Olympia, Agricultural Hall, Islington, are other examples.

ARCHITECTS and others, hopeless of better architecture in connection with our disunited and behind-the-age railway system, should help forward the movement that is being initiated for the Nationalisation of the Railways. A scheme advocated by the *Echo*, the *Weekly Times* and *Echo*, and a number of other newspapers and leading politicians of all sections, has for its object the transfer of the railways to the control of the State by a plan which will not rob a single shareholder nor require a single penny of additional taxation, but which will secure a greatly improved service all over the country at lower rates and with greater profit. A conference will be held shortly to arrange for a great public meeting in London, and anyone disposed to help should communicate with Mr. W. H. Mead, the secretary of the Railway Nationalisation League, 47, Victoria-street, Westminster, S.W. In every quarter in which it has been propounded the plan advocated is being received with enthusiasm.

LEEDS has long been known for the large quantity of freehold property it contained within its borders, but a new departure, so far as the city corporation is concerned, is now proposed, and that body is to be asked to grant powers to dispose of surplus lands on building leases. It is thought that in central situations, where the land is likely to increase in value, this would enable the corporation to reap the benefit in the interest of the ratepayers. The question has been considered by a committee, who after taking counsel with the town clerk have reported to the city council as follows:—"That it is desirable, under certain circumstances, chiefly in central situations, to dispose of surplus lands by way of building leases,

and the committee recommend the council to empower the committee having charge of the sale of surplus properties to decide all such cases upon their merits."

A STEEL tower, which will be 1,150ft. high, is in process of construction in Chicago. The plan of the structure, which is to be occupied by restaurants, barbers' shops, dance-halls, a bicycle rink, a theatre, and so on, closely resembles that of the Eiffel Tower in Paris. The base occupies an area about 325ft. square, with four arches 200ft. in span, and 200ft. high. Above the arches is a platform, with an open floor area of 90,000sq. ft., which will accommodate an assemblage of 22,000 persons. The next landing is 450ft. above the ground, and is 150ft. square. Above this is a succession of landings, of course diminishing in size to the top platform, which is 25ft. square. Thirty-four elevators are to convey passengers to various parts of the building, while stairs are provided for those who prefer to use their own muscles to transport them. Steel construction is very cheap now in the United States, and it is expected that the tower can be completed for about £160,000 sterling, while the Eiffel Tower, which is 166ft. less in height, cost half as much again. The structure is to be ready for use by next summer.

THE Antwerp correspondent of the *Liverpool Journal of Commerce* says:—"The freights for the conveyance of Belgian cement to South Africa having been considerably reduced, mainly owing to the reports of the Belgian Consul-General, there has been a corresponding advance in the import of that article into that country. The consequence is that it is driving English and German cements entirely out of the South African markets, a result which is stated to be equally due to the far superior quality and lower price of the Belgian product."

In his annual report to the Chelsea Vestry Mr. T. W. E. Higgins, their surveyor, mentions that of the 38 miles of public streets in the parish 24½ miles of carriageways are now laid with broken granite, nearly four miles with wood blocks, and one and a quarter miles with asphalt, adding: "Asphalt is undoubtedly the healthiest form of paving, and its only objection is that it is slippery for horses when slightly damp. A suggestion for paving part of the carriageway of Kilburn-lane with compressed asphalt blocks has been under consideration. The result of the experiment will be watched with much interest."

CHIPS.

The Bishop of Southwell reopened, on Tuesday, the parish church of Syerston, near Newark, which has recently undergone restoration at a cost of £1,000.

At Colombo, Ceylon, a new General Post Office has been built at a cost of £37,500 sterling. The preparation of the plans and the overseeing of the construction were intrusted to Mr. H. F. Tomalin, A.R.I.B.A., of Colombo, who unfortunately met with an accident, involving the loss of an eye, during the progress of the work. The building is lighted throughout by electricity.

Mrs. Heycock, of Leamington, has placed a stained-glass window in the tower of Seaton Church, near Stamford, in memory of her husband, for many years rector here and patron of the living. It represents the Angels appearing to the Shepherds to announce the Nativity of Christ. The window is by Messrs. Heaton, Butler, and Bayne, of Covent Garden, London.

At a meeting on Friday of the Main Roads Committee of the Lancashire County Council, Mr. Joseph Slater, Manchester, was appointed surveyor for the Salford district. There were originally 150 applicants from all parts of the country, and this number was reduced to six by the committee. Mr. Slater will commence his duties at a salary of £200 a year.

A new school for girls and infants has been erected by St. Andrew's Roman Catholic congregation in Brooke-street, Dumfries. It is a two-story building, and possesses accommodation for 500 pupils.

The Horbury District Council were informed on Friday that it would be necessary to raise an additional rate of 8d. in the £, this being mainly due to expense in resisting the claim of London contractors in connection with the recent drainage works. The firm had claimed £2,400, and the Council had offered £1,125 to settle the matter, but when the matter went to arbitration only £1,053 was awarded. The arbitrator, however, ordered the Council to pay part of the contractors' costs, and altogether the Council was put to an expense of £1,400.

Trade News.

WAGES MOVEMENTS.

LEEDS.—The strike in the building trades has now reached its twenty-first week, and no change for the better is to be reported. The men on strike have received each week from 10s. to 15s. each. Throughout the present week pickets have been parading the streets with a view to inducing the non-union men, who have been engaged from other towns, to leave off work; but no further disturbances have taken place, the police being well in evidence at the various building operations in progress. The non-union bricklayers are receiving 8½d. per hour and lodgings, and the labourers 6d. an hour and lodgings. Funds for the strikers continue to come in freely, both from trade unions and other sources.

PORTSMOUTH.—The strike in the Portsmouth building trades, which commenced on May 1, finally collapsed on Saturday. The painters at a general meeting decided to withdraw their notices for ½d. an hour increase, and to return to work at the old rate of wages. This ends the protracted dispute, the carpenters having given way three weeks ago.

NOTTINGHAM.—A serious condition of affairs has arisen with regard to the local building trade. Seven weeks ago the plumbers of the town struck for an advance of wages and a modification of the working hours, and this dispute is still unsettled. Last week the mayor intervened, with the hope of arranging a compromise. He invited representatives of both masters and men to meet him; but the conference proved futile, and now a general lock-out in the entire building trade is threatened, the master builders having decided that unless the plumbers' strike is speedily settled they will lock out the whole of their workmen. This decision affects about 5,000 men. The building trade has not for many years been as brisk in the town as it is at present. The extension of the Manchester, Sheffield, and Lincolnshire Railway has necessitated the demolition of a great deal of property, and the consequent erection of other buildings, and there are also other extensive operations going on.

WATFORD.—The carpenters and joiners of this town have applied this week for an advance in wages of 1d. per hour.

CHIPS.

The Manchester Corporation adopted the report and scheme prepared by Mr. T. de Conroy Meade, their surveyor, for the removal of the effluent sewage from their works at Davyhulme to the estuary of the Mersey. The scheme involves the construction of a conduit, over 15 miles in length, and with a discharging capacity of 70,000 gallons a day. The cost is estimated at £258,000, and it is claimed that it will solve the Manchester sewage problem once for all.

The Sheffield Corporation are reviving a proposal of four years ago to extend the boundaries of the city, so as to include several districts which are already practically parts of the city. The corporation will seek to include Hillsborough, on the north-west border, and also a large portion of Norton, on the south, which is situated in Derbyshire. The addition to Sheffield's population by the carrying out of the scheme would be from 20,000 to 30,000.

Mr. Henry Knight, Director of Parks and Gardens to the King of the Belgians, has died. The deceased was at one time employed at Dalkeith Palace Gardens, and afterwards was head gardener to the Duke of Roxburghe at Kelso. The late Mr. W. H. Smith chose him as his head gardener, from which situation he was appointed by the King of the Belgians.

The new corporation depot stables at Gloucester, which have cost nearly £6,000, were opened on Tuesday afternoon.

Plans of 21 new buildings, principally dwelling-houses, of the total estimated value of £17,454, were sanctioned on Friday by the plans committee of Aberdeen Town Council.

The new docks at Cuxhaven will be shortly opened for business. The works, which have been carried out, were commenced in 1890. They have involved an outlay of £350,000. The depth of water afforded by the port is about 26ft. The entrance is 330ft. wide; it is formed by two moles 400ft. in length. The construction of a dry dock is in contemplation.

Mr. W. A. Ducat, Local Government Board Inspector, held an inquiry at Ilkley on Friday into an application of the Ilkley District Council for sanction to borrow £6,270, for the purchase of a site of 4,150 square yards opposite the station for a town hall and public offices. Subsequently an inquiry was held in regard to further applications of the council to borrow £900 for their gas undertaking, £500 for works of sewerage, and £300 for laying out and planting pleasure-gardens.

We understand that the Plastic Decoration and Papier Mâché Company, Wellington-street, Straud, London, have been entrusted with the carrying out of the ornamental fibrous-plaster work to the New Empire Theatre, Glasgow, from Mr. Frank Matcham's designs. This, we are informed, will be, when completed, one of the finest theatres in the kingdom, the proposed treatment being of a very elaborate character.

At the Worcester County Police Court last week George Haynes, builder, Bath-road, was summoned under the by-law of the Martley District Council for erecting a foundation wall to a building on the Vernon Park estate, St. John's, of only 9in. thickness instead of 13in. The magistrates imposed a fine of £5 and costs.

The preservation of the remains of the famous wall of Antoninus, between the Firths of Clyde and Forth, built A.D. 140, has been occupying the attention of the National Trust for Places of Historic Interest or Natural Beauty. There is reason to believe that the landlords along the line of the wall will co-operate in the work of preservation.

The infants' school, Isleworth, is being warmed and ventilated by means of Shorland's patent Manchester grates, the same being supplied by Messrs. E. H. Shorland and Brother, of Manchester.

Mr. Robert G. Nicol was appointed on Monday harbour engineer at Aberdeen, at a salary of £500 per annum. Mr. Nicol has been interim engineer for a year.

The Great Western Railway Company has under consideration a project for shortening the route to the Midlands. The present route *via* Didcot is very circuitous, and it is proposed to construct a new line from Southall to Oxford, which would place the company on practically equal terms with the London and North-Western Railway Company in regard to traffic to and from Leamington, Birmingham, and other Midland towns. The country presents no great engineering difficulties, and the project is so far advanced that a Bill authorising the construction of the line will be introduced into Parliament next session.

A scheme is projected for the construction of a double line of tramway seven miles in length from Southport to Lytham across the Ribbles. The plans have been drawn by Mr. S. Speddy, of Hampton-road, Southport. It is proposed to build the tram on wooden piles and ironwork across the Salters' Bank, and the motive power would be electricity. It is also proposed to construct a 30ft. carriageway in addition to sidewalks. In order to not interfere with the navigation of the Ribble, it is proposed to have a bridge across the channel which would be raised on the approach of a vessel. Theatres, pavilions, ballrooms, &c., are proposed to be placed at each end of the tramway.

The Central London Railway is now fairly in hand. At the sites of nearly all its 14 stations excavations are being made, and at one or two of them that work has been carried down to the line level. From all these points the tunnelling will be carried on, and it is hoped that by about this time next year both tunnels may be finished. That, of course, does not imply the completion of the work, which will probably require almost another twelve-month after that to finish.

Ground has been broken for the new university library of Princeton, N.J. The building will cover about 200ft. by 180ft., and will cover all the ground now occupied by the old chapel. It will be almost square, with a large court in the centre, will be four stories high, and will cost £120,000. Mr. Henry M. Potter, of New York City, is the architect, and the style is to be Gothic.

The aggregate of sales at the Auction Mart last week was £7,205, the lowest recorded for any business week this year. Sales were held on four days, but on two of them nothing whatever was done, and on another one small lot only was disposed of for £410.

The Crystal Palace Company have removed their old cinder cycle track, and in substitution have provided a new cement track, designed to meet all the present-day requirements. It surrounds the northern section of the sports arena. It has been designed and constructed by Mr. H. Woodham, the constructor of the track at Catford. It measures three laps to the mile, and is banked to 8ft. It is 25ft. in width at the northern rounded bend, and 27ft. at the southern or home curve, and widens to 30ft. in the 130 yards' straight. The base of the track is formed of cement concrete, faced with a composition of Mr. Woodham's invention. The banking is on timber trestles, on which the cement is laid.

The foundation-stone of a mission church of St. John the Evangelist, now in course of erection at Greengate, Staincross, in the parish of Darton, was laid on Tuesday. The new church is to accommodate 280 persons, and, exclusive of site, will cost about £1,100.

A new Masonic hall in Tower-street, Portobello, N.B., built from designs by Brother P. L. Henderson, was formally opened by Sir Charles Dalrymple, M.P., on Monday.

The Duke of Norfolk entertained on Tuesday night some 300 men engaged in the restoration of Arundel Castle at supper, in the private grounds of the Castle. The Duke said he considered the restored castle one of the finest ancient and historic buildings in the country. Mr. Kett, of Messrs. Rattee and Kett, of Cambridge, the contractors, said, although he had been engaged in the colonies and in various parts of the country for the past 45 years, he looked upon the Arundel Castle restoration as the grandest work of his life.

The Duke of Westminster will open, on Oct. 9, the Agricultural and Horticultural School established by the Cheshire County Council at Holmes Chapel, near Crewe.

The Glasgow Corporation have agreed to purchase from the Glasgow Tramway and Omnibus Company the lease of the Govan and Ibrox tramways, their horses, cars, and depot, for £7,500.

A receiving order has been granted in the case of Jennings Brothers, of Sprules-road, Brockley, S.E., and Ramsgate, builders.

The internal decorations at St. George's Hall, Liverpool, executed twenty years ago, have, within the last few weeks, been renewed, in anticipation of the meetings this week of the British Association, by Messrs. Alexander White and Sons, of Duke-street, under the supervision of Mr. F. T. Turton, the deputy city surveyor. Electric light has been installed throughout the building, a thousand globes having been placed in the ten chandeliers of the great hall.

Mr. W. A. Ducat, an inspector for the Local Government Board, held an inquiry at Ossett, on Thursday in last week, as to an application from the town council for sanction to borrow £11,000 for erecting a town hall in Bank-street. Great opposition was offered to the scheme on the ground that a site in the Market-place ought to have been selected. Mr. George Arthur Fox, the Mayor of Dewsbury (of the firm of Messrs. Holton and Fox), who had prepared the designs for the proposed town hall for Ossett, produced and explained the plans. The buildings will comprise municipal offices, borough court, a hall to seat 1,200 persons, and also stabling at the rear. Tenders have been obtained for the execution at a cost which, allowing £1,500 for furnishing, will bring the whole within the estimates. Evidence in favour of the Market-place site was given by Mr. W. Watson, architect, Wakefield.

St. Roman's Well, near Innerleithen, made famous by Sir Walter Scott, and long ago a popular resort with invalids, was reopened on Friday by a limited liability company, who have leased the property. The company has expended a sum of about £2,300 in erecting a pump-room on the southern slope of the Caer Lee Hill, and in repairing outlets of the springs and beautifying the grounds, which extend to about an acre and a quarter. In addition to the pump-room, which is situated on the verandah, the buildings include reception rooms for ladies and gentlemen, baths, lavatories, and a bottling factory. Mr. Adam Watt was the contractor.

The new railway station at Knot Mill, Manchester, being now well advanced towards completion, was brought into partial use on Monday. The platforms have been partially roofed with steel and glazed, and raised, widened, and lengthened on the Deansgate side, where the bridge has also been widened by steel girders to the extent of 80ft. The buildings have been erected from designs by the joint engineers of the London and North-Western and Manchester, Sheffield, and Lincolnshire Railway Companies (Messrs. Fraucis Stevenson and Alexander Ross), and the contractors for the work are Messrs. R. Neill and Sons.

The town council of Gainsborough adopted at their last meeting plans for a new reservoir, water tower, and rising main, and decided to apply to the Local Government Board for sanction to borrow £5,000 to carry out the works.

At Norwich, the new Roman Catholic Schools have been opened. The Roman Catholic Church of the Holy Apostles, Willow-lane, which has been closed since the opening of Mr. John Oldrid Scott's new church dedicated to St. John the Baptist, has undergone a complete transformation, having been converted into an elementary school for children. The necessary alterations have been carried out by Mr. Burton from plans by Mr. C. Brown, architect to the Norwich School Board. Accommodation has been provided for 700 children, for whom three separate entrances to the schools have been made. The former makes a lofty central hall for the general assembly of the children. Eight classrooms, together with cloakrooms and lavatories, have been added to the original structure, and two open and covered playgrounds have been provided.

LIST OF COMPETITIONS OPEN.

Newport, Shropshire—Agricultural School	£45, £25, £10	C. R. Liddle, Solicitor to Adams' Charity, Newport, Salop	Sept. 25
Farnham—School Infirmary		E. Kempson, Clerk to Managers, 121, West-street, Farnham	Oct. 13
Gorton—Laying Out Cemetery	30gs.	R. T. Holland, Clerk, Town Hall, Gorton	" 21
Belfast—New City Hall (Assessors, A. Waterhouse, R.A., and J. C. Bretland)	£300 divided	S. Black, Clerk to Corporation, Belfast	" 25
Poplar—Coroner's Court, Mortuary	£30, £20	W. H. Farnfield, Clerk, 117, High-street, Poplar	" 26
Malmö, Sweden—New Gasworks	3,000, 2,000, & 1,500 Swedish crowns	Corporation Gas Works Offices, Malmö, Sweden	Nov. 1
Bootle—North Board School for 1,000 children (local architects only)	No premium	F. K. Wilson, Clerk, Balliol-road, Bootle	" 11
Newport, Mon.—Hospital (£16,000 limit of cost)	£100, £50.	J. K. Stone, Secy., 39, High-street, Newport	Dec. 1
Rhos-on-Sea, Colwyn Bay—Laying-out Building Estate	£100, £30, £10	J. F. Kent, Rhos Abbey, North Wales	" 5
St. Gilles, near Brussels—Town Hall (£42,000 limit of cost)	£160 and two lesser premiums.	Communal Authority, St. Gilles, Belgium	Feb. 1
Sunderland Corporation—Artisans' Dwellings	£50, £30, £20	Town Clerk, Sunderland	"
Kirriemuir, N.B., Parish Church Hall			"
Kesteven District Lunatic Asylum (C. H. Howell, Assessor)			"

LIST OF TENDERS OPEN.

BUILDINGS.

Highgate and Hornsey, N.—Stables, Stores, and Sheds	Hornsey Urban District Council	E. J. Lovegrove, Engineer, Council Offices, Highgate, N.	Sept. 21
Wakefield—West Riding Asylum and Men's Hospital extension	West Riding County Council	J. Vickers Edwards, County Surveyor, Wakefield	" 21
Blackpool—Waterworks Offices, Hull-street	Fylde Waterworks Co.	E. S. Garlick, Engineer, 33, Winckley-square, Preston	" 21
Cork—15 Cottages at the Glen	W. J. Goulding, D.L.	Robt. Walker, M.S.A., 17, South Mall, Cork	" 21
Dublin—Two Shops and Houses	H. Doyle	Hugh Doyle, Rehoboth-place, South Circular-road, Dublin	" 21
Salisbury—Additions to Assize Courts	Corporation	J. C. Bothams, City Surveyor, Endless-street, Salisbury	" 21
Willenhall—Board School Enlargement	School Board	J. P. Baker, Architect, 33, Market-place, Willenhall	" 21
Darlington—Works in Haughton-road	Ord and Maddison	G. Dickinson and Son, Architects, 5, Houndgate, Darlington	" 21
Macroom—Church Restoration		A. W. Barnard, Macroom Rectory	" 21
Buckland Monachorum—Enlargement, School	Schools Committee	J. H. Symons, Buckland Monachorum	" 21
Hereford—Isolation Wards at Infirmary	Committee	Nicholson and Hartree, Architects, Hereford	" 22
Acton—Additions to Council's Offices	Urban District Council	D. J. Ebbetts, Surveyor, 242, Hight-street, Acton	" 22
Kilmacthomas—Additions to Workhouse	Board of Guardians	W. Hunt, Clerk, Kilmacthomas, Ireland	" 22
Herne Bay—Pair of Houses		T. E. Howell, Hill Side, Herne Bay	" 22
Barnsley—Three Houses		H. Crawshaw, Architect, 13, Regent-street, Barnsley	" 22
Queenstown, co. Cork—Custom House	Public Works Department	Public Works Offices, Cork	" 23
Bramley, Leeds—Eight Cottages and Shop		J. P. Kaye, 34, Prudential-buildings, Leeds	" 23
Wellingborough—Alterations, Fever Hospital	Urban District Council	E. Sharrman, Surveyor, Market-square, Wellingborough	" 23
Mitcham—Wards at Workhouse	Guardians of Holborn Union	C. E. Vaughan, Architect, 25, Lowther-arcade, Strand, W.C.	" 23
Hampstead—Finchley-road Baths	Hampstead Vestry	A. P. Johnson, Vestry Clerk, Hampstead	" 24
Shoeburyness—Additions to Board School	South Shoebury School Board	Burris and Harris, Architects, Southend	" 24
Cargyreevy Church—Pulpit		Rev. S. Murray, Cargyreevy, Ireland	" 24
Belfast—York-road Presbyterian Church	Building Committee	Rev. J. Knowles, A.B., Belfast	" 24
Dorchester—Two Semi-Detached Houses		J. Feacy, South Walk, Dorchester	" 24
East Hull—Baths	Corporation	A. E. White, Borough Engineer, Town Hall, Hull	" 25
Tremadoc—Church Restoration	Committee	D. Breeze, Solicitor, Portmadoc	" 25
Bodmin—Storehouses at Cornwall Lunatic Asylum	Cornwall County Council	Robt. P. Edyevean, Clerk to Visitors, Bodmin	" 26
Dartford—Heating Fever Hospital	Joint Hospital Committee	J. C. Hayward, Clerk, Sessions House, Dartford	" 26
Horsham—Offices	Messrs. Snell and Luckin	G. H. Barstow, Architect, Horsham	" 26
Coventry—Police Offices and Magistrates' Court	Corporation	L. Beard, Town Clerk, Coventry	" 26
Dundalk—Railway Carriage Shed	Great Northern R. Co., Ireland	T. Morrison, Secretary, Amiens-street, Dublin	" 26
Ingleton, West Riding—Reading-room and Mothers' Institute	Committee	H. Ross, Architect, 15, Cannon-street, Accrington	" 26
Farringdon-street, E.C.—Underground Convenience	Commissioners of Sewers	H. Montague Bates, Guildhall, E.C.	" 29
Durham—Mortuary, County Hospital		C. H. Fowler, Architect, The College, Durham	" 29
Felling Shore—Board School Additions	Felling School Board	H. Miller, Architect, Felling, Co. Durham	" 29
Ipswich—Pair of Houses at Sewerage Pumping Station	Corporation	E. Buckham, Borough Surveyor, Ipswich	" 30
Cameron Bridge, N.B.—Distillery		C. C. Doig, Architect, Elgin	" 30
Llandudno—Police Cottages	Carnarvon County Council	J. H. B. Roberts, Clerk, Carnarvon	" 30
Aberystwith—Alterations to 40, Terrace-road	Messrs. Clapperton	—Peake, Bath-street, Aberystwith	Oct. 1
Windermere—Fever Hospital	Joint Urban District Councils	G. Gately, Clerk, Windermere	" 1
Bethnal Green, E.—Infirmary	Guardians	Giles, Gough, and Trollope, Archts., 23, Craven-st., Strand, W.C.	" 6
York—Show Yard	Yorkshire Agricultural Society	Marshall Stephenson, Blake-street, York	" 7
Caerw—Infant School Extension	Llanwono School Board	A. O. Evans, Architect, Post Office Chambers, Pontypridd	" 7
Reading—Station Sorting Office	H.M. Office of Works	Hon. R. B. Brett, Secretary, 12, Whitehall-Place, S.W.	" 7
Bromley, Kent—Houses in Gleebe-road		F. W. Stocker, Architect, 90-1, Queen-street, E.C.	" 8
Brighton—Additions to Town Hall	Corporation	F. J. Tillstone, Town Hall, Brighton	" 9
Stanningley—Four Houses and Shop		Ryeroft and Firth, Architects, Bank-buildings, Bradford	"
Bradford—House and Shop, Carlisle-road		F. Moore, Architect, 40, Sunbridge-road, Bradford	"
Stonehaven—Granite Villa		J. A. Souttar, Architect, 42, Union-street, Aberdeen	"
Keswick—Rebuilding Stabling, Duke of Wellington		A. D. Kaye, Architect, 4, Albion-place, Leeds	"
Exmouth—Wesleyan Chapel and Schools		W. J. Morley, Architect, 269, Swan-arcade, Bradford	"
Buttershaw, West Riding—Two Houses		Brayshaw and Dixon, Architects, Bowling Old-lane, Bradford	"
Belfast—Two Houses, University-avenue		J. G. Lindsay, Architect, 6, Chichester-street, Belfast	"
Oven-den, Yorks—Farmhouse		J. Robert Shaw and Son, Architects, 53, Tyrral-street, Bradford	"
Gateshead—Thirty Dwellings in Flats, Saltwell-lane		E. Bowman, 52, Westgate-road, Newcastle	"
Nuneaton—Galley Common National Schools	Committee	J. R. Veall and Son, Architects, Wolverhampton	"
Cardiff—Addition Halfway House Hotel	Brain and Co.	Jones, Richards, and Budgen, Architects, Cardiff	"
Sheerness—Conservative Club	Committee	Wm. J. Shearburn, Architect, Dorking	"

ENGINEERING.

Bermondsey—Tube Wells at Baths	Vestry	F. Ryall, Vestry Clerk, Spa-road, S.E.	Sept. 21
Finchley—Bridge Rebuilding	Middlesex County Council	F. H. Pownall, Co. Surveyor, Westminster	" 21
Willesden—Brent Sewerage Extension	Urban District Council	S. W. Ball, Clerk, Byne-road, Willesden	" 21
Craiova—Waterworks		The Mairie	" 21
Edinburgh—Electric Lighting, Hoist and Hoppers	Corporation	T. Hunter, Town Clerk, Edinburgh	" 22
Malden and Coombe—Sewerage	Urban District Council	W. H. Hope, Engineer	" 22
Edinburgh—Electric Wiring at Burgh Assessment Office	Corporation	T. Hunter, Town Clerk, Edinburgh	" 22
Stirling—Deepening Town and Abbey Fords	Forth Navigation Commissioners	T. H. Galbraith, Clerk, Stirling	" 23
Hythe, Southampton—Redecking Pier	Hythe Ferry Co.	D. Davy, Surveyor, Southampton	" 24
Dublin—20,000 Sleepers	Dublin, Wicklow, & Wexford Ry. Co.	E. M. Cowan, Secretary, Dublin	" 24
Kelty, Fifeshire—Waterworks	Dunfermline Com. Fifeshire C.C.	J. Ross, District Clerk, 147, High-street, Dunfermline, N.B.	" 24
Freswick—Pier	Caithness County Council	J. A. Cronin, Engineer, Wick	" 25
Freswick, Caithness—Rock Excavation and Pier Construction	I.W. County Council	W. H. Woodbridge, Clerk to Visitors, Newport	" 26
Whiteroot, I.W.—Asylum Farm Buildings	Corporation	J. Wolsterholme, Borough Engineer, Blackpool	" 26
Blackpool—Tramways	Joint Water Committee	A. C. Macintosh, Town Clerk, Pittenween, N.B.	" 28
Ovenstone, Pittenween—Reservoir	Official.	Herr Gier, Regierungen und Bauamt, Berlin	" 28
Berlin—Iron Bridge (1,800 tons)		E. L. Maryatt, Secretary, 237, Gresham House, E.C.	" 28
India—Railway Carriages, Vans, Girders, and Signals	Bengal and North Western R. Co.	D. M. Davies, 58, Water-street, N. Co.	" 29
Cilfrev—Two Bridges, and Footpath Construction	Blaenhouddan Parish Council	H. Montague Bates, Guildhall, E.C.	" 29
Farringdon-street, E.C.—Underground Convenience	Commissioners of Sewers	J. A. Kelman, Secretary, 251, Winchester House, E.C.	" 30
Nilgiri—Railway Waggon and Coaches	Nilgiri Railway Co.	T. R. Price, Acting Manager, Cape Town	" 30
Cape of Good Hope—Mossel Bay to Oudtshoorn Railway (75 miles)	Cape Government	F. W. Thomas, Secretary, Cambrone	" 30
Cambrone—Winding Engines at Dolcouth Mine	Directors	W. B. Myers-Beswick, Engineer, 31, Park-square, Leeds	Oct. 1
Hunslet, Leeds—Railway Works	Great Northern Railway Co.	D. W. Georgeson, Secretary, Wick	" 1
Wick—Harbour Improvement	Wick Harbour Trustees	J. Bond, Surveyor, Council Offices, Morecambe-st., Morecambe	" 5
Morecambe—Sea Wall, Carriage Way, &c.	Urban District Council	A. Argo, County Clerk, Golspie, N.B.	" 5
Bonar Bridge—Works of Water Supply	L.C.C.	D. J. Steward, Clerk	" 6
Crossness—Outfall, pipes and valves	L.C.C.		" 6
Ditto Ditto, Triple Expansion Engines	Spanish Government	Commercial Department, Foreign Office, S.W.	" 7
Havana—Floating Dock	West Gloucester Water Co.	J. James, Clerk, 110, Cannon-street, E.C.	" 8
Old Sodbury—Engines and Pumps	Official.	Director, State Railways, Bucharest	" 10
Bucharest—Foundation Bridge (about £64,000)	Bredwardine R.D.C.	C. Griffiths, Clerk, Hay	" 10
Dorstone—Two Highway Bridges	Corporation	E. B. Hopkins, Town Clerk, Morley	" 14
Morley—Electric Lighting Plant	Corporation	E. de Normanville, Engineer, Town Hall, Leamington	" 14
Leamington—Bore, part steel lined	Water Committee	J. S. Brodie, Engineer, Town Hall, Whitehaven	" 15
Whitehaven—Intake Works	Urban District Council	W. H. Hope, Eng., Gate House, Portsmouth-rd., Kingston-on-Th.	" 15
New Malden, Surrey—Machinery for Sewage Disposal Works	North-Eastern Railway Co.	C. A. Harrison, Central Station, Newcastle-on-Tyne	" 16
Durham—Subway at Penshaw Station			"

ENGINEERING—continued.

Wellington, Salop—Cast-iron Water Mains, Excavating, &c.	Urban District Council	G. J. Monson, Engineer, 45, Walker-street, Wellington, Salop	Oct. 16
Shrewsbury—Main Drainage Engines and Crane	Corporation	H. C. Clarke, Town Clerk, Shrewsbury	" 22
Naj Hamadi, Kinch Line, Upper Egypt—Metallic Bridges	Official	Col. Western, Broadway Chambers, Westminster, S.W.	" 39
Jassy, Roumania—Baths Installations	Municipal Council	N. A. Bogdan, Secretary, Jassy	Nov. 5
North Wales—Pumping out Slate Quarries	Corporation	R. Parry Jones, Talysarn, North Wales	—
Burnley—Sewage Outfall Plant	Corporation	W. T. Fullalove, Clerk, Burnley	—

FENCING.

Hove—Oak Park Fencing (2,890 lin. feet)	Corporation	H. Endacott, Town Clerk, Hove	Sept. 23
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PAINTING.

Rotherham—Inside Market Hall	Corporation	Borough Surveyor, Rotherham	Sept. 21
Shrewsbury—Grey Friars and Coleham Bridges	Corporation	W. C. Eddowes, Borough Surveyor	" 22
Wellingborough—Cemetery Buildings	Burial Board	W. Lewin, Clerk, Wellingborough	" 29

ROADS AND STREETS.

Wembley—Materials	Urban District Council	G. Hurn, Clerk, Public Offices, Wembley	Sept. 21
Ramsbottom, Lancs—Materials to Sept. 30, 1897	Urban District Council	J. W. Barlow, Clerk, Market-place, Ramsbottom	" 21
Hawick—Laying 1,400 square yards Whinstone setts	Corporation	Town Clerk, Hawick, N.B.	" 21
Romford—Broken Guernsey Granite (500 tons)	Rural District Council	E. G. Boden, C.E., Council's Offices, Romford	" 21
Chingford—Patent Stone Paving	Urban District Council	W. Stair, Surveyor, Chingford	" 21
Bermondsey—Barging Earth to Sept. 29, 1897	Vestry	F. Ryall, Vestry Clerk, Spa-road, S.E.	" 21
Stoke Newington—Road Channelling	Vestry	E. E. Burgess, Surveyor, Vestry Offices, Stoke Newington	" 22
Rotherham—Kerbing and Channelling	Corporation	Borough Surveyor, Rotherham	" 22
West Ham—Road-making at Forest Gate	Corporation	F. E. Hilleary, Town Clerk, West Ham	" 22
Edmonton—Materials	Urban District Council	G. E. Eachus, Engineer, Town Hall, Edmonton	" 22
Tottenham—Making-up and Widening Roads	Urban District Council	E. Crowne, Clerk, Tottenham	" 22
Watford—Making-up Leavesden-road	Urban District Council	H. M. Turner, Clerk, 14, High-street, Watford	" 22
Chiswick—Making-up Roads	Urban District Council	A. Ramsden, Surveyor, Vestry Hall, Turnham Green	" 23
Hadleigh—Broken Guernsey Granite (150 tons)	Urban District Council	C. J. Grimwade, Council Office, Hadleigh, Suffolk	" 23
Eccles—Brick Culvert—745yds. 3ft. by 2ft.	Corporation	G. W. Bailey, Town Clerk, Eccles	" 24
Sevenoaks—Broken Granite (230 yards)	Urban District Council	H. J. Thompson, Clerk, Sevenoaks	" 25
Bishops Stortford—Granites (2,000 tons)	Urban District Council	W. Gee, Clerk, North-street, Bishops Stortford	" 26
Sevenoaks—1,140 c.yds. Road Metal	Urban District Council	H. J. Thompson, Clerk, Sevenoaks	" 28
Eccles—Draining and Paving, Wellington-road	Corporation	G. W. Bailey, Town Clerk, Eccles	" 28
Middleton, Lanc—Street Works	Corporation	F. Entwistle, Town Clerk, Middleton	" 30
Lee, S.E.—Road Repairs	District Board of Works	G. Whale, Clerk, Old Charlton	" 30
Aldershot—Broken Granite (1,500 tons)	Urban District Council	W. E. Foster, Clerk, Victoria-road, Aldershot	Oct. 6
East Barnet—Materials to September 29, 1897	Urban District Council	H. York, Surveyor, Council Offices, Station-road, New Barnet	" 8

SANITARY.

Highgate, London, N.—Pipe Sewers, Manholes, &c.	Hornsey Urban District Council	E. J. Lovegrove, Engineer, Southwood-lane, Highgate, N.	Sept. 21
The Maldens & Coombe, Surrey—Sewerage & Disposal Works	Urban District Council	W. H. Hope, Eng., Gate House, Portsmouth-rd., Kingston-on-Th.	" 22
Acton—Sewer in Acton Lane	Urban District Council	D. J. Ebbetts, Surveyor, 242, High-street, Acton	" 22
Lee, S.E.—Sewers, Burnt Ash Hill (1,140ft. of 12in.)	District Board of Works	G. Whale, Clerk, Old Charlton	" 30
Eccles, Lancs—Brick Culvert (745yds., 3ft. by 2ft.)	Corporation	A. C. Turley, Borough Engineer	—

STEEL AND IRON.

Hornsey, N.—Cast-iron Lamp Columns (200)	Urban District Council	E. J. Lovegrove, Engineer, Northwood-lane, Highgate, N.	Sept. 23
Calcutta—Cast-iron Water Pipes (5,000 tons)	Corporation	H. S. King and Co., 65, Cornhill, E.C.	" 23
India—Steel and Iron Work	Southern Mahratta Railway Co.	E. Z. Thornton, Secretary, 41, Finsbury-circus, E.C.	" 23
East Hall Baths (38 tons)	Corporation	A. E. White, Borough Engineer, Hull	" 25
Valetta, Malta—Iron Columns and Steel Joists	Official	Crown Agents to Colonies, Downing-street, S.W.	" 28
Punjab—Switches and Crossings	Southern Punjab Railway Co.	Secretary, 70, Cornhill, E.C.	" 30
Alexandria—Bridge Works (Iron)	Administration of Railways	Chief Engineer to Administration, Alexandria	Oct. 30
New South Wales, Australia—Steel Rails (150,000 tons)	Government of New South Wales	Sir Saul Samuel, 9, Victoria-street, S.W.	Dec. 30

CHIPS.

The premises at Leeds formerly occupied by the Yorkshire Technical College have been altered and extended, and will provide a home for the Leeds College of Music. Messrs. Swale and Mitchell, of Leeds, were the architects.

The Kelly Memorial Schools at Portrush, built from designs by Mr. R. W. Seavey, of Belfast, are approaching completion. Mr. Alexander Graham, of Portrush, is the contractor.

The joint committee of management of the water works belonging to the burghs of Pittenween, Anstruther Easter, and Anstruther Wester have adopted plans by Messrs. Buchanan and Bennett, of George-street, Edinburgh, for the construction of an additional reservoir at Ovenstone, with intake-pipe and other works connected therewith.

Memorial stones have been laid at Standish of a new Wesleyan chapel, with schoolroom and five classrooms. The chapel will seat 350 adults, and the school will accommodate about 400 children. Mr. W. H. Dinsley, of Chorley, is the architect, and Mr. Joseph Wilson, of Wigan, the builder. The cost will be £2,500.

A steel-arch bridge of 550ft. span, with a rise of 114ft., is now in course of construction over the Niagara Gorge, Mr. L. L. Buck, M.Am.Soc.C.E., being responsible for the design. The arch in question is of the two-hinged type, and will accommodate both railway and road traffic, being a two-decked structure, with the railway on top. The conditions of the site preclude the use of falsework for the main span, which will accordingly be built out cantilever fashion, a method of construction first adopted at the great Eads Bridge over the Mississippi.

It is stated that a Blackpool syndicate have purchased the site of the Marina near the jetty at Margate, on which it is proposed to erect an Eiffel Tower, a spiral railway, and an exhibition with gardens.

The new crematorium for Liverpool, situated in Priory-road, near Anfield Cemetery, was opened on Friday.

The members of the Southampton and District Builders and Decorators' Association had their first annual outing on Thursday in last week, when by special permission they were allowed to visit Osborne House and Whippingham Church. A large party assembled, including Major G. Brinton, chairman of the society.

The private view of the inaugural exhibition of the Society of Miniature Painters will be held at the Gallery, 175, New Bond-street, on Tuesday next, the 22nd inst., and the exhibition will be open to the public daily, from the 23rd inst. to the 17th of October.

The Yale lock manufacturers, we understand, have proved that in a patent lock having six "steps," each capable of being reduced in height twenty times, the number of changes or combinations will be 86,400. Further, that as the drill pin and the pipes of the keys may be made of three different sizes, the total number of changes will be 2,592,000. In keys of the smallest size the total number of changes through which they can be run is 648,600, while in those of large size the number can be increased to not less than 7,776,000 different changes.

The memorial stone of St. Chad's Mission-hall was laid in Upper Green-lane, Walsall, on Thursday in last week. The front elevation will be built of red pressed bricks, with moulded bricks for dressings, and it will contain a large mullioned and transomed window. The east end has been treated more in accordance with ecclesiastical traditions, and the eastern window will have three narrow lights with cusped tracery heads. The work of erection is being carried out by Mr. S. Wootton, of Bloxwich, from designs by Messrs. Bailey and McConnall, of Walsall; and the cost, inclusive of the site and furniture, will be about £800.

Mr. W. O. E. Meade-King, an inspector from the Local Government Board, held an inquiry at Belmont, on Friday, as to the application by the rural district council of Durham for sanction to borrow £4,400 for works of sewerage and sewage disposal works for the parishes of Belmont, Sherburn, and Pittington. Mr. G. Gregson, the surveyor of the authority, exhibited and explained the plans.

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TENDERS.

* * * Correspondents would in all cases oblige by giving the addresses of the parties tendering—at any rate, of the accepted tender: it adds to the value of the information.

BAMPTON, DEVON.—For restoration of parish church.
Mr. C. H. Samson, F.R.I.B.A., The Laurels, Taunton, architect:—

Luccombe, Exeter	£2,992 0 0
Hems, Exeter	2,537 0 0
Luxton, Exeter	2,032 19 6
Berry, Crediton	1,953 0 0
Bryant, Barnstaple	1,689 12 9

* Accepted for greater portion of works at £1,300 18s. 9d.

THE BUILDING NEWS

AND ENGINEERING JOURNAL.

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FRIDAY, SEPTEMBER 25, 1896.

REMUNERATION AND COMMISSIONS,
LEGITIMATE AND QUESTIONABLE.

EVERY now and again, when professional topics fall rather flat, questions are trotted out which have been disposed of more than once. The old charge of secret or illicit commissions is one of these. We do not doubt but that they obtain in the engineering and architectural professions, as well as in many others; but the writers who rake them up to make a little capital out of them take care to deal only with general assertions rather than with actual facts. Why architects and engineers should be particularly pounced upon it is not easy to see, except that they have the control of large expenditures of money, and are more directly responsible to the client than the contractor or the tradesman, who, it seems to us, are more addicted to this sort of surreptitious bribing. What inducement can an architect, for example, have to add to his regular and legal emoluments, when by so doing he implicates himself in a manner which must most effectually deprive him of exercising that control over the work upon which his success depends, besides endangering his reputation for honesty should any disclosure take place? The charges levelled against the profession by the Right Hon. Sir Edward Fry, are, no doubt, to some extent true; but we deny that architects and engineers accept bribes in the form of payment or commissions. There are other modes of receiving remuneration, no doubt equally dishonourable, though not so glaringly dishonest; many secret modes of bribery which are seldom discovered by those who are ready to rush into print with the recital of flagrant instances of commissions or trade discounts. "Suspicion," it is truly said, "has always dogged the steps of secrecy," and for this reason, the architect, engineer, manufacturer, and trader may derive some profit by another, though scarcely authenticated, charge made against them. Though these charges are preferred against the profession, architects are far from being wholly responsible for the evil complained of.

Many ways are open to tradesmen and professional men for offering and accepting remuneration or commissions which may not directly implicate them in a charge of dealing in illicit commissions. The architect and engineer may not, in fact, accept commissions or so much money in any form; but may receive remuneration in some other way for their "good turn," or recommendation, or kindly office, which is equally dishonest, although more obscure and less readily found out. When, for instance, an architect promises a tradesman to introduce his goods if they are reasonable, or he has an opportunity of doing so, and he actually specifies them, he is doing something which is unfair probably to others in the same trade who are too independent to ask favours, or whose goods are more expensive. The professional man, in short, favours one man at the expense of others who submit offers, and who have better wares to sell. The remuneration may come in the shape of a case of choice wine or cigars, or a promise to do something for the said architect by way of recommendation or otherwise. The said tradesman may be a member of the town council, a "County Councillor," or hold some appointment. A "good word" from him may be worth a commission of a more substantial kind than a cheque or a discount on the goods supplied. And have we not sometimes heard of an architect favouring a builder by accepting

his tender if it is within a reasonable amount?—which means that the architect will receive some kind of acknowledgment. Building business is slack, and it is worth Snook's, the local builder's, while, who has a number of hands to be paid and plant to be turned to account, to obtain a contract. Mr. Brown, the architect, does his best for Snook, who has perhaps lost on a former job. We do not infer that any fraudulent commission has been received by Brown, who has done it as a "friend"—not in any way so nefarious as the proceedings of a certain surveyor of a corporation, who obtains contracts for a firm for a supply of material at a price slightly above the market price, the extra sum being paid to him as a bribe. Many cases of the latter kind have been discovered, and it is well known that secret commissions received by an agent can be recovered, and it has been decided that the principal can recover from the contractor the excess price which the latter receives as damages for the fraud. But there is the other side. Our readers may remember instances where manufacturers of goods advertise them with the intimation that "5 to 15 per cent. commission will be allowed to architects or builders." A few years ago a firm of tile manufacturers sent out a pattern sheet of their tiles to the profession, with a memorandum to that effect; and we have even heard of building firms offering bribes in a like manner to the unwary.

The correspondence that has taken place in the *Times* on "Secret Commissions" corroborates these experiences. "A Civil Engineer," who was formerly a contractor's agent, states that there are very few contracting firms who do not "provide for the engineer." A regular order to him when pricing quantities was, "Put on so-and-so for Mr. Engineer." If he does not accept it, so much the better for the contractor. In one instance he tells a tale of a partner in a firm of contractors whose tender had been accepted, who told the engineer that he had put on 2½ per cent. for him. Blame is attached to directors and clients and to engineers for cutting down fair fees; but we think the contractor is quite as much to blame for degrading himself and his craft by offering bribes for a contract which should wholly depend on the fairness of the transaction and the prices affixed to the quantities. If they are honest and fair prices, why remunerate anybody for its acceptance? If not honest, then we can clearly understand the practice which seems to prevail amongst a certain class of contractors and tradesmen. It has been denied, indeed—and, as far as we have had experience, rightly—that this practice of offering bribes exists to so large extent as stated. Occasionally tradesmen and manufacturers make offers to architects of this kind, as in the case of one firm who lately offered a leading Gothic architect a commission on some goods, and were peremptorily taken to task for their attentions and misdirected zeal. An offer of this kind ought not to impose on any intelligent practitioner, and it certainly would not on an architect of any reputation, as it is an insult to be offered a bribe which has to come out of somebody's pocket. If the amount is supposed to come out of the contract, so much the worse for the work; if it is a gratuitous present by the trader, it reflects on the person who accepts it, for either he must be a man who can be bribed for so much, or must, let us suppose a more charitable view—be very "hard up." In either case the transaction by him who offers and by him who accepts is degrading.

That the practice of tradesmen and builders offering discount or bribes should exist depends much on the attitude of the profession. Demand creates supply in this as in other things. If engineers and architects are a party to this sort of arrangement, we cannot be surprised that builders and trades-

men are found who are ready to make offers, and even try to compete with each other in giving the largest trade discount. If one firm puts down 2½ per cent. for the architect, another may make it 5 per cent., or even more, and a dishonest kind of competition be encouraged that might even seriously impair the advantages of tendering. We have, indeed, heard in provincial towns, where keen competition exists between the local builders, of the tenderer who is next the lowest offering a percentage if his tender be accepted. Such dishonest practices could scarcely take place if the professional men in a locality sternly refused all these overtures, and made it a rule to disqualify anyone who made them. Less objectionable, it may be urged, are trade discounts offered for cash payments; but the question instantly occurs, why the architect or engineer should benefit by these discounts? Should not the employer have the advantage of any ready payment made through his agent? We might fill a page with giving instances of this sort of surreptitious dealing, by which it has been alleged some architects add materially to their commission. Sometimes we know a trade discount is offered on goods supplied by a large ironfounder on iron girders and columns or roofs; a percentage is put down to the architect on the hot water or steam heating; or as discount on goods purchased for cash, such as a large order for the supply of iron grates, and paid for on the ready-money system. On one or two occasions we have heard of decorators doing the same thing. But whether in the shape of trade discount or surreptitious commission, the practice is fraught with danger to the interest both of the profession and the trade, as it must mean dereliction of duty, loss of control over the work, sacrifice of independence on the architect's part, and much injury to manufacture and trade. The honest manufacturer and trader are seriously hampered by those in their business who resort to these practices, for if it commonly prevailed, which happily it does not, good quality and workmanship would soon be abandoned. How useless would become the specification which provided for the best materials, and the approval of the architect would become a mere "fraud."

Closely connected with the subject of surreptitious commissions is the question of the architect's mode of remuneration. Payment for services by way of commission is, to say the utmost that can be said for it, a convenient mode; but it is certainly not one that will ever commend itself to the architect, who thinks, rightly enough, that his design and services should be paid for according to their merit as a work of art, or, what amounts to the same thing, to the reputation or eminence he has achieved as an architect. No doubt the system of payment by commission has led to the general imputation that architects brought about increased expenditure in order to add to their own charges. If they could do this, it is alleged they can go farther, and try to obtain a commission also from those they recommend, or from whom they obtain goods. There is something in this suggestion. There is a too commercial ring about the word "commission," and some people have begun to think that architects are accustomed to be remunerated in these irregular ways by builders and tradesmen. The percentage commission is so common in commercial life, that legitimate and questionable methods of obtaining it are alike put in the same category. From the questionable to the absolute dishonest commission is a comparatively easy transition, as with other questions of right and wrong among people who are not very particular to examine motives. The payment of architects by a percentage on the cost instead of on the results seems to be really a sort of incentive among a few in the profession to step beyond the bounds of legitimate practice,

and to make up by other sources, as it were, for what they lose by inadequate percentage on their professional duty.

SANITARY CONSTRUCTION.

THE Sanitary Congress at Newcastle-on-Tyne has dealt with a variety of subjects of more or less interest to architects and engineers. Yet, if we were to inquire as to what the Congress had really contributed to our knowledge of the various branches that have been discussed, we fear the answer would not be very satisfactory. That sanitary science has accomplished much during the last 40 years goes without denial; from the experimental stage of sanitation, begun about 1848, we have advanced by leaps and bounds; the whole sanitary condition of the country has been changed; the Public Health Acts of 1848 and of 1875 have reorganised our towns and rural districts, and placed them upon a basis of efficiency in all that regards healthy living of which we may be proud.

The president of the Engineering and Architecture section, Sir Andrew Noble, dwelt in flattering terms upon the progress that has been made, and compared our proficiency in these matters with the progress made in Germany, France, and other countries. It was very flattering, for instance, to find that in many hotels in those countries notices are common informing visitors that the sanitary arrangements had been carried out by well-known firms of English engineers. The proverbial saying that "prophets have no honour in their own country" may even apply to the plumber also; it is certain, however, that the foreigner gives us credit for our sanitary fittings, and this is something to be thankful for. But laying this flattering unction to ourselves is no absolute proof of any standard; these comforting reflections do not show how much we have advanced of late years; we only know we are better than other countries, which have been sadly behind in these matters. The results of the development of sanitary science are to be seen in many directions—not only in our improved sewerage and water supply and refuse disposal facilities, but in the fitting up of our dwellings. Compare, for instance, a house in a town or suburb of 40 years ago and at the present day, even of those of a good average rental. The old house has probably no proper bath-room, the sanitary fittings and closets are of an inferior kind and inadequately ventilated, to say nothing of insanitary traps and connections with the sewers. The modern small house of £30 to £40 a year rental is fitted up with a bath-room and lavatory on the best sanitary principles, though the fittings and brasswork may not be the best, and the house is drained under properly devised by-laws, and subjected to inspection. In Newcastle, as Sir A. Noble tells us, the great majority of small rental houses of £15 a year are fitted with baths. A bath in every house is one of the most important results of modern sanitation, and it should no doubt be regarded as absolutely necessary in a large industrial city like Newcastle.

The question of sanitary fittings was dealt with in Mr. Bland's paper, and the discussion which followed. It has revealed a grievance. While we have arrived at important results, there is the evil of competition among manufacturers of introducing cheap and insanitary fittings. Although, as we have said, our smaller houses are all provided with baths and lavatories, many of them are of the flimsiest description. We improve our theories and systems, but these are rendered nugatory by the demand for cheapness, and the consequent supply of inferior fittings, which wear out or become useless in a very short time. Thus we have heard much lately of the cracking of cast-iron flush cisterns in some

houses on large new estates, of imperfect closet apparatus, and of ill-fitting taps to baths, sinks, and lavatories. No doubt a central board of health would be of value in requiring some uniformity in the provision of fittings, of a certain pattern and quality.

There are advocates for both cast iron and stoneware for drain-pipes and ventilators. Mr. Rogers Field said his experience favoured iron; that stoneware pipes after a few years became defective and broken; that both for houses and large institutions iron is more durable. On the other hand, Mr. A. Dunn considered stoneware the most desirable material in the end, as being more durable and clean than iron, and if laid in concrete the pipes could not fracture or break joint by settlement. In this connection we must refer to the paper of Mr. A. B. Plummer, F.R.I.B.A., of Newcastle, on "The Diameters and Inclines of Drains," and the form of pipe he suggested for soil drains for clearing with a small flush of water. We have given a summary report of Mr. Plummer's paper on p. 369, and his experiments and tests, showing the effects of flushes on pipes of 6in. and 4in. dia., and of different gradients, are of interest as establishing the value of the smaller pipes. The author's opinion is that a two-gallon flush is sufficient for a satisfactory apparatus, but not enough for flushing large drain-pipes laid to a gradient of from 1 in 40 to 1 in 80. The tests on 6in. and 4in. sanitary pipe drains and 4in. and 3in. glass-lined metal pipes resulted in showing that the latter were better for discharge. Mr. Plummer's suggested form of drain-pipe, in which the lower part or invert of the section is of smaller diameter than the upper or crown, is one that may be usefully considered by sanitary engineers and pipe-manufacturers, and is a form based on the true or egg-shaped principle. The experiments recorded by the author at least have proved again that under like tests the 6in. pipe became clogged, while the smaller pipes ran clear with the same flush, despite the contentions of a few who maintained that a three-gallon flush was better than the two-gallon flush. In connection with this subject, Mr. R. S. Rounthwaite's defence of clay for jointing sewer pipes may be mentioned. No doubt cement joints often crack through settlement, or from the pipes being walked on, &c. The author drew attention to a joint made of a bituminous substance which would neither run nor crack. A joint made of bitumen and Portland cement, such as is adopted in Stanford's and Doulton's pipe joints, is one of the best now in use. From the remarks of some of the speakers, it may be inferred that the socketed pipe for drains or sewers will soon be a thing of the past, and is now abandoned for all great sewerage works. One of the few papers on constructive sanitation was that of Mr. Louis Hanks, Assoc. San. Inst., on the "Sanitary Construction and Fitting-up of Stables and Cow-houses," fully reported in our last issue (p. 404). A great deal of the paper dealt with methods of building with which most builders are familiar, which, though well known, are, nevertheless, often neglected—such, for example, as subsoil draining in low, damp situations, which after building cannot be so easily introduced. The remarks on the planning and construction of stables are worth attention. Speaking of walls, the author recommends the internal face of all brickwork to be neatly pointed or rendered with cement and sand, steel-trowelled, and the inner walls of stables and cow-houses to have glazed bricks or tiles of a soft tint or colour—not white, as the animal's eyes are injuriously affected by white. Soft green, buff, or grey is preferred, as being restful to the horses' sight. "A very economical plan is to terminate the glazed bricks or tiles at a height of 7ft. from the floor at the head of stalls, and 4ft. 6in. high round rest of walls, capped with an iron

moulding, and the walls above smoothly cemented and painted." One good point not often observed is, that "no room or loft should be over the horses' standings." The roof is recommended to be open timber work, boarded, stained, and varnished, as it gives extra air-space and height, and the varnished surface is sanitary, and easily cleaned. If rooms are really required over the stable, the ceiling should not be less than 10ft. from floor, though 12ft. is better, and this allowance is based on the reasonable air-space requirements of a horse, greater space being necessary than that for human beings. An allowance of from 1,100 to 1,800c.ft. should be given to each horse; this space is obtained by giving 9ft. by 6ft. for each stall, which, with a passageway at heel of 7ft. by 6ft., gives 96ft. super. of floor, which, multiplied by 12ft., gives 1,152c.ft. For loose boxes, 12ft. square is not considered too much. These dimensions, it will be noticed, exceed considerably those generally given by architects. Another matter is the floor of room or loft over the stable. Light iron and concrete are considered the best, as being not only fireproof, but sound and proof against dust and vitiated air passing through from the stable. How seldom these materials are used. Any ordinary kind of floor construction is thought sufficient. The floor-boards are not grooved and tongued as they ought to be, and the ceilings of common plaster not even painted. An impervious floor and ceiling are essential. The former should be laid with every precaution to prevent the passage of effluvia through or to deaden the sound; the latter should be of cement, or be boarded and painted. The author says a ceiling of flat iron sheets butted closely together and nailed to the joists and pointed would be more sanitary. A strong objection is urged against a staircase or ladder with opening communicating with the stable to the rooms above, which opening becomes a shaft for ventilation. On this account the staircase should be cut off by a brick wall or be externally arranged. Various suggestions are made about ventilation of stables. The town stable, with high adjoining buildings, is very difficult to ventilate, unless by a metal shaft opening over the horses' heads. Boyle's "air-pump" ventilator, or some form of roof ventilator, is necessary, and this can be made to a form suitable to the external style by ridge outlets or turrets. Then the paving of stables is important. The author lays it down as a cardinal principle that no underground drains ought to be made in either a stable or cowshed; but the paving should be sloped to a fall of 4-10in. to the foot from head to heel, and from sides to centre of stalls, forming a valley down the centre of each standing, which will carry away the liquid collected by a shallow gutter along the heel of stalls, thence by a half-channel pipe through wall, and discharge over a trapped gully outside. The author strongly objects to underground drains. Iron sunk gutter channels, with perforated iron covers, now commonly used, seem to obviate the objections of open channels in the paving. Other useful remarks on the construction of stables and cattle-sheds are to be found in the paper, to which we may refer the reader.

BUILDING AND LANDSCAPE WORK.

VERY few writers have touched on the border-land between architecture and scenery. Where the one ends and the other commences has not been made very clear. In our great cities, the line of separation is too frequently hard and unpleasant. We see a street of houses and shops arrested by meadows and woodland without any gradation to break the too sudden transition between bricks and mortar and the country

beyond. We see those strangely hard lines most in our suburbs, where the jarring notes of building often clash in discordant proximity to rural surroundings. In the denser parts of the city the contrast is less jarring, as the architect and builder make the environment, and there is a sort of agreement or harmony between one mass of buildings and another. Even here, however, the need of a "setting" to our public and private buildings is sadly apparent, and we have much to learn to make the most of our architecture in our squares, streets, and open spaces. Occasionally we find architects who have a wider and less restricted view of their art, who endeavour to bring their work into unison with the adjacent buildings and natural features. They are not content to confine their efforts within the four walls of their structure, as if it was nothing to them how other buildings stood in relation to their own design. The idea of an Italian palace or Gothic villa, evolved from some model or portfolio, set down amidst sordid surroundings or dropped from the cloudland of fancy in the midst of plain engineering factories or shops is no longer compatible with a cultured taste.

A writer in the *Engineering Magazine*, Mr. Downing Vaux, makes some useful suggestions on the "Harmony of Architecture and Landscape," illustrated by views from landscape work at Washington, New York, Chicago, Boston, Vienna, Versailles, Fontainebleau, Oxford, Cambridge, and other European localities. These examples are not the best or happiest that could have been selected to illustrate the subject, though they are sufficient to show how architectural features can be blended harmoniously with landscape and natural surroundings. At the World's Fair at Chicago the attempt was made to show the co-operation of architect, engineer, and landscape gardener, and many of the examples were worthy of their authors. The influence of this experiment has been felt, and to it probably our American cousins are indebted for the artistic impulse in some new directions like this. Mr. Vaux points to the success achieved by the co-operation, and regards it as a conspicuous precedent that ought to be followed. On that memorable occasion the landscape designer was called in at the beginning, a point which the author justly thinks important, as an opportunity is then given to "suggest changes in the location of buildings, instead of being called in as an afterthought, to make the most of an unfortunate position." No doubt. What might not have been done to make Hyde Park Corner or the Marble Arch noble and stately entrances if the landscape artist and the architect of those structures had been called in to work in co-operation; or how far more dignified would have been Trafalgar-square and Piccadilly-circus if a plan for those fine sites had been prepared at the onset? It is only on the unmade site that this combined effect can be properly attained. In the American cities there were opportunities, and there are many now which can be turned to good account if this advice were followed. The author says: "By securing his assistance—the landscape gardener—at the outset, the building would get the immediate benefit of such local features as the site afforded; the trees and rocks would be saved, to serve as a basis for the more extended treatment decided upon, instead of being sacrificed to the profit or convenience of the contractor; the materials removed in the construction of the work could be at once disposed in accordance with the general scheme for the treatment of the grounds, and the building and its setting grow simultaneously towards orderly completion." These initiative precautions are too often neglected. The architect specifies certain excavations and removals of surface soil, old buildings, trees, and other objects; the site is to be

"cleared," and the building commenced. The effect of this direction is that the contractor makes a clean sweep of everything; trees are cut down, shrubberies grubbed up, and the site levelled, whereas if ordinary tact and artistic sense were displayed many groups of trees and shrubs or particular specimens might be left to make the surroundings of the new house or building, and the excavated material could be thrown up to make a terrace here or a hillock there to hide some undesirable view or object. The offices and back buildings often require to be planted out, and the approaches made to reveal fresh beauties at each step.

The author observes that when the situation is uneven the design may be relieved by a broken skyline and entrances on different sides on varying levels. It would be inharmonious to place a Classic building of level, horizontal, and reposeful lines on a rocky, irregular surface, though sometimes this has been done with effect. We need not look far. The Acropolis at Athens supplies us with an example of an edifice dignified and full of repose perched on a rocky platform, and what has been done by the Athenian architects in the erection of the Parthenon may be followed. But this kind of contrast would be ridiculous under Northern skies and conditions which might suggest comparison. Better examples of uniting the architect's work with nature may be seen in England and Germany on the Rhine and other situations, where the picturesque elements of the landscape have been brought into harmony with Gothic and castellated architecture. Sometimes, indeed, the quieting and severe lines of building may be found to add charm to woodland and even irregular sites, as may be exemplified in the beautiful process block illustrating a well-known English Tudor edifice amidst foliage, given as the first illustration. In flat table-lands, a desire for variety, too, may constrain the architect to break through the monotony of the scene and introduce towers, turrets, and breaks in the building. The White House and grounds at Washington give us an instance of a severely-lined Classic mansion situated in a wooded park of great breadth and folial beauty. No contrast is attempted here, but still the effect is harmonious. In fact, it is not always safe for the architect to follow a particular rule. A compensating treatment may sometimes be desirable; but in not a few modern instances it awakens a sense of the ludicrous, as when a villa bristling with turrets and gables and chimneys is placed in a flat suburban garden. Other points might be dwelt upon if our space allowed. The author dwells on the style of landscape architecture and scenery seen in various countries. He speaks with admiration of the private parks of Europe, of the beauty of the English parks and gardens, and he acknowledges the aid of English writers in this branch of art, and it is a pity he has not given better examples of landscape than the one selected. The strong and valuable relief of a background of foliage is shown by the parterre in the Schönbrunn Palace grounds, Vienna, and its noble avenue and fountain, and the "Obelisk-Allee." The Central Park, New York, supplies many picturesque combinations, as in the Bethesda Fountain, the Lily Pond, the terrace and fountain. To mar the effect of foliage by cutting it into grotesque and artificial forms should certainly not be regarded with much sympathy.

WROUGHT IRON AND STEEL IN CONSTRUCTIONAL WORK.—I.

By JOSEPH HORNER.

FEW save those who are engaged in engineering work realise the vast capacities and wide range of utility of wrought iron and mild steel. Bridges, viaducts, roofs, piers, in their varied designs, to say nothing of work which lies outside of this special subject, can be, and are, constructed almost wholly of these materials. It would, on

first thoughts, seem that it must be a task of great difficulty to build up so many members of diverse forms with plain plates, bars, sections, and rivets, and to unite them so securely that they are as strong as though made solidly in one. The sections used are not numerous, for only a limited number of simple types can be rolled. But these can be combined in so many composite forms that they suffice for all needs that arise in practice. And if plates cannot be rolled very thick, yet where much thickness is needed several plates can be riveted together, and this is often done. The shop processes involved are not, as a general rule, difficult or troublesome. There is really more trouble experienced often in erection in place than in the preparation in the shops.

Little more than a generation ago cast iron and timber were the principal materials, other than masonry, used chiefly in large public works. In roofs, bridges, piers, and in smaller works, as warehouses, houses of business, and dwellings, these materials were almost exclusively employed. Gradually wrought iron won its way to favour, partly by reason of its lightness, partly because it seemed more reliable and more durable for many purposes than the other materials. Sectional forms—small, and of no great length—were rolled to suit the requirements of the times, forms, however, which combined a maximum of strength with a minimum of weight. Mechanical ingenuity built up these elementary sections into composite forms in columns, principals, struts, ties, bracings, girders and arches. Rivets, pins, cottars, nuts and bolts supplied adequate methods of union, with the minimum expenditure of smith's work, until both cast iron and timber became largely displaced from the position which they had previously occupied, and to a certain extent masonry also.

But there are certain drawbacks inseparable from the use of wrought iron, which tend to narrow its range of utility, and which would certainly in time have been regarded with much distrust, even had no other better material been available. These drawbacks are due to the processes involved in its manufacture, in the course of which the homogeneity of the fibre is broken by the intermixture of scale, and the presence of areas of imperfect union. These defects are for the most part hidden, and only those brands of iron, the prices of which are prohibitive, can be accepted as being wholly free from such defects. More than that—the increased use of wrought iron, and the demand for cheap production has had its natural effect in the manufacture and sale of low grades of merchant irons, which are hardly worthy of the name of malleable iron at all, being short and brittle, and incapable of withstanding any severe loads of a live character; incapable also of sensible extension before fracture, and which are therefore lacking in the distinctive qualities which should specially characterise malleable irons.

Coincidentally with the depreciation in the qualities of wrought iron, the new product, mild steel, has been winning its way to favour, and largely taking the place of iron in structural work. And although there are cheap and common brands of steel sold, in response to the demand for cheap goods, yet they are almost always more reliable than the cheap wrought irons, for the reason chiefly that they are free from the distinctive defects of the cheap malleable irons. And the cause is wholly dependent on the difference in the method of manufacture, and not due to any extra care or labour bestowed upon the steel in the course of its treatment in the furnace, or in the rolls. Substantially, the difference consists in this: that while steel is fused, wrought iron is not. Why this fact should produce so marked differences in the resulting products will be explained precisely in the next articles.

The advantages which have resulted from the partial substitution of wrought iron and steel for cast iron and timber are these: Lightness is the principal one, and after that, often increased stability, sometimes economy. The matter of durability, however, is open to question. Wrought iron is peculiarly liable to corrosion, which may proceed much more rapidly than the decay of timber, or than the corrosion of cast iron. It is not merely surface corrosion either which is dangerous, since the presence of scaly seams, and of the other hidden imperfections to which malleable iron is liable, permit of the ravages of rust in the interior of the iron. It is certain that more scrupulous care is necessary in the protection of wrought iron from corrosion than was ever necessary even with cast iron, or than was necessary

for the preservation of timber from decay. In this respect steel occupies a rather more favourable position, because of its homogeneity. Though the outside is open to attack, yet if that is adequately protected, there is but slight risk of any interior corrosion going on.

Many take a pessimistic view of the permanence of the public works into the construction of which iron and steel now enter so largely. They fear, and not without some justification in reason, that in the course of a generation or two the ravages of corrosion will have played such havoc with the great public works, that these will no longer possess a sufficient margin of safety, and will have to undergo extensive and costly repairs, or else be rebuilt. Certainly a very heavy responsibility rests upon those who have the conduct of such works. The protection of iron and steel is almost a science. It should be commenced before any section leaves the shops, before a particle of incipient rust has been able to form, it should extend to all hidden parts equally with those exposed, and should be renewed at frequent intervals, under the most rigid and conscientious inspection. Only by the adoption of such apparently extreme, yet essential, precautionary measures will the credit of the work of the present generation be maintained to posterity. It is not judicious, to say the least, to build up any structure in wrought iron or steel in a closed box form, unless openings are left for access to be gained to the interior for the purpose of repainting. Good engineers always make such provision for ready access to all parts. If a beam, or boom, or dock gate, is boxed up, openings are left at intervals for a man to get inside, either for purposes of painting or repairs. Or, at least in smaller sections, hand holes are left for the insertion of paint brushes. When practicable, as it is in many instances, a large boom or girder is not inclosed with plate on each side. But one side is formed with lattice work, or one side is left quite open, and stretchers or diaphragms are riveted between the side plates.

But whether the great works of to-day are permanent or not, wrought iron and steel are the materials with which we of the present generation have, and must certainly continue to have, to work extensively in. We shall have less and less to do with wrought iron, but steel will hold its own, and the number and extent of its applications will increase. Its manufacture, although recent, has become one of the most important of the national industries. With extended use its price has diminished, and its adaptability for specific purposes has improved. Steel can now be had of any grade, of almost any dimensions, forms, and sections. Structures built in it can be made lighter than those in wrought iron, because its tensile strength is greater. Limitations in sizes which occur in wrought iron, and which lessened its utility, and increased the expenses incidental to its employment, do not exist in the same degree in steel. Further, much more scientific experiment has been brought to bear on steel than was ever brought to bear on iron. The material was long regarded with suspicion by engineers and architects, and not, it must be confessed, without good reason in its early days. Those who were interested in its manufacture and sale therefore experimented and tested, and varied the physical characteristics of their products until they were able to supply manufacturers with any kind of steel, to suit any class of work. Thus it has come about that the term "steel," used alone, is too utterly vague to indicate any precise product. There are so many grades of mild steel that it becomes necessary always to specify precisely the grade which is required for a given class of work. Enormous sums of money have been expended in the plant for manufacture, in testing machines, and in experiments of a most elaborate and varied character for ascertaining the best methods and details of workshop practice in relation to steel work. The result is that the practice in this class of work has been placed upon a sure and settled basis of the utmost precision in all details. The subject is one which is replete with interest, both historical and practical, and one which it is proposed to treat in this series on both these broad outlines.

Even to-day not a few would be puzzled if asked to define exactly the difference between iron and steel. The answer might probably be this: Steel can be hardened and tempered, and iron cannot be. And steel can be hardened because it contains more carbon than iron. But these definitions would be not only incomplete, but incorrect.

The larger part of the mild steel manufactured cannot be sensibly hardened or tempered. And plenty of wrought iron contains as much carbon as soft steel. Soft cast iron, again, contains twice or thrice as much carbon as many steels that will harden and temper. Evidently, then, some more precise definition must be sought, since the question is not one of capacity for hardening and tempering, nor of percentage of carbon present, for mild steel resembles wrought iron in being soft under any treatment. And since cast iron resembles the tempered or high carbon steels in its hardness, and brittleness, and steely character, the distinction required must be sought wholly in the methods of manufacture. All steels are produced by fusion in the first place. All wrought irons are produced by puddling, after which they are never fused, never passing beyond the pasty condition after conversion from the pig. The term "ingot iron" has been applied to the first, the term "weld iron" to the latter, because all steel has been poured into ingots, and no wrought is ever so poured, but is built up by welding. But, on the other hand, all mild or low-carbon steel can be welded as readily as wrought or weld iron, hence something seems wanting to completeness in this distinction. In strictness, therefore, steel may be defined as a definite compound of iron and carbon which has been cast, and is malleable; and wrought iron as a material which has not been cast, and which is always malleable and weldable. In mild steel, moreover, there must always be a certain quantity of carbon and manganese. In wrought iron the aim is to eliminate as far as practicable all foreign elements. So that, when they happen to be present, they are there not from choice, but because of the difficulty of their absolute elimination.

Just as other matters besides differences in chemical composition affect the qualities of cast iron, so do they in the case of wrought iron and steel. There may be, and often is, a very slight difference in the composition of a bar of wrought iron and one of steel, yet the steel will stretch something like four times as much as the iron before fracture, will be 25 per cent. stronger, will be sounder, and more homogeneous, and more elastic. In order to understand the reason of these differences we must, as we did in the case of cast iron, consider the subject from the standpoint of manufacture and manipulation. We must observe how the two materials are prepared, and note how the two processes to which they are subjected and the work done upon them affects their subsequent behaviour and history.

The method of treatment which it is proposed to adopt in this series will be one mainly practical. The essential and fundamental differences between iron and steel, their physical characteristics, their elements of strength and of weakness, their relative adaptability for certain purposes, will receive treatment. The tests commonly adopted and the lessons to be learned from them will be illustrated and explained. The commercial forms in which iron and steel are obtainable, and the various grades in quality will be stated. The methods of building up both elementary and complex forms from these materials, the combination of various sections, the joints, the fastenings, &c., used in the construction of great public works, will receive the full treatment which their importance demands. The shop processes involved in the constructive details will be treated with just that amount of detail which will be of interest to the architect and consulting engineer, who, though not very directly concerned in such matters of detail, must nevertheless take a considerable concern in the mechanical processes performed at the forge and furnace, and in the yard of the contractor. The illustrations will consist wholly of examples selected from works which are in existence. They will be selected with a view not to show entire works on a minute scale, but enlarged details of the main elements in their construction.

THE TIMBERS OF AUSTRALASIA.—XV.

By "J. G." ("DE LIBRA.")

THE SOFT WOODS: III.—THE NON-CONIFEROUS AUSTRALIAN SCRUB TIMBERS.

RETURNING finally to Australia, we have two distinct classes of non-coniferous soft woods to deal with—viz., the scrub timbers and the brush timbers. Not that absolute lines of demarcation between the several classes of timbers

can be drawn, since some of the scrub timbers occasionally grow in the open forests, and there are other difficulties in the matter. But as some such classification seems desirable, and as I have not yet seen it accomplished by anyone else, the subjoined table (which I have compiled specially with this object) may answer the purpose; while showing at the same time the botanical and vernacular names of the several non-coniferous timbers, the Natural Orders to which they severally belong, and their respective habitats. A widespread notion seems to exist in the Old World that Australian timbers are entirely hardwoods. The extreme importance and great value of these hardwoods have been sufficiently enlarged upon; but nothing can be more erroneous than the idea that they exhaust the timber wealth of the great southern colonies. On the contrary, the soft woods outnumber the hardwoods nearly six times; out of the 630 different Australian timbers, 97 only being hardwoods (including 69 Eucalypts) as against 533 soft woods. Of that large number, however, it is only necessary, for the purpose of these articles, to deal with the woods enumerated in the accompanying table.

The non-coniferous scrub timbers of Australia (nearly all of which are indigenous to New South Wales) occupy a somewhat analogous position to the genera *Metrosideros* and *Leptospermum* of New Zealand. They are not hardwoods—not in the same sense as the Eucalypts and the timbers allied to them—though in any other country they would certainly be so regarded; for in density, toughness, hardness, weight, and other qualities belonging to hardwoods some of them go far towards rivaling English oak. With these few prefatory remarks, I pass to the consideration of

A.—THE SCRUB OAKS.

The various species of the genus *Casuarina*, which grow in most of the coastal districts as well as in the arid interior of the continent, and bear no actual leaves, but only wiry drooping branchlets called leaves by courtesy, have received the name of "oaks" or "she-oaks," from the fancied resemblance of the wood to that of English oak, though the grain is really more like that of the Mediterranean evergreen oak (*Quercus Ilex*) than of the other European varieties, as the veins are small, slightly curled, and closely distributed throughout the whole substance of the wood. Many of the specimens are extremely pretty, and those who have given close attention to the subject are of opinion that a very large demand might be created in Great Britain and the Continent for scrub-oak (or "she-oak") timber, were it sufficiently known.

Scrub She-oak (*Casuarina Cunninghamii*—Nat. Or. *Casuarina*) attains a height of 60ft. or 70ft., and a trunk diameter of 24in. The wood is light, hard, close, strong, and prettily marked. Its Colonial use is principally for shingles and staves, but it would be suitable for many purposes connected with building.

Bull oak (*C. equisetifolia*) grows from 50ft. to 70ft., with a 12in. to 20in. diameter. The wood is heavy (weighing from 55lb. to 63lb. per cubic foot), strong, hard, and durable. "Ironwood" is one of its many aliases. The grain is coarse and beautifully marked, and the veneers are valuable for cabinetmaking.

The *Casuarina Fraseriana* is a small tree, peculiar to Western Australia, the vernacular of which seems never to have been determined. Baron von Müller, however, calls it "the best furniture wood of South-Western Australia, as it does not rot."

The River She-oak (*C. glauca*) attains a height of 40ft. or 50ft., and a diameter of from 12in. to 24in. The timber is tough and strong, red in colour, close in grain, beautifully marked, though very brittle.

Stringybark Oak (*C. inophloia*) was exhibited in London, by Queensland, at the Indian and Colonial Exhibition of 1886. It is an extremely beautiful reddish wood, with numerous dark marks and a close grain, and is highly desirable for cabinet furniture.

Swamp Oak (*C. stricta* or *quadrivalvis*) seldom exceeds 30ft. in height and 15in. diameter. The wood is close, strong, and generally considered durable, though its durability has been disputed. The specific gravity is 1.037, equal to a weight of 65lb. per cubic foot. It is of reddish colour, with longitudinal dark bands, which impart a fine mottled appearance to the polished wood. The wood works splendidly, and is exceptionally adapted for the purposes of furniture.

Forest Oak—to adopt, out of some half-score

DISTRIBUTION THROUGHOUT THE AUSTRALIAN COLONIES OF THE NON-CONIFEROUS SOFT WOODS SUITABLE FOR EXPORT.*

NON-CONIFEROUS AUSTRALIAN SCRUB TIMBERS. A.—*Scrub Oaks*.

Botanical Name.†	Vernacular Name.‡	Natural Order.	Habitat.‡
Casuarina Cunninghamiana	Scrub She-oak	Casuarinaceæ	N.S.W., Q.
Casuarina equisetifolia	Bull Oak	Ditto	N.S.W., Q., N.T.
Casuarina Fraseriana	(?)	Ditto	W.A.
Casuarina glauca	River She-oak	Ditto	N.S.W., Q., Vic., S.A.
Casuarina inophylla	Stringybark Oak	Ditto	N.S.W., Q.
Casuarina stricta	Swamp Oak	Ditto	N.S.W., Vic., S.A., Tas.
Casuarina suberosa	Forest Oak	Ditto	N.S.W., Q., Vic., S.A., Tas.
Casuarina torulosa	Forest Oak	Ditto	N.S.W., Q.

B.—*Wattles*.

Acacia Cunninghamii	Bastard Myall	Leguminosæ	N.S.W., Q.
Acacia excelsa	Ironwood	Ditto	Q.
Acacia glaucescens	Mountain Brigalow	Ditto	N.S.W., Q., Vic.
Acacia harpophylla	Brigalow	Ditto	Q.
Acacia homalophylla	Narrow-leaved Yarran	Ditto	N.S.W., Vic., S.A.
Acacia longifolia	White Sallow	Ditto	N.S.W., Vic.
	Golden Wattle	Ditto	N.S.W., Vic.
Acacia macradenia	Toney	Ditto	Q.
	Myall	Ditto	Q.
Acacia melanoxylon?	Blackwood?	Ditto	N.S.W., Vic., S.A., Tas.
Acacia pendula	True Myall	Ditto	N.S.W., Q.
Acacia penninervis	Blackwood	Ditto	N.S.W., Vic., Tas.
Acacia polybotrya	Mountain Hickory	Ditto	N.S.W., Vic., Tas.
	(?)	Ditto	N.S.W., Q.
Acacia salicina	Cooba	Ditto	N.S.W., Q., Vic., S.A., W.A.
Acacia stenophylla	Native Willow	Ditto	N.S.W., Q., Vic., S.A.
	Dalby Myall	Ditto	N.S.W., Q., Vic., S.A.

C.—*Honeysuckles*.

Banksia æmula	(?)	Proteacæ	N.S.W., Q.
Banksia integrifolia	White Honeysuckle	Ditto	N.S.W., Q., Vic.
Banksia littoralis	(?)	Ditto	W.A.
Banksia serrata	Red Honeysuckle	Ditto	N.S.W., Q., Vic., Tas.
Grevillea striata	Beefwood	Ditto	N.S.W., Q., S.A.
	Silvery Honeysuckle	Ditto	N.S.W., Q., S.A.

AUSTRALIAN BRUSH TIMBERS.—A. Cedar Group.

Cedrela { Australis	{ Cedar	{ Meliaceæ	{ N.S.W., Q.
{ toona	{ Red Cedar	{	{
	{ Moulmein Cedar	{	{
Dysoxylon Fraserianum	Rosewood	Ditto	N.S.W., Q.
	Pencil Cedar	Ditto	N.S.W., Q.
Dysoxylon Muellieri	Red Bean	Ditto	N.S.W., Q.
	Pencil Cedar	Ditto	N.S.W., Q.
Dysoxylon rufum	Bastard pencil cedar	Ditto	N.S.W., Q.
Melia composita	White Cedar	Ditto	N.S.W., Q., N.T.
Flindersia Oxleyana	Light Yellowwood	Ditto	N.S.W., Q.
Owenia cepidora	Onionwood	Ditto	N.S.W.
Rhus rhodanthema	Dark Yellow wood	Anacardiaceæ	N.S.W., Q.

B.—*Silky Oak Group*.

Grevillea Hilliana	White Yiel Yiel	Proteacæ	N.S.W., Q.
	Silky Oak	Ditto	Q., N.T.
Grevillea polystachia	(?)	Ditto	N.S.W., Q.
Grevillea robusta	Silky Oak	Ditto	N.S.W., Q.
Orites excelsa	Red Ash	Ditto	N.S.W., Q.
Stenocarpus salignus	Beefwood	Ditto	N.S.W., Q.
	Red Silky Oak	Ditto	N.S.W., Q.
Villaresia Moorei	White Maple	Olacineæ	N.S.W.
Xylomenum pyriforme	Scrub Silky Oak	Proteacæ	N.S.W.
	Native Pear	Ditto	N.S.W.

C.—*Miscellaneous Brush Timbers*.

Achras Australis	Native Plum	Sapotacæ	N.S.W., Q.
Alphitonia excelsa	Red Ash	Rhamnaceæ	N.S.W., Q., N.T.
Bosistoa sapindiiformis	Union Nut	Rutaceæ	N.S.W., Q.
Castanospermum Australe	Black Bean	Leguminosæ	N.S.W., Q.
Ceratopetalum apetalum	Lightwood	Saxifragæ	N.S.W.
	Coachwood	Ditto	N.S.W.
Cryptocarya obovata	White Sycamore	Laurineæ	N.S.W., Q.
Diploglottis Cunninghamii	Native Tamarind	Sapindaceæ	N.S.W., Q.
Duboisia myoporoides	Corkwood	Scrophularinæ	N.S.W., Q.
Echinocarpus Australis	Maiden's blush	Tiliaceæ	N.S.W., Q.
Eleocarpus grandis	Blue Fig	Ditto	N.S.W., Q.
Eleocarpus helopetalus	Prickly Fig	Ditto	N.S.W., Vic.
Endriandra glauca	Teak	Laurineæ	N.S.W., Q.
Eremophila Mitchelli	Bastard sandal-wood	Myoporinæ	N.S.W., Q., S.A.
Eucryphia Moorei	Plumb-wood	Saxifragæ	N.S.W., Vic.
Fagus Moorei	Negrohead Beech	Cupuliferæ	N.S.W.
Fagus Cunninghamii	Myrtle	Ditto	Vic., Tas.
	Negrohead Beech	Ditto	Vic., Tas.
Fusanus acuminatus	Quandong	Santalacæ	N.S.W., Q., S.A., W.A.
Gmelina Leichhardtii	Beech?	Verbenacæ	N.S.W., Q.
Harpullia pendula	Tulip-wood	Sapindaceæ	N.S.W., Q.
Olea paniculata	Native Olive	Jasminæ	N.S.W., Q.
	Marble-wood	Ditto	N.S.W., Q.
Olearia argophylla	Musk-wood	Compositæ	N.S.W., Vic., Tas.
Aster argophyllus		Ditto	N.S.W., Vic., Tas.
Pittosporum undulatum	Native laurel	Jasminæ	N.S.W., Q., Vic., Tas.
Vitex lignum-vitæ	Lignum Vitæ	Verbenacæ	N.S.W., Q.

* I hoped to have included in this table the strengths of a number of soft woods which have lately been tested for the first time, in the Engineering Department of the Sydney Technical College, for the Technological Museum. As, however, the date when the results will be available is still uncertain, the completion of the present matter must not be longer delayed to allow of the inclusion.—D. L.

† The vernacular nomenclature of these timbers, particularly the scrub oaks and wattles, is still in a state of almost inextricable confusion. Even as regards the botanical names, the same timber is, in several instances, equally well known or commonly spoken of under two different synonyms. In most cases, therefore, I have adopted the nomenclature appearing on the labels at the Sydney Technological Museum.—D. L.

‡ "N.S.W." signifies New South Wales; "Q." Queensland; "Vic." Victoria; "S.A.," South Australia; "N.T.," the Northern Territory of South Australia; "W.A.," Western Australia; and "Tas.," Tasmania.

§ The blackwood (*Acacia melanoxylon*) and beech (*Gmelina Litchfordii*) have already been dealt with among the hardwoods—the latter in Article No. IV. (New South Wales, Vol. LXX. p. 433), the former in No. IX. (Tasmania, p. 888).—D. L.

appellations, the name by which *C. suberosa* seems the most generally known—attains a height sometimes of 50ft., with a 24in. diameter, and a weight of about 60lb. per cubic foot. The wood possesses remarkable strength, though it is apt to rend in drying, and should therefore be used only for veneers, for which purpose the great beauty of its figure renders it very valuable. It was exhibited at the London International Exhibition of 1862.

Another Forest Oak with a like number of

aliases is *C. torulosa*. Its height is from 60ft. to 80ft., and its diameter 18in. to 24in., with a weight of 64lb. per cubic foot. The wood is of great strength, close in grain, and possessed of a very pretty marking distinctly its own, which peculiarly fits it for cabinet-work, especially in the form of the handsome veneers cut from it.

B.—THE WATTLES.

The ordinary Colonial name of the *Acacia* is the old English word "wattle," signifying the

interlacing of twigs together to form a kind of wickerwork. The Australian aborigines had been in the habit of constructing their habitations of such wickerwork, and the early colonists laid the foundations of architecture in Australia with the same process, only adding mud to the wicker, and so practising in the erection of their first abodes the nearest approach to building that was then often feasible, in what was long called "wattle and dab," and is still occasionally met with in remote parts of the country, where even corrugated iron is not yet obtainable. Many of the *Acacias* (of which Australia possesses 52 timber-bearing species) are also called "Myall," the name of the several tough wattle woods from which the natives made their spears.

The Bastard Myall (*Acacia Cunninghamii*, Nat. Or. *Leguminosæ*) seldom grows above 30ft., with a 12in. diameter. The wood, which was shown at the London International Exhibition of 1862, is heavy, close-grained, hard, and dark, taking an excellent polish, and is valuable for cabinet-making.

Ironwood (*A. excelsa*) often reaches a height of 80ft., with a 3ft. diameter. The wood, which has the odour of violets, is hard, close-grained, elastic, and extremely tough. It possesses great beauty for furniture.

The Mountain Brigalow (*A. glaucescens*), exhibited in London in 1862, has a height of 45ft. and a diameter of 18in., with a weight of 45lb. per cubic foot. The wood is dark, handsome, scented, finely grained, and very hard, with an appearance something between walnut and rosewood. It is admirably suited for cabinet and turnery work.

Brigalow (*A. harpophylla*) is a hard, brown, heavy, and elastic wood, with a strong odour of violets. It is well adapted for a variety of building purposes.

The Narrow-leaved Yarran (*A. homalophylla*) is a small tree, rarely exceeding 30ft. in height. The wood is light, hard, and tough. Towards the outside it is pale yellow; but the heartwood is brown, streaked with black. Formerly, it was little used except for tool-handles; but of late attention has been directed to it as a very valuable furniture wood.

The Toney, or Queensland "Myall" (*Amacradenia*), often reaches a height of 50ft., with a 12in. diameter, and yields a beautiful, hard, close-grained, blackish wood, which takes a very high polish.

The True, or Weeping Myall (*A. pendula*), though it rarely exceeds a foot in diameter, with a height of from 20ft. to 30ft., frequently furnishes veneers, as the wood is hard, close-grained, of a rich dark colour, and beautifully marked. Moreover, it is the most perfectly and strongly violet-scented of any wood, and as it retains its fragrance as long as it remains unpollished, it should be of especial value to cabinetmakers for the internal fittings of such articles as wardrobes, escritoirs, &c.

The Mountain Hickory (*A. penninervis*), more frequently still called "Blackwood," is now receiving a good deal of attention, as a by no means despicable rival, in New South Wales, to the real Tasmania Blackwood (*A. melanoxylon*), which it resembles in appearance and in many of its qualities, and which see (Vol. LXX., p. 888).

Cooba (*A. salicina*) grows from 30ft. to 50ft. high, with a 12in. to 18in. diameter. The wood is close-grained, heavy, hard, tough, and of a dark-brown colour, prettily marked. It finds considerable employment in New South Wales for drawing-room and other furniture, as it takes a particularly high polish.

The Dalby Myall (*A. stenophylla*) is frequently called "ironwood," on account of the weight and hardness of the wood, which is close-grained, dark, and beautifully marked. It planes up excellently, shows a very smooth surface, and takes a fine polish, and is therefore eminently adapted for cabinet furniture. The tree attains a height of from 40ft. to 60ft., with a trunk diameter of from 15in. to 24in.

C.—THE HONEYSUCKLES.

"Honeysuckle" is the name given in the colonies to the trees belonging to the genus *Banksia*, and a few others nearly allied thereto. Of these the following are the most important:—

A specimen of *Banksia æmula* (Nat. Or. *Proteacæ*) was shown by Queensland at the Indian and Colonial Exhibition of 1886. It is scarcely more than a shrub, but yields an excellent cabinet wood when thoroughly seasoned, deep red, coarse-

grained, and prettily marked, though it shrinks unequally in drying.

The White Honeysuckle (*B. integrifolia*), often called "Beefwood," reaches an extreme height of 30ft., with a 12in. diameter. It was exhibited in London in 1862. The wood is tough, strong, and close-grained, and is much used for ribs and knees in boat-building. But its pretty pinkish hue and beautiful grain should lead to an extensive employment of it for furniture.

The *B. littoralis* of Western Australia, a 30ft. to 40ft. tree, yields a rich brown wood, also handsomely grained, which is eminently suitable for cabinet-work and inlays.

The Red Honeysuckle (*B. serrata*), which was exhibited in London in 1862, would be the most valuable of all the Banksias but for its liability to boring by certain larvae. It needs, therefore, to be carefully selected, and also well seasoned, but is then durable, as well as strong and close-grained, and as it does not split in nailing, it is especially useful, and largely used in ship- and boat-building. But it is even more valuable as a furniture wood on account of its remarkable purplish mahogany colour, combined with a peculiar figure, which is quite *per se*, and a very attractive mottling in certain sections.

The Beefwood, or Silvery Honeysuckle (*Grevillea striata*—Nat. Or. *Proteaceæ*), is the only *Grevillea* which belongs to the scrub forests (all the others being brush timbers), where it grows to about 50ft., with a 20in. diameter. The wood is hard and close-grained, and (like *B. integrifolia*) bears much the appearance of raw beef in colour and texture. But its usually pretty markings and the excellent polish that it takes cause it to be regarded in some parts of New South Wales as one of the very best furniture woods.

Many others of the scrub timbers are of value in various ways, but further mention of them is unnecessary.

(To be concluded.)

THE BRITISH ASSOCIATION.

THE British Association meetings hardly keep up their old reputation for interest, and this year's assembly at Liverpool has not been distinguished by any originality in theme on the part of the President, or by any very striking papers or addresses. We give a selection from the former on subjects likely to interest our readers:—

THE METRIC SYSTEM.

On Saturday, in the Economic Section, the first paper, prepared by Mr. Frederick Toms and read in his absence by Mr. William Senior, was on "Metric Measures and our Old System." Mr. Toms expressed his belief that, sooner or later, the British public would have to accommodate itself to a new system of weights and measures, and that the metric system would before long be legalised. But the system had defects as well as advantages; admirable as it was for scientific purposes and large commercial transactions, it was not well adapted for the small transactions of life. In France itself the want of the old subdivisions had proved to be a source of great inconvenience, and the people tried to palliate their difficulties by applying old names to new divisions. In this country, if a new code were compiled, there would be no need to sweep away the method now in force, as the two systems might be combined, and the retention of old forms might make the acquisition of new principles easier to our untalented population. Endless confusion and heartburnings would, he submitted, be sure to result from an attempt to compel the untalented population to use tenths and hundredths of a kilogramme or dekalitre instead of following the ancient practice of dealing in pounds and ounces, quarts and pints. Far better would it be to legalise and define the new meaning of old and familiar words which would certainly continue to be used by the great mass of the people.

Mr. Millar (secretary of the Decimal Association of Edinburgh) thought that in the wholesale trade the system might be adopted with great advantage. The metric methods made arithmetic easier and supplied a greater number of concrete illustrations. The present system was inconsistent and anomalous, as it was not purely duodecimal.

Mr. William Martindale did not think Mr. Toms's way of introducing the metric system was the best. He thought a definite time should be fixed at which the adoption of the decimal system should be made compulsory. As a pharmacist, he

found our measures most inconvenient, and it was a great pity that the decimal system was not employed in our Pharmacopœia, as it was in those of other countries.

Sir Frederick Bramwell thought the modifications suggested in the paper would be most inconvenient, and would not put us in accord with other countries. The metric system was not so easy as it was thought to be. Napoleon I. had discovered that the human mind needed variety, and that dozens and scores were wanted to help it to grasp a great number of figures. Even those nations which had the metric system did not adhere to it consistently, and French people called a thousand kilos a "tonne"; and they spoke not of 500 grammes, but of half a kilo. At Boulogne he found the people still used their local weights and measures. The first Napoleon tried to make the new methods obligatory within two or three years; but the task was beyond him, and the system was only made universal and compulsory within his own recollection. Unless one had the marvellous capacity for figures of a Bidder, the decimal system was much harder to work than our own. A French railway station afforded amusing illustration of the difficulty of calculating by mental arithmetic with a decimal coinage. In England you are told the amount of your fares at once, but the Frenchman had usually to take pen, ink, and paper for the purpose. One could do one's business at an English bank in a quarter of the time which was necessary in France, and the French clerk was constantly misplacing the decimal point, to the ludicrous disturbance of the result.

Mr. S. Bourne concurred with Sir F. Bramwell, and had found vulgar fractions much easier to deal with than decimals. [So have we, and we congratulate Sir Frederick Bramwell on his very sensible remarks, which should be carefully considered by people who are led away by advocates of the present imperfect French metric system, who, for the most part, do not in the least understand the nature or working of the change they profess to desire to bring about.]

SURVIVALS OF FIRE-WORSHIP.

In the Anthropological Section, on Saturday, Mr. G. L. Gomme read an exhaustive paper on "A Method of Determining the Value of Folklore as Ethnological Data, illustrated by Survivals of Fire-worship in the British Isles." Having specially drawn attention to the important survey of one distinctive area—Galloway—by Dr. Gregor, as preliminary to the investigation of the folklore of Scotland, and to Dr. Gregor's method of cataloguing his material, Mr. Gomme laid stress upon the importance of the mathematical element of large numbers of observations similar to the accumulation of observations and experiments by Darwin and other scientists, followed by comparison and subsequent generalisation. When any given custom or belief, having undergone this double process of analysis of component elements and classification of the individual examples, reveals a distinct parallel between its radical elements and the elements of a custom or belief occupying a place in the cultus of a barbaric or savage people, we may then, and only then, discuss its right to a genealogy which can be traced back to a prehistoric cultus of the same stage of development as that of modern barbarism or savagery. Classification and analysis go hand in hand as the necessary methods of studying survivals. Mr. Gomme then applied this principle to an interesting examination of the survivals of fire-worship in these isles by detailing customs relating to fire rites and ceremonies practised at the various seasons—Christmas, New Year's Eve, and Easter Eve. From the several elements preserved in the customs, a comparison was drawn of the survivals of the British tribal fire-cult with the system belonging to the early Aryan tribes elsewhere than in Britain. The conclusion was that the scattered remnants of fire customs in our folklore could be restored by the comparative method, only possible after due analysis and classification of the customs, as a part of the early tribal system of organisation. The importance of this to folklore was that it enabled the ethnologist to proceed from the identification of tribal custom and belief to the identification of tribes, and thence to the identification of races; and the importance of it to history was that it gave to historical data a large body of evidence not otherwise obtainable.

ELECTRICITY AND GAS.

In the Mechanical Science Section, on Monday, Mr. W. H. Preece, Chief Electrician to the

General Post Office, said since the end of the Swan-Edison patents many cheap and nasty electric lamps had been introduced into the market. He had, therefore, for the past two years been engaged in a series of exhaustive experiments, which he described, in order to establish a fair and reasonable specification for Post Office requirements. The object was to find an expeditious as well as trustworthy way of testing the efficiency and usefulness of electric glow-lamps. A new test had now been introduced which enabled users of such lamps to determine, in a few minutes, the behaviour of a lamp for many months. The test was extremely simple, and all users of lamps, by forwarding samples to Central Electric stations, ought to be able to have the quality of their lamps determined. A discussion followed, in the course of which a question arose as to the comparative cheapness of gas and electric lighting as illuminants. In reply, Mr. Preece said gas *per se* was cheaper to produce than electricity. This was especially the case if only an hour's continuous burning was taken into comparison; but electricity was found more economical for prolonged use, inasmuch as electric lamps could be placed exactly where they were wanted, and need be lighted only when they were actually wanted, besides the advantage that they were so easily turned on and off. The cost of the use of electric lamps for irregular use, or for a number of hours' burning, was found to be little more than half that of gas.

Mr. W. G. Walker read a paper on "Street Lighting by Incandescent Electric Lamps." He said such lamps were much cheaper for lighting side streets and roads in country towns. Arc lamps were more effective and more suitable for busy main streets, but were too expensive for side roads. After describing the systems in use in various Continental towns and elsewhere, he said it was perfectly clear that the series system of overhead wires was suitable for scattered districts, and was as cheap as gas.—Mr. E. W. Anderson read a paper designed to prove that electricity is the best method of applying power to the working of travelling cranes.

PRE-HISTORIC RACES.

Mr. J. L. Myres, Recorder and Secretary of the Anthropological Section, read a paper descriptive of the theory of a Mediterranean race. The suggestion was that the basin of the Mediterranean in the remote ages, before it was covered with water, was the home of a race somewhat allied to the peoples now living north and south of that ocean. There was a similarity of type in these peoples, especially in the shape of the head.—Sir H. Howarth and Professor Boyd Dawkins demurred to the theory, which they considered too vague and indefinite for acceptance.—Dr. Monro expressed his belief that the bed of what was now the Mediterranean was at one time the theatre of the existence of all sorts of land animals, and also, probably, of human beings.

Dr. O. Montelius read a paper in which he contended that the Oriental civilisations, long before 1500 B.C., had been brought over to the Greek coasts and isles; also that we could, during this so-called Tyrrhenian period, trace in Greece an influence from the Phœnicians and from Egypt. The main influence was due to over-sea immigration from Asia Minor. The Oriental civilisation was, in the 11th century B.C., introduced into that part of Central Italy which the Romans called Etruria, and the Greeks Tyrrhenia.

In the same section, a discussion took place on the origin of the knowledge of copper and iron in Europe. There was apparently a general agreement that the transition from the use of copper to bronze implements was gradual, and that, having found out accidentally that tin was the best metal for hardening copper, the best relation of alloy was gradually determined by the Egyptians and Cypriots between 2000 B.C. and the Christian Era.

Mr. R. A. S. Macalister read a paper, illustrated by lantern views, on remains of a pre-historic settlement in West Kerry, near the village of Coumencoolle. The question whether these remains were ecclesiastical or not, pagan or Christian, was considered. An attempt was made to estimate the number, culture, and circumstances of the inhabitants. In conclusion, reference was made to the bearing of the remains on the archaeology of Ireland.

The Anthropological Section received the third report of their committee on the lake or marsh village near Glastonbury. The fifth season's explorations, which began in May, had already yielded results of more than ordinary interest and

importance. The circumference of the village had now been completely explored, and eight more dwelling mounds had been examined. The walls of the dwellings were about 6ft. in height. Several hearths had been excavated, and many ancient articles of wood, pottery, flint, stone, horn, bronze, and iron had been found, as well as some human bones, including adult skulls and three more or less complete skeletons of young children.

MYCENÆAN ART.

On Tuesday, in the Anthropological Section, Professor W. Ridgway opened the discussion by giving an address entitled "Who Produced the Objects called Mycenaean?" He said that in Peloponnesus either the Greeks of Classical times, or the Achæans of the Homeric age, or the older race who preceded the Achæans, called by the Greeks Pelasgians, and who, according to the consensus of Greek history continued to occupy Arcadia in historical times, must be the producers of the objects called Mycenaean. In Crete, too, the claim for precedence belongs to one of the same three—the Dorians, the Achæans, and the Pelasgians. The claim of the Dorians may be rejected, for it would not only give the lie direct to all Greek history, but would make the Dorians build the walls of Tiryns and create beautiful works of art, which in historical times they were notoriously incapable of doing. It rests, then, between the Achæans and the Pelasgians. Homer gives a picture of culture which scholars following Schliemann have sought to identify with that of Mycenæ. This involves many difficulties, of which the chief are these. The age of Mycenæ is that of bronze, that of Homer's Achæans is distinctly of iron. Engraved gems are characteristic of Mycenæ, but these, used as signets or ornaments, are unknown to Homer. No fibulæ have been found in the Acropolis of Mycenæ, but Homer's Achæans used to keep them on their dress. The Mycenaean had a peculiar oblong shield, but no breastplate, greaves of metal, whilst the Achæans had round shields, bronze breastplates and greaves, and wore their hair flowing. Excisions of such descriptive passages in Homer have been proposed as being "late"; but if interpolation had been practised in late times we should have had the use of coined money, signets, and alphabetic writing alluded to, as they are by the tragic poets when they treat of the heroic age. Now the Greeks themselves thought that Mycenæ and Tiryns were built by the Pelasgians before the Achæans entered the Peloponnesus. The Greek historians declared that Attica was never inhabited by any other race than the Pelasgians, and as Mycenaean remains have been found in abundance in Attica, the conclusion is that it was the same race who made similar monuments in Peloponnesus. There is no need to cut Homer to pieces to fit the Mycenaean age. The Mycenaean culture was that of the Bronze Period, and this was supplanted by the Iron Age, which the Achæans introduced into Greece.

PRE-CLASSICAL GREECE AND ITALY.

Dr. O. Montelius then gave a paper, aided by lantern slides, on pre-classical chronology in Greece and Italy. He showed that it was possible to establish several successive periods from the beginning of the Bronze Age in Italy through Classical times. This constituted an evolution of the Bronze Age, comprising two necessary requirements—namely, to fix the relative chronology, and then to determine what actual date of historical time each of the successive periods represents. He had come to the conclusion that there were seven periods of the Bronze Age in Italy before iron was used, and from the beginning of the Iron Age to the 5th century B.C. six different periods. The end of the sixth period was fixed by the discovery of the red-figured Attic vases on the Athenian Acropolis in layers below the stratum formed by the destruction of the Acropolis in the Persian war, 480 B.C. And, on the other hand, we can fix the date of the oldest Italian fibulæ contemporaneous with Mycenaean pottery from the 15th century B.C. by the presence of Egyptian scarabs bearing the name of King Amenhotep III., who reigned in that century. And between these two fixed points, the period of over 900 years which elapsed is approximately represented by nine of the 13 periods, the oldest fibula of the 15th century B.C. belonging to the third of the seven periods of the Bronze Age before the introduction of iron. The discoveries in Italy with the oldest writing date from the 9th century before our era.

Sir Henry Howarth, M.P., opened a discussion

on the two papers. He thought it was very important that Professor Ridgway and Dr. Montelius had arrived at the same conclusion by the same inductive method, but from different points of view. He was sorry that Dr. Montelius had not gone one step further westward—to Spain, where recent discoveries had shown the first chapter of the early bronze culture. It was doubtful whether the different periods of the relative chronology were of anything like equal length. It was, too, exceptional that writing should have extended back to the 9th century B.C. in Greece. In that case there would surely have been examples on stones, tombs, and other monuments.

Professor Flinders Petrie thought that as the Athenians were the fathers of Classical art, and Athens a pure Pelasgic centre, it was reasonable to connect this historic art with the art of a pre-historic people. The continuity showed that the previous race was, too, of Pelasgic origin. Dr. Montelius's happy exposition entirely coincided with his own conclusions respecting the early connection between Egypt and other Mediterranean peoples. He himself had recently found iron tools in Egypt which proved that there was an early development of the working of iron in Egypt and the Assyrian highlands as far back as 600-1000 B.C., but that it did not penetrate to the South and West Mediterranean area until a much later period. The large mass of evidence proved that the beginning of the use of copper tools dated as far back as 2500-3000 B.C.

Dr. Beddoe regretted that the archaeological had recently almost eclipsed the purely anthropological argument, and pointed out that his observations of the modern Greek type indicated a mixed nationality, the brachycephalic element in which appeared to be recently intrusive.

Principal Rendall, Principal of University College, Liverpool, said that the Liverpool meeting of the Association had, in this section, been signalled by a recrudescence of the Pelasgian superstition. Professor Ridgway and Dr. Montelius had from different sides come to the same conclusion, but it was only a nominal one, for the former had derived the Mycenaean from Asia Minor, while the latter had placed them everywhere but in Asia Minor. The term Pelasgic was too vague, for all the Greeks were Pelasgi. The discrepancies noticed between the Homeric and Mycenaean weapons were extremely slight. And the correspondence between the documentary evidence of the Homeric poems and the archaeological evidence afforded by Schliemann's discoveries and more recent excavations was, on the whole, very close.

Dr. Munro thought that it was the first time they had had such a great field-day. It was a struggle between the physical and the classical archaeologists, and it was the only way in which the conflict could be settled. In respect of the weapons, he thought that the greaves would have been found in tombs if the Mycenaean had worn them. There was no evidence for a copper age in this country. Copper weapons may have been sometimes used from lack of tin, but for every one of copper there were ten of actual bronze in Western Europe.

Sir John Evans urged that the Homeric poems do distinctly relate to a period later than the Mycenaean period, and the civilisation of the time when the poems were written was evidence of this. Dr. Montelius had given data for the relative chronology, but it was very difficult to divide it out into an actual number of years. It did not follow that a form introduced at the beginning of one period went out of use at the end of the period. It was unfortunate that the marks of the pottery could not be carried back to an exact date. Bronze tools, however, were in definite use in Egypt in the time of Khames, in the 16th century before our era.

Mr. J. L. Myres, in answer to Dr. Munro, said that graves had been found in Mycenaean tombs, not, indeed, made of metal, but with metal bands and clasps. He explained how the whole type of armour worn in Greece changed while the Homeric poems were yet in the unwritten ballad state, and interpolations most probably occurred in reciting the poems.

The President, summing up a most interesting discussion, thought it did not seem desirable to tie down the Pelasgians to any one distinct race. There was no reason to deprive the Pelasgians of the honour of having shared in Mycenaean civilisation. In respect of the early date assigned to writing by Dr. Montelius, there was internal evidence in the letters of the Greek alphabet

showing earlier forms than the corresponding Phœnician forms, and therefore going back to the 10th century B.C., a period anterior to that of which we have a written record. There was a general consensus of opinion as to the very early date of the Mycenaean remains. The presence of bronze and pottery of Mycenaean form in closed Egyptian tombs was sufficient to give a fixed date, and all the evidence has shown that there was a high period of Mycenaean development as far back as the 15th or 16th century B.C. And a greater latitude must be given to earlier bronzes, which in some cases were probably worked as far back as 3,000 years before our era.

PILLAR AND TREE WORSHIP.

In the afternoon, the President, Mr. Arthur Evans, gave an address, illustrated by lantern slides, on the recent evidence he has collected in relation to pillar and tree worship in Mycenaean Greece. Mr. Evans said that, by finds in Crete and the Peloponnesus, he had new evidence to show the great part played in the Mycenaean religion by the worship of deities in aniconic shape as stone pillars or as trees. On a gold ring obtained by him from the site of Knōsos, in Crete, and dating from the Early Mycenaean period (about 1500 B.C.), a dual cult of a male and female divinity in their pillar shape, and an armed sun-god being brought down on to his obelisk or "beth-el" by ritual incantation were illustrated. Parallels to this dual cult of deities in a columnar form were cited from Cypriote cylinders of Mycenaean date, and the later cone of Aphrodite at Paphos was shown to be a survival of a cult once common to pre-historic Greece, and of "Ægean" rather than Semitic importation into Cyprus. Mr. Evans identified the column of the Lions' Gate at Mycenæ with the aniconic idol of the Phrygian goddess Kybēlê, whose anthropomorphic image later supplanted the pillar form in the same position between the lion supporters. A confusion seemed at times to have taken place between the pillar form of the divinity and the tombstone of the god himself, or some allied hero really his double; and there were reasons for identifying the traditional "Tomb of Zeus" in Crete with the remains of a prehistoric sanctuary he had visited on Mount Juktas. An interesting fragment of a Mycenaean stœte vase from the site of Knōsos showed an altar in front of a stone inclosure containing a sacred fig-tree, and the cult of this tree, illustrated by other Mycenaean relics, was compared with that of the *figus ruminalis* in Ancient Rome, where, as in Cyprus, the traditional Arcadians represented a Mycenaean influence. The early sanctity of the dove was also associated throughout Mycenaean Greece with this primitive worship and with the religion of prehistoric Crete. Finally, the pillar and tree worship of Mycenaean Greece had largely survived in the rustic cult of classical Greece at a time when in the more civilised centres the images of the gods had been mainly anthropomorphised. This was illustrated by the rural sanctuaries with their sacred trees and stones so well represented on the Pompeian frescoes.

Mr. G. Coffey read a paper, illustrated by diagrams and slides, on "The Ornament of North-West Europe," and Mr. P. M. C. Kermodé gave an account, also illustrated by a large number of diagrams and lantern slides, and entitled "Celtic and Scandinavian Ornament Illustrated on the Monuments of the Isle of Man."

NOTES FROM PARIS.

THE three large panels completing the series painted by M. Puvis de Chavannes for the decoration of the library of the town of Boston, are now being exhibited at the Durand-Ruel Art Gallery. The other paintings of this fine series of decorative panels have been successively exhibited at the annual salons, the first, entitled "The Muses acclaiming Genius Messenger of Light," enjoyed great success at the salon of 1895, and the five panels, entitled "Astronomy," "History," "Virgil," "Æschylus," and "Homer," described in the BUILDING NEWS of 1st May, formed the special attraction of the Salon of the Champ de Mars this year. The remaining three paintings, "Philosophy," "Chemistry," and "Electricity," are quite worthy of the preceding work, and will complete in a magnificent manner the fine decoration of the Boston library. "Philosophy" represents Plato giving utterance before one of his disciples to his famous saying, recalling the struggle

between Spiritualism and Materialism, "Man is the offspring of Heaven, not of Earth." The philosopher and his listener are placed in the foreground of the picture; in the distance may be seen the other followers clothed in light-coloured tunics, strolling about and discussing in a verdant garden surrounded by colonnades. "Chemistry," the subject of the second panel, is personified by a young girl leaning against a rock, presiding over the mysterious combinations of various matters contained in a retort, and waving her wand to hasten the chemical transformation, the phases of which are attentively followed by three crouching spirits. The subject of the last panel, "Physics" or "Electricity," must have been one very difficult to treat properly; but the artist has succeeded in avoiding all hackneyed treatment, and has given much powerful sentiment to his work. The wires of the electric telegraph are seen crossing a rough and mountainous landscape, these wires representing the agents of thought carrying with lightning swiftness to distant places news both good and bad. Good news is personified by a white-robed woman gliding rapidly across space along the wires, carrying the emblem of welcome news, a golden palm. A woman in mourning follows close behind, hiding her tearful face in her hands as if grieving over the bad news she is carrying—unwelcome news destined to break or bring despair to many hearts. The artist has almost surpassed himself in this last beautiful panel, which may be considered as being one of the best of the whole series.

The monument erected to the memory of Watteau will be inaugurated in the Luxembourg Gardens on the anniversary of the birth of the celebrated painter of the "Fêtes Galantes." This little monument, the work of M. Gauquie, sculptor, and M. Guillaume, architect, son of the late M. Guillaume, architect of the Louvre, is composed of a marble balustrading, Louis XV. in style, surrounding an elegant pedestal supporting the bust of Watteau. To the left of the pedestal is a young girl seated on the balustrading, and offering with graceful gesture a bouquet of flowers to the painter. The figure is clothed in a costume of the Regency style, copied by the sculptor from one of the paintings of Watteau. An inscription, "To Watteau, 1684-1721," is marked on the pedestal, at the foot of which are the attributes of palette and brushes and a palm-leaf. This work offers, besides its clever and artistic ensemble, a certain interest in the fact that whilst the balustrading and the girl's figure are sculptured in white marble, the bust of the painter, as well as the attributes, are modelled in a composition of tin, supposed to better withstand the injuries of time and weather.

The Luxembourg Museum or art gallery is being greatly enlarged, for the rooms, especially those for sculpture exhibits, are becoming very much too crowded, the statues being placed almost one against the other. The terrace adjoining the museum on the garden side is being cleared of its statues and bronze vases, and will be covered in, affording thus considerable additional space for painting and sculpture exhibits. Visitors will, during the duration of the work, be admitted to the museum from the orangery only. It is here that the celebrated "Pauvre Pêcheur," one of the first works of M. Puvis de Chavannes, and some of the best works by living and dead artists purchased by the State, may be admired.

The question as to what is to be done with the ground occupied by the Cour des Comptes, burned during the Revolution, and of which the ruins form a picturesque object opposite the Louvre, appears to be a very difficult one to decide. The Orleans Railway Co. is very anxious to acquire the ground for the construction of a terminus railway station to be connected with the present station by a line passing under a portion of Paris. In return for this grant, the company promises to construct gratuitously a new building for the Cour des Comptes, on any ground which may be designated. If this offer is accepted, the new building will be constructed in a position as central as possible, and the Museum of Decorative Arts, banished from the Champs Elysées by reason of the demolition of the Palais de l'Industrie, will have to seek further for a spot for the new building for the collection which it was hoped would have been housed in a special building to be erected on the present site of the Cour des Comptes.

Much resistance is still being made at Paris by the proprietors of flat dwelling houses to the new laws and rules relating to health and sanitation.

A syndicate of landlords has recently emitted the proposition that each proprietor should instruct his "concierger" to forbid any person or inspector belonging to the administration of sanitation to enter the house for any reason whatever, unless specially authorised by the landlord himself; a printed notice even, attached to the walls of the "loge," giving the concierge all power to forbid such inspection. This is certainly a strange state of affairs in a city where the new sanitary measures are much needed, and should also be rigorously enforced.

The Committee of the Directors of the Exposition of 1900 have now accepted the definitive scheme prepared by M. Girault, for the two palaces to be erected in the Champs Elysées in place of the Palais de l'Industrie. M. Girault, who has been appointed chief architect for this work, has combined in his scheme the best of the various arrangements comprised in the plans and designs premiated in the late competition. The new façade will comprise three large porticoes, flanked on either side by a colonnade forming loggia. The work of constructing the larger palace will be divided between three architects. M. Deglane will follow up the studies for the chief façade on the new avenue, M. Louvet will undertake the central portion, and M. Thomas the façade on the Avenue d'Antin, the whole work being supervised by M. Girault, chief architect. It will be interesting to follow this rather strange arrangement of dividing the work of one building between four architects, each of them men of value. However, it is to be hoped that the work will be carried on without any show of jealousy or bad feeling between the four confrères. The smaller palace will be built entirely by M. Girault, from his designs, which won him the first premium in the competition. The work of demolishing the present Palais de l'Industrie will be commenced as soon as possible, probably towards the end of next month. A portion of the building, however, will be left standing until after the Salon of next year. A tunnel will be excavated from the building to the quay of the Seine, for the purpose of carrying away the materials from the demolition without spoiling the avenue and trees of the Champs Elysées. There is a certain disappointment that the monumental bridge to cross the Seine in front of the Invalides has not been put to competition between architects and engineers, the architects being of opinion that such a bridge, which, if anything, should be monumental, will not have a sufficiently decorative and ornamental character, if designed and constructed by engineers only, and that the art of the architect should be combined with the science of the engineer.

The work which is now being undertaken by the Paris-Lyons Railway Company for the construction of a new terminus station at Paris, will probably take over ten years to complete. The credit opened amounts to £800,000, but this figure will in all probability be exceeded. The new station hall will be 282ft. wide, composed of two trusses of 141ft. span and 590ft. long. There will be eighteen lines for the departure or arrival of trains, the platforms from which will lead to a large vestibule parallel to the façade, which will be very monumental in design, comprising two stories, and a length of 330ft. It is hoped to complete the principal portion of the work in time for the coming Exposition Universelle.

The piercing of the new Rue Réamur, a magnificent street opening out a portion of Paris from the Bourse to the Boulevard de Sebastopol, is bringing into view a large number of old houses and buildings of historical interest which were hidden away in the narrow streets of this one of the oldest quarters of Paris. Besides the ancient Priory of St. Martin les Champs, an interesting portion of which has been brought to light, and which will probably remain standing on one side of the new street, if the Committee of Historical Monuments buy up the ground and insist on the preservation of the building, there are a number of houses which recall interesting souvenirs. No. 7 of the Rue de Cléry, to be demolished, was erected by Leroux under Louis XIV., and was inhabited by Ducis under the Empire. An ornamental panel and a handrailing of wrought iron both very pure in style, will remain as relics. Close by, the old ramparts of the city under Louis XIV. are discovered, and near these is a house once belonging to Lenormand d'Etiolles, husband of Mme. de Pompadour. This quarter, under Louis XI., was the refuge of vice in all its forms, and was inhabited by a group of Moorish women brought from Palestine by the Crusaders.

Artists and architects are busily sketching and making notes of the various interesting buildings and examples of ornamental art brought to light for a short time before being demolished.

M. Berthelot read an interesting communication before the last meeting of the Académie des Sciences, concerning the recent discovery of extensive copper mines under Mount Sinai, worked 6,000 or 7,000 years before our era. M. de Morgan, author of the magnificent discoveries at Dachour, has lately visited these mines, and found the galleries in the state in which they were abandoned several thousand years ago. In the ruins of the habitations once surrounding the mines he discovered many examples of the tools, such as graving tools, chisels, and needles, employed by the workmen of the mines, slaves whose cruel and miserable existence has been described by ancient writers. Most of the objects found are made of pure copper, proving that at this epoch the advantages of combining tin and copper for the manufacture of bronze was unknown. Some of the tools were hardened by means of the addition of slight quantities of arsenic; but it is not known from whence this arsenic was obtained. M. Berthelot, in presence of these facts, opined that the progress realised by metallurgy was small since those times; but that the moment was near when electricity would make a revolution in the science of the preparation of various metals.

A number of Parisian architects are engaged in preparing their plans and designs for the international competition opened by the town of Kiew (Russia) for a theatre. The theatre should contain 1,500 spectators, and the cost of construction should not exceed £48,000. The competition closes on the 15th December next.

The lighthouse now being constructed at Eckmühl, near Penmarch, will be completed in about three months. This lighthouse, which will form a safeguard against the dangerous coast of Finistère, is the gift of the Marquise de Bloqueville, who left the sum of £12,000 for its construction, to which sum £16,000 has been added by the French Government. The height of the lighthouse will be 208ft. The power of the electric-light lantern is estimated at 40 million candles, or twice the power of the most powerful existing lighthouse light. The tower will have at its summit a compressed-air siren for use in misty weather. The carrying distance of the light will be about 120 miles, the light being visible at this great distance—of course, by cloud reflections only. The lighthouse is constructed entirely of Kersanton granite, under the direction of M. Proberteau, engineer. In the entrance vestibule of the tower a statue of Marshal Davout, father of the donatrice, will be erected, and a plate commemorating the legacy of Mme. de Bloqueville.

A society of mutual assistance for French architects has just been created, having its central offices at Versailles, and destined to come to the aid of the widows or children of deceased architects. This society, from which much good work is expected to come, has been sanctioned by the Prefect of the Seine.

ARTHUR VYE-PARMINTER.

OBITUARY.

THE death has been announced, at the early age of 35 years, of Mr. T. RIDYARD ROSCOE, M.S.A., who had been for some years in the employ of the Vestry of St. Leonard's, Shoreditch. He was elected a member of the Society of Architects last November; but, owing to prolonged illness, had not been able to take any part in its proceedings.

The conversazione and distribution of prizes at King's College, Strand, to the students of the architecture and building construction classes, and the architectural studio at that college, and the wood carving classes at King's College, Great Titchfield-street, and Kensington, W., will take place on Friday evening in next week, October 2, at 8 p.m. The Rev. Henry Wace, D.D. will occupy the chair, and the distribution will be made by Mr. Jesse Jacob, Master of the Worshipful Company of Carpenters.

The memorial-stone of St. David's Episcopal Church, Govanhill, Glasgow, was laid on Saturday. The building, which is situated in Aitkenhead-road, will accommodate about 300 persons.

The township commissioners of Pembroke, near Dublin, have adopted plans by Mr. J. Franklin Fuller, of Donnybrook, for 65 cottages, which they are about to provide for the working classes.

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ILLUSTRATIONS.

THE KURSAAL AT CHELTENHAM.—“GUYZANCE,” ACKLINGTON. — FUNFKIRCHEN CATHEDRAL.—TOMBS IN PAVEMENT, S. CROCE, FLORENCE.—SKETCHES NEAR CAEN.—HALCYON INN IN THE ADIRONDACK MOUNTAINS.

Our Illustrations.

FIRST PREMIATED DESIGN: KURSAAL, IMPERIAL-SQUARE, CHELTENHAM.

THIS design, which was submitted in the recent competition for the Kursaal buildings, Cheltenham, was placed first and awarded the premium of £100 by the assessor, Mr. J. M. Brydon, F.R.I.B.A. The instructions to competitors were to plan a building suitable for the distribution of the Cheltenham mineral waters (with ample storage accommodation), and to be an attractive place for a social centre; the existing Winter Garden could be pulled down or dealt with in any way. Beyond these no exact instructions were issued for the guidance of competitors. The plan illustrated is arranged so that the building could be used for promenade concerts, musical recitals, dramatic performances, balls, and any social function usual in a building of this character; the entrance-hall serving as a pump-room for the distribution of the waters; the existing winter garden to be retained as an annexe, and to serve as a promenade, the organ of the new hall being placed so that it may be heard in both buildings. One bay of the west transept of Winter Garden to be pulled down, the remaining bay to be used as a refreshment-hall, and separated from the main body of the existing building by an ornamental wooden screen. A tea-garden (to be situated in the large south-west angle of buildings), with terraces, &c., and served from a small kiosk, forms part of the scheme. The materials of the general walling to be red bricks, with Monk's Park stone dressings, the roofs for the greater part to be covered with lead, the dome of pump-room to be glazed. Internally, the walls of hall and the ceilings to be panelled in Keene's cement; the ceilings of ladies' and gentlemen's rooms to be plaster ribbed. The floors of hall and large rooms to be of pitch pine, in 3in. widths on concrete; the floor of pump-room to be of marble, lin. thick, in 6in. squares; the corridors to have marble mosaic paving, with ornamental borders; the floors of cloak-rooms and entrance-porch to be of encaustic tiles, the heating to be by hot water. In the architectural treatment it was the endeavour, in accordance with its being a possession of the municipality, to produce a design both graceful and dignified, keeping in a measure the feeling and suggesting the associations belonging to the buildings of a somewhat similar character in the adjacent watering-places of the district.

CHARLES V. JOHNSON.

“GUYZANCE,” ACKLINGTON, NORTHUMBERLAND.

THIS work comprises considerable alterations and additions as indicated in black on the plan; the hatched walls denote the old buildings. Local stone has been used for the walling, the roofs being covered with Broseley tiles. Much of the interior has been rearranged, and the staircase

and hall contain some good oak work. The floors of the dining-room are in parquet, and those of the staircase and hall in mosaic. Other additions and improvements have been carried out on the estate, including extensions to stable, groom's residence, kennels, game-house, &c. The house is situated on the north bank of the river Coquet, and commands delightful prospects. Messrs. Armstrong and Knowles, of Newcastle-upon-Tyne, are the architects.

FUNFKIRCHEN CATHEDRAL, HUNGARY.

THE Cathedral of Fünfkirchen stands on the site which was occupied by a Christian church, dating as far back as the time of the Romans. Excavations executed a few paces to the south of the cathedral, in the course of the last century, brought into view a Christian funeral vault, dating from the 4th century of the Christian era. As to the precise period when the foundation-stone of the present church was laid no definite information is obtainable. In 1009, “Stephen the Sainly” founded a bishopric of Fünfkirchen, but we know not whether he built its cathedral. Tradition ascribes the building to King Peter, but there is no certainty. In all probability, the cathedral was erected in the 12th century, in the Romanesque style. It was destroyed by fire on more than one occasion. In the year 1303 it was covered with a new roof; but, as experience showed, the roof proved too heavy for the walls, which so strikingly threatened to collapse after a time, that it was found necessary in the 14th century to prop the main structure by the addition of chapel annexes, north and south, located between the towers. In the year 1506 Bishop Sigismund had the cathedral painted by a Benedictine monk, by name Jakob. But very shortly after the Battle of Mohacs (1526), the Turks used the cathedral, first as a storehouse for hay, and later on as a school. After the Turks had evacuated the territory, Bishop Matias Radonay had the cathedral restored. In 1704, however, the Kuruzen set fire to it, involving its destruction. Under Bishop Nesselrode it was rebuilt again, but not in the same style of architecture. At the beginning of the present century it again underwent a process of renovation, but in such execrably bad taste that but little remained of its original character. Some years back the church showed such palpable signs of dilapidation, and the ceiling revealed such formidable cracks, that, to guard against the peril of an utter falling in, it was resolved to carry out a thorough restoration. Under the patronage of His Excellency Dr. Ferdinand Dulausky, the cathedral was once more renovated, in the Roman style, by the late Friedrich Baron von Schmidt, architect-councillor of the first class, the work commencing in 1882, being completed in the course of ten years. It is a great achievement, and worthy to rank as a unique specimen of the style. Unhappily, it was not vouchsafed to the architect to behold his magnificent work completed, for he died on January 23, 1891. The last thing he designed for the cathedral was the Apostles' Candelabrum, now hanging in the sanctuary, as depicted in the illustration, beyond the baldachin over the high altar. The beautiful and highly-successful photograph of the Fünfkirchen Cathedral, which we have reproduced, is one of a series executed by the specialist, Mr. Carl Zelesny, at his “Royal Household Studio” in Fünfkirchen. We are indebted to him for permission to use his originals. The plan and two sections given on the second plate exhibit the extent of this notable and ornate building.

TOMBS IN PAVEMENT, SANTA CROCE, FLORENCE.

THIS sheet of sketches of inlay marble tombs from the magnificent church of Santa Croce, Florence, calls for little description. The examples chosen are among the most beautiful of the series, and our illustration was taken from the original water-colour studies placed at our disposal by Mr. H. V. Lanchester, from whose sketch-book we published some similar drawings on April 19, last year. The ornament is charming in drawing, and exceedingly suggestive.

SKETCHES NEAR CAEN.

THE grand lantern of Le Vieux St. Etienne, the spires of St. Sauveur and St. Pierre at Caen have over and over again been praised and illustrated as they deserve; but I have never seen any mention made of the magnificent parish church of St. Jean, though doubtless many must have sketched it. The tower is a little later than

those of St. Sauveur and St. Pierre, and evidently by the same artist, being almost identical in treatment to St. Pierre, and finer, I thought. More wall-space is allowed between the top of the belfry windows and the parapet; also the gargoyles arrangement seems rather happier, there being no diagonal ones on the angles. The belfry windows were originally, like those of St. Pierre, divided into two lights by long slender shafts, but these have disappeared. The tower seems in a very distressing condition; it is considerably out of the perpendicular, and there are huge rents and cracks in it—these appear rather worse in the interior. An octagonal slated roof inside the parapet, not seen when close under the tower, takes the place of the splendid spire it was intended to have, the building of which had to be given up owing to the tower standing on an undrained morass. The interior of the church is very impressive; low transepts open out of the west tower. The nave has four bays, the western one occupied by the great organ, with a magnificent Renaissance front, as most of the French organs have. The main transepts opening from the central lantern are slightly lower than the main avenue. The choir is of four bays, with a three-sided apse, and three hexagonal chapels beyond. Both nave and choir have aisles with chapels between the buttresses. A considerable amount of old gilding and colouring remains in the choir chapels. There is a wealth of splendid Flamboyant carving and tracery, especially on the exterior, the flying buttresses being very grand. The central lantern is likewise incomplete, and leans slightly to the south; the change from the square to the octagon seems very well managed in it. Although unfinished, the two towers group very well together. Verson is about six miles west of Caen. It is an exceedingly picturesque and well-situated village, with a very fine and interesting church, mainly Transitional, of the end of the 12th century. The nave has a lofty barrel vault of timber, a thing very rare in Normandy, where every little church is vaulted. The aisles have half-barrels likewise of timber, and the transepts flat boarded ceilings. A chapel was added in the 13th century on the north of the choir, the east wall of it being built skew, as it faces a small road. The nave pillars are a good example of the progress they made in carving, the westernmost pair being almost Egyptian in character, with simply a swelling out at top and bottom; but each pillar as you advance eastwards develops more carving than the one before. All the roofs are tile except the tower, and this has a stone roof, which has turned a beautiful green colour. The little chateau near the church has the main roofs of tile, the tower-roof and turret being covered with small blue-grey slates, those on the turret cut into ornamental patterns. The bit of wall below the turret is covered with hanging tiles. It is, I think, entirely built of Caen stone. All round Caen the villages and churches are very interesting, and no one who stays at Caen should miss going to Falaise.

JOHN C. HAWES.

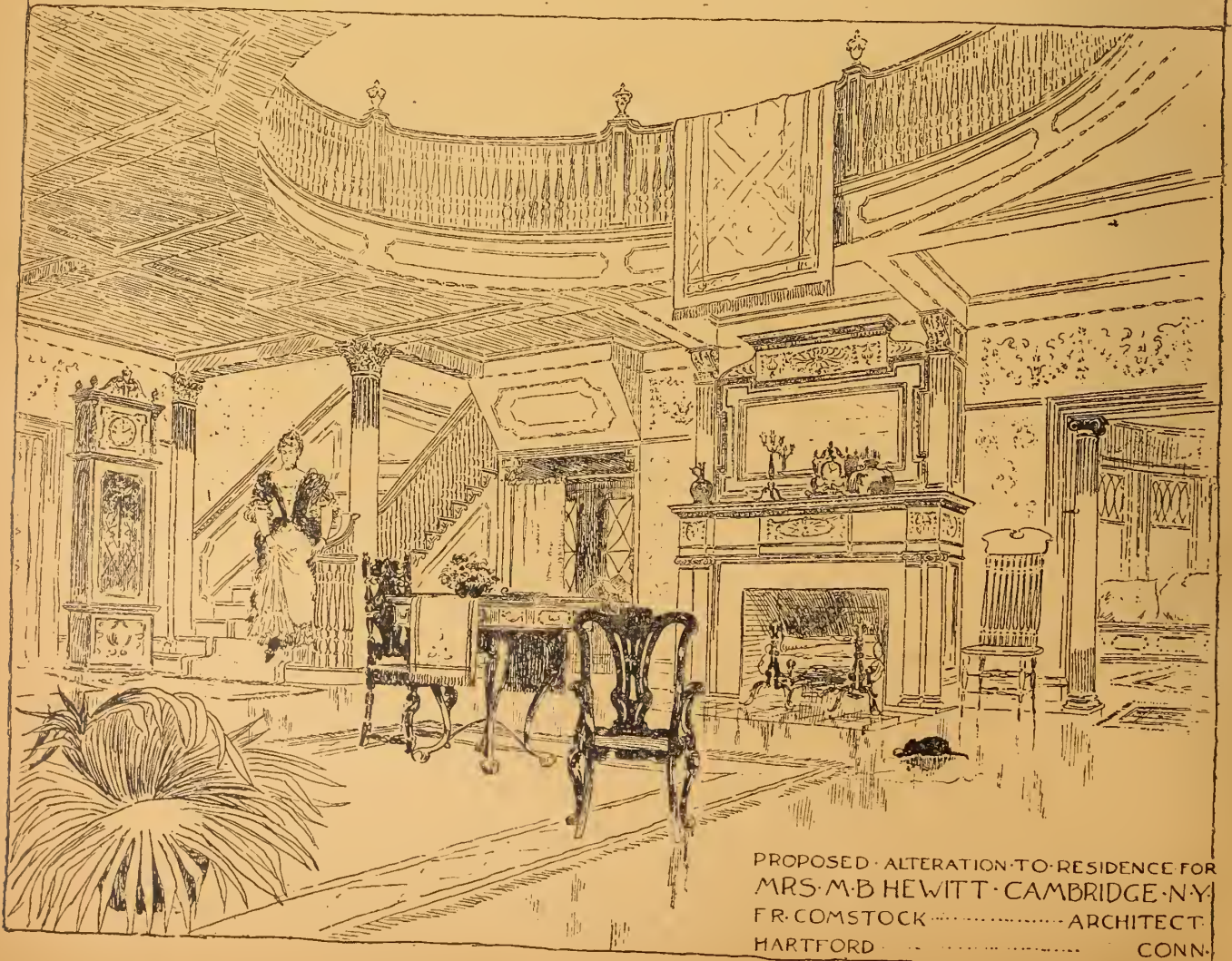
HALCYON INN, LITTLE TUPPER LAKE, AND HALL AT CAMBRIDGE, N.Y.

THIS hostelry retreat in the Adirondack Mountains, south of St. Laurence, furnishes a typical example of picturesque building much in vogue in the United States, and we are indebted to the architect, Mr. F. R. Comstock, of Hartford, Conn., for the accompanying sketch. A feature is made of the verandah, and a belvedere is fittingly provided amidst this still wild primitive forest region. The interior, by the same architect, shows the staircase and hall designed for a house at Cambridge, New York, in a free and suggestive manner, with a degree of refined detail.

The opening conversation of the Sheffield Society of Architects and Surveyors will be held at the Cutlers' Hall on Wednesday evening, Oct. 7, 1896. The address of the president, Mr. Charles Hadfield, F.R.I.B.A., will be delivered at 8 o'clock. The pictures of the Sheffield Society of Artists will be on view at this conversation. An original collection of the works of the late Alfred Stevens will be exhibited.

The fourth annual exhibition of the works of the pupils of the art and technical classes under the direction of the Technical Instruction Committee of the Worcestershire County Council was opened on Monday at Oldbury. The exhibition, which principally consists of specimens of woodwork, ironwork, modelling, and designing, will remain open until to-day (Friday).

·HALCYON INN·
 LITTLE TUPPER LAKE
 ADIRONDACK MOUNTAINS.
 F. R. COMSTOCK ARCHITECT



PROPOSED ALTERATION TO RESIDENCE FOR
 MRS. M. B. HEWITT · CAMBRIDGE · N. Y.
 F. R. COMSTOCK ARCHITECT
 HARTFORD · CONN.



EARLY 15 CENZY

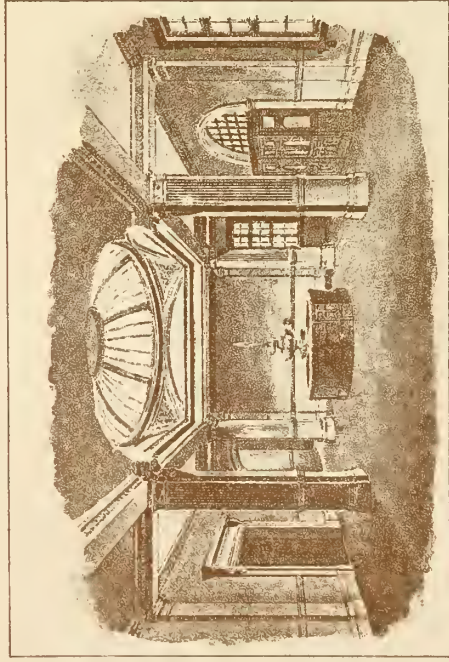


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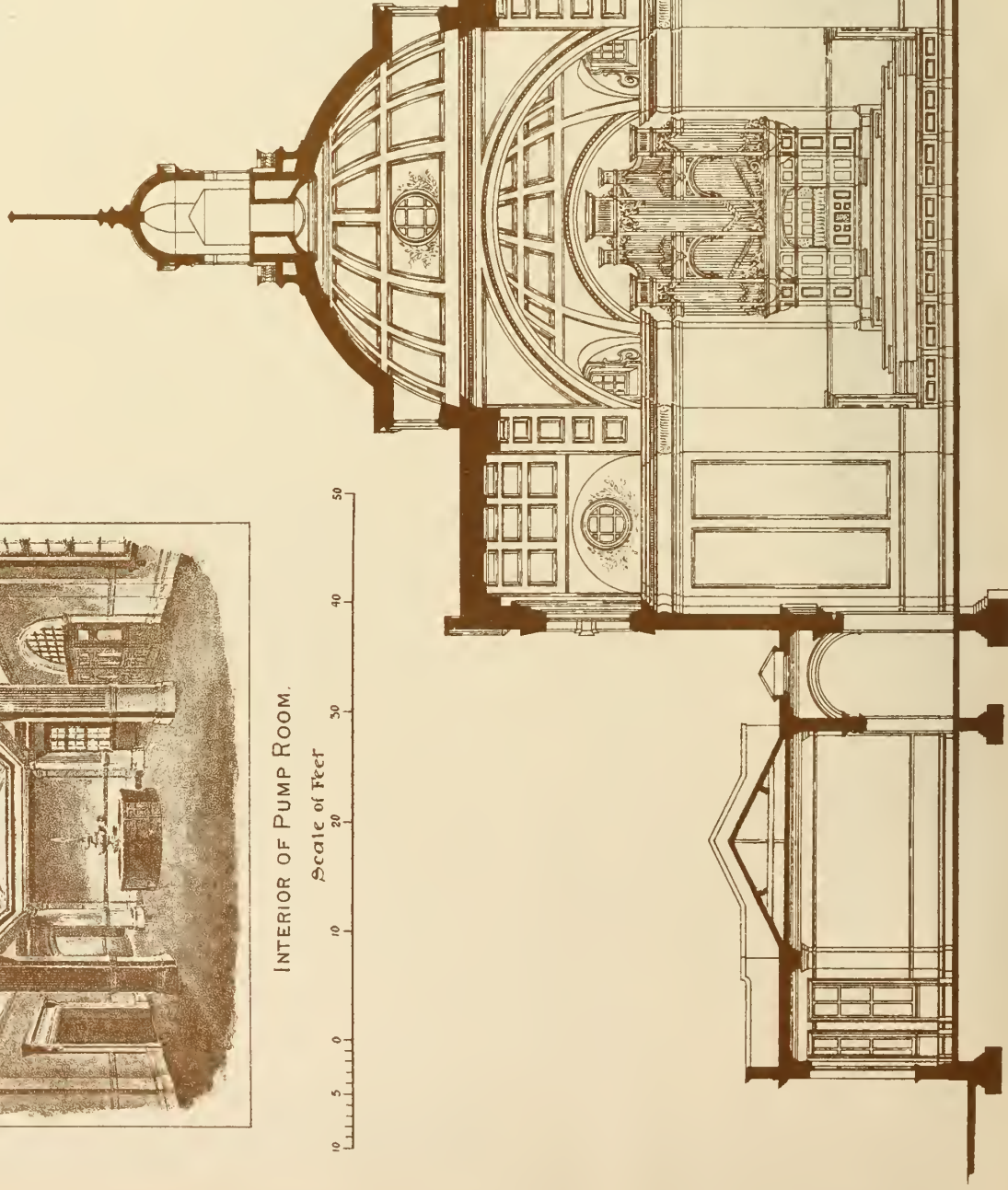
..DESIGN FOR KURSAAL: IMPERIAL SQUARE.

· CHELTENHAM:

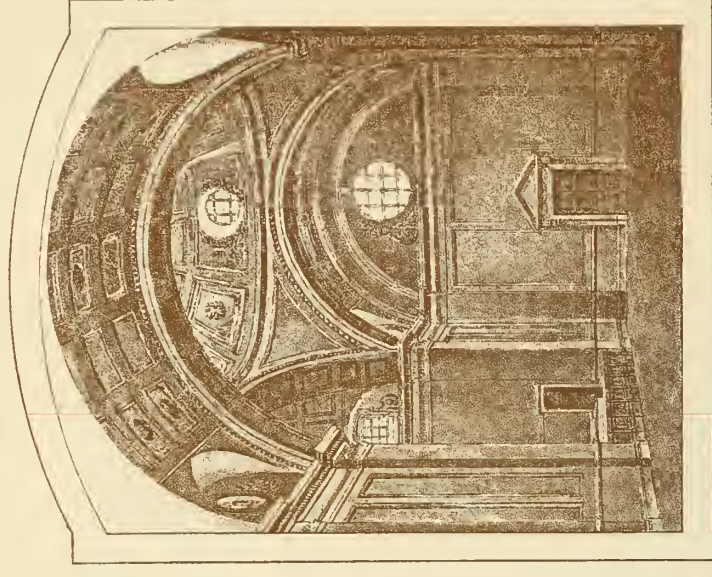


INTERIOR OF PUMP ROOM.

Scale of Feet



INTERIOR OF HALL.





"PHOTO TINT" by James Akerman. Queen Square London W.

SEP^T 25, 1896

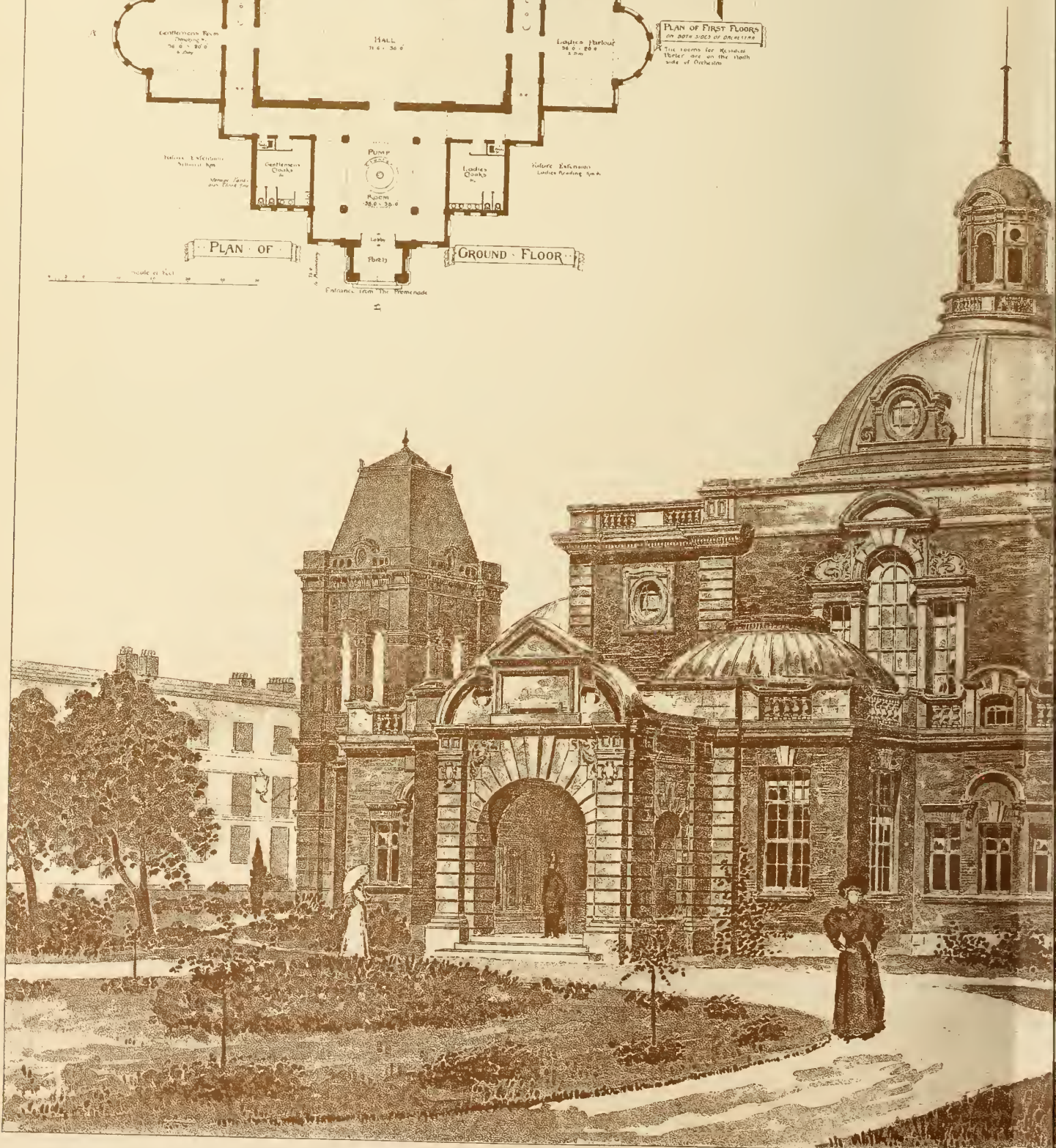
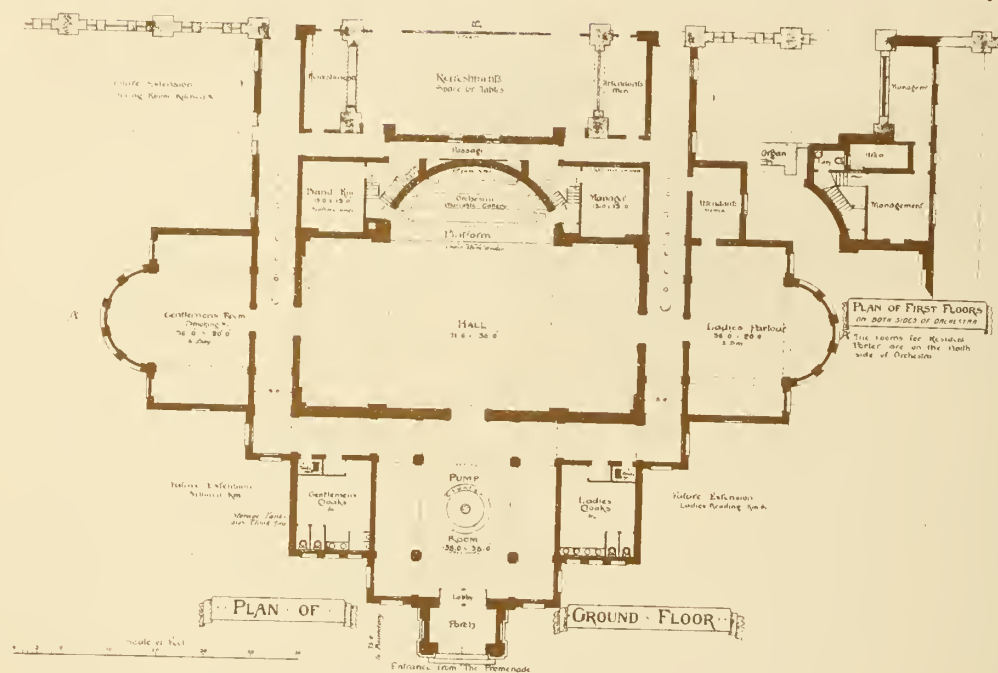


HUNGARY: BY THE LATE BARON VON SCHMIDT: ARCHT

PHOTO BY CARL ZELESNY

DESIGN FOR KURSAAL, IMPERIAL

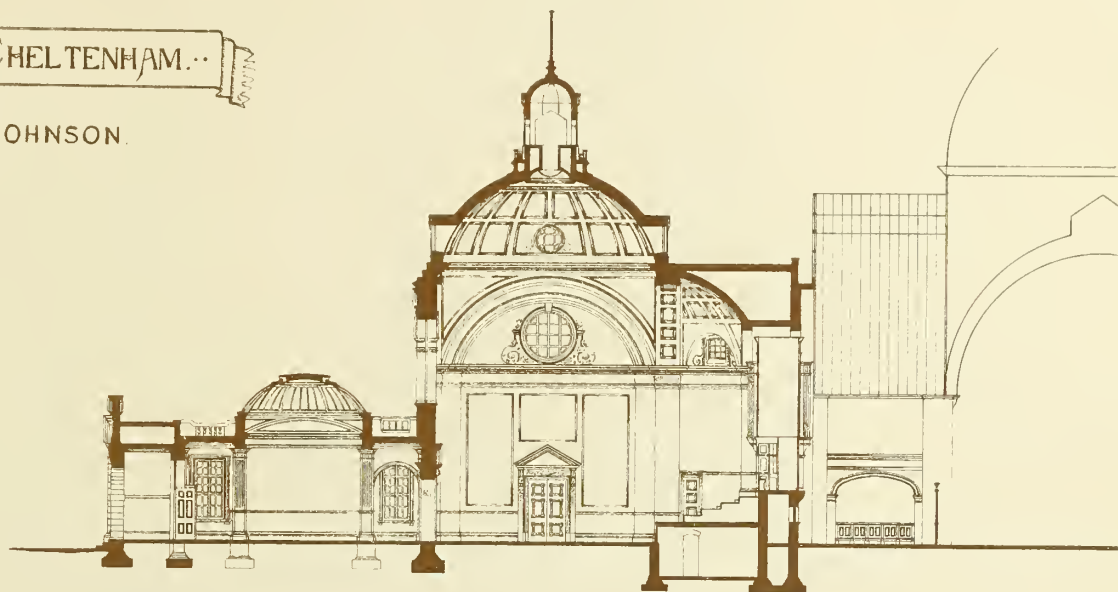
FIRST PREMIATED DESIGN



SEPT 25, 1896.

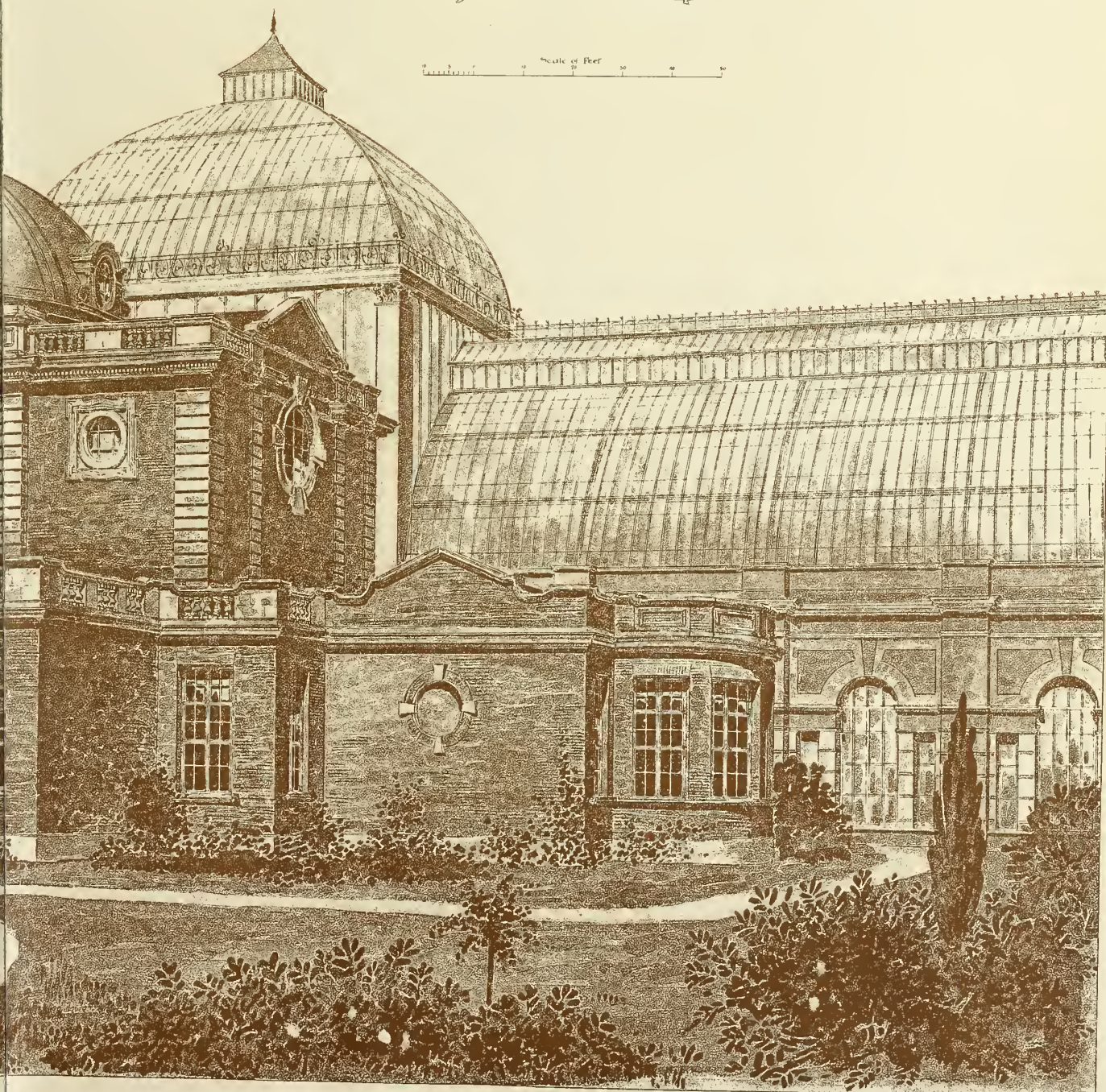
SQUARE. CHELTENHAM.

Y CHARLES V. JOHNSON.



SECTION ON LINE BB.

Scale of Feet



"GUYZANCE" ACKLINGTON Northumberland
Additions &c for J.D. Milburn Esq J.P.

Crimstrong and Knowles Architects
Newcastle upon Tyne

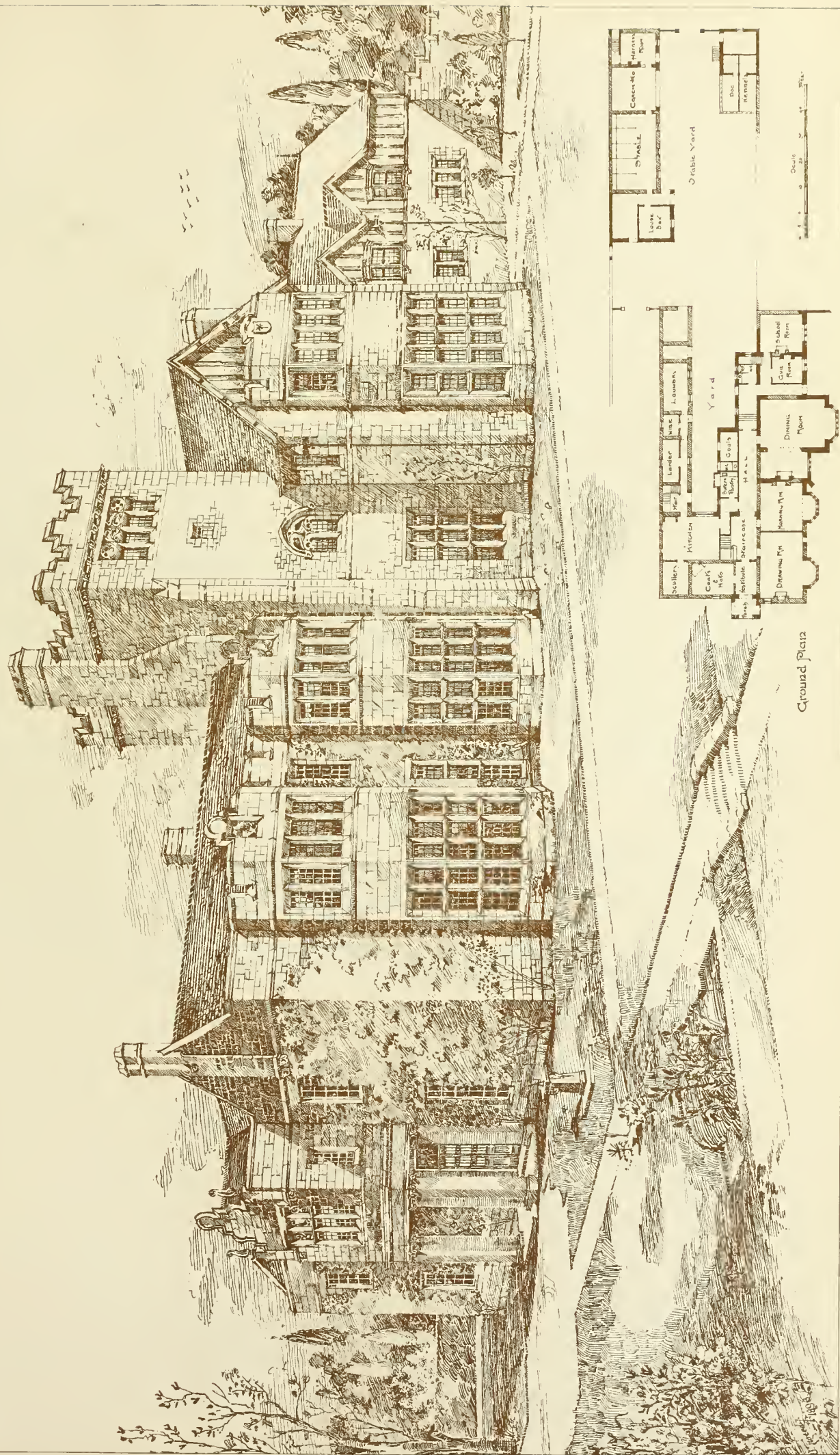
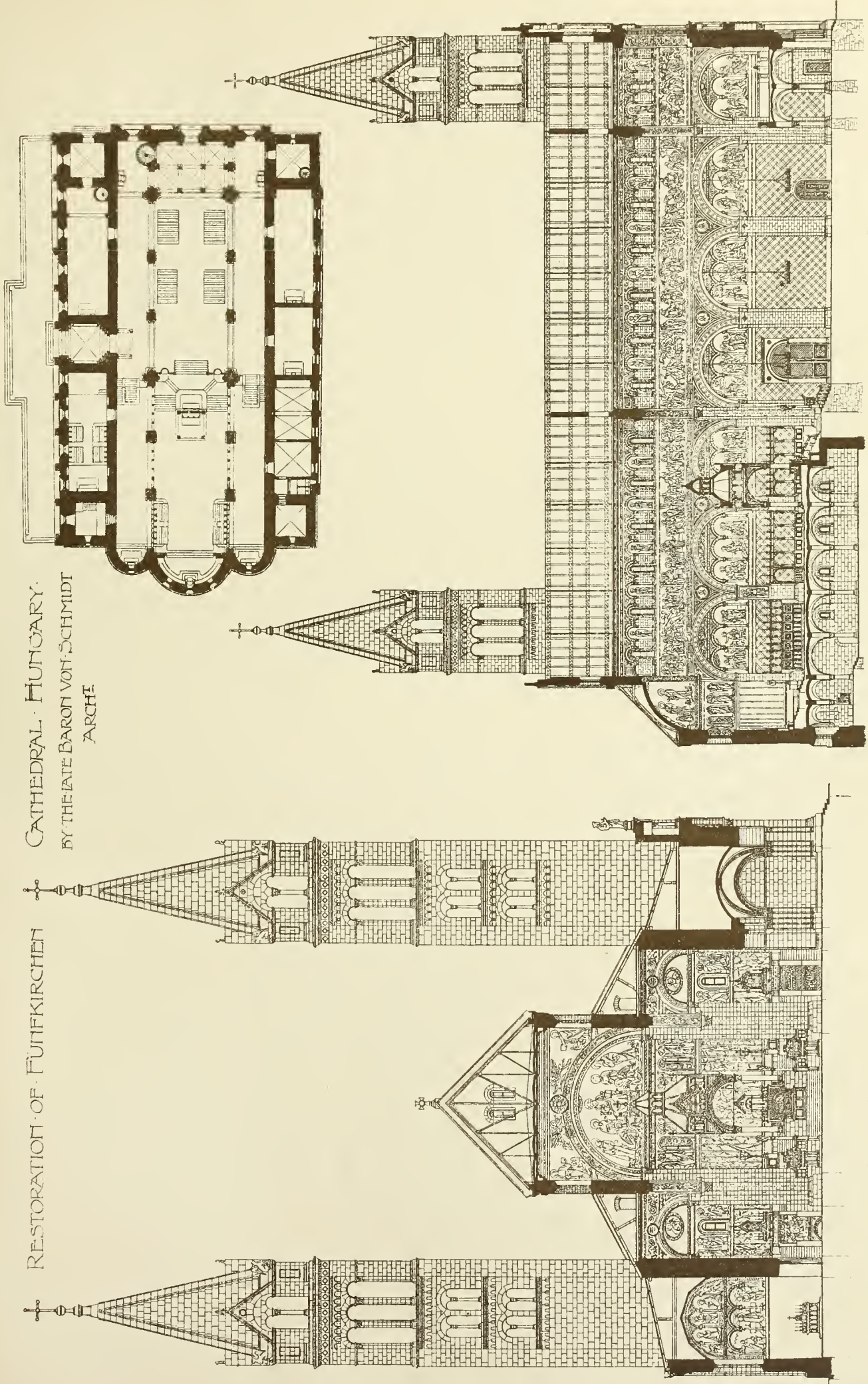


Photo Lib. Leeds & Co. Ltd. 1896

RESTORATION OF FÜNFKIRCHEN

CATHEDRAL, HUNGARY.
BY THE LATE BARON VON SCHMIDT
ARCHE

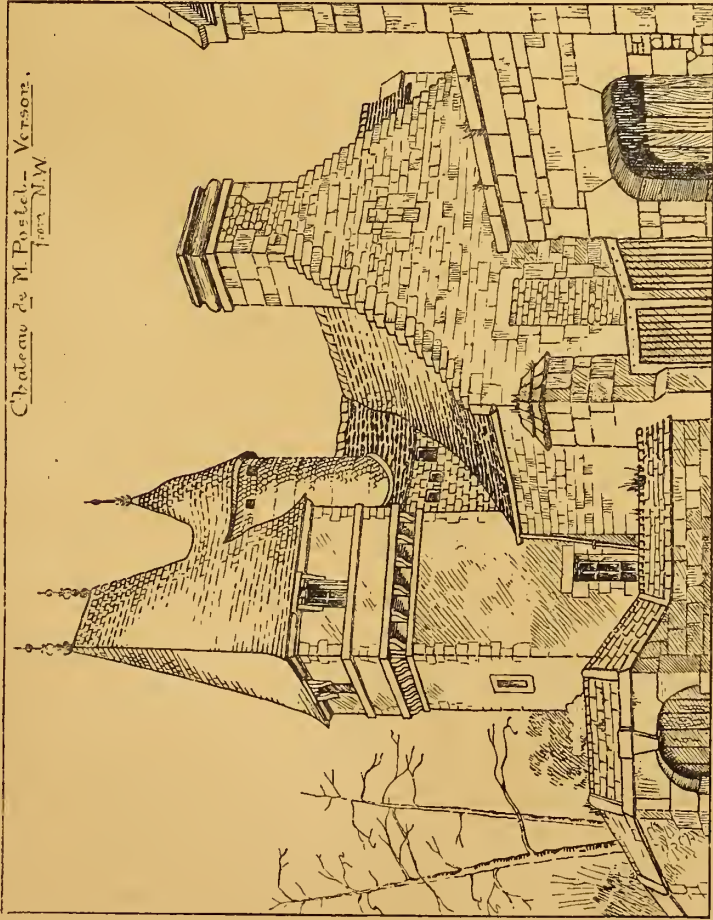


CROSS SECTION.

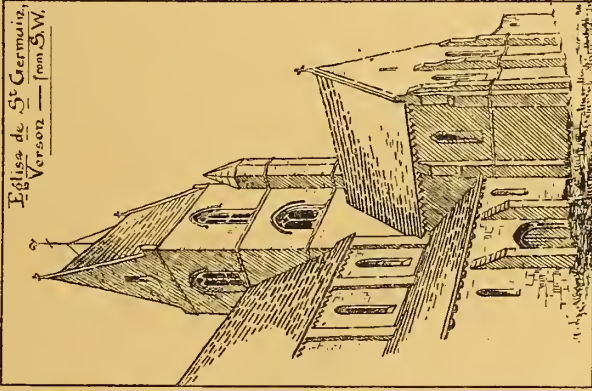
LONGITUDINAL SECTION.

Sketches Near Caen

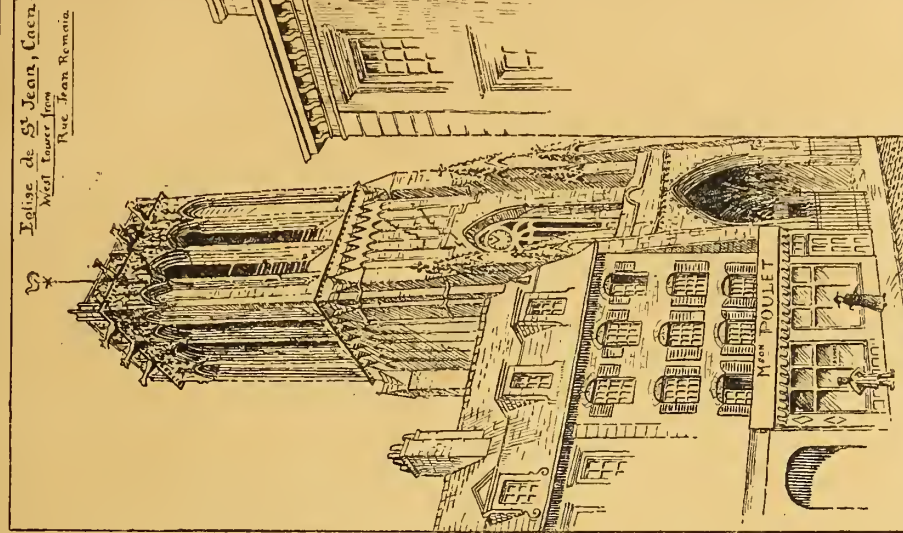
Chateau de M. P. de la Versson.



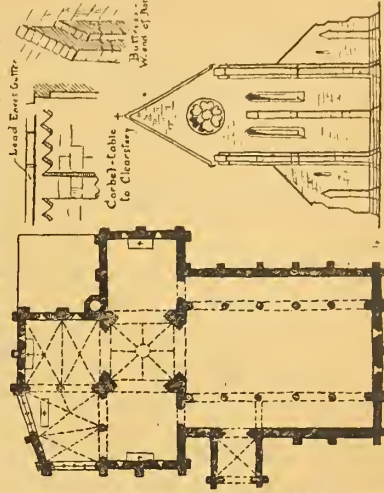
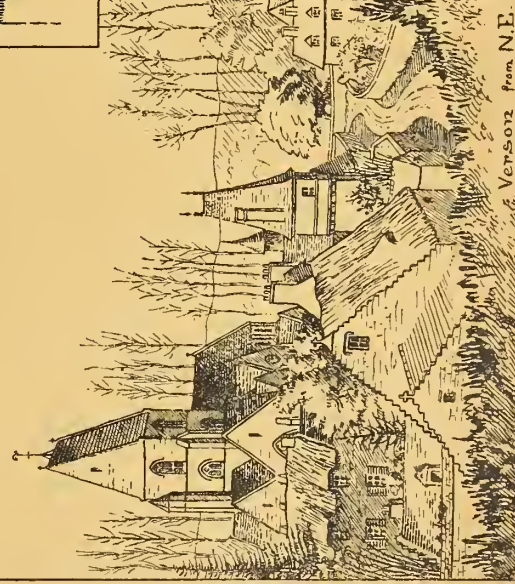
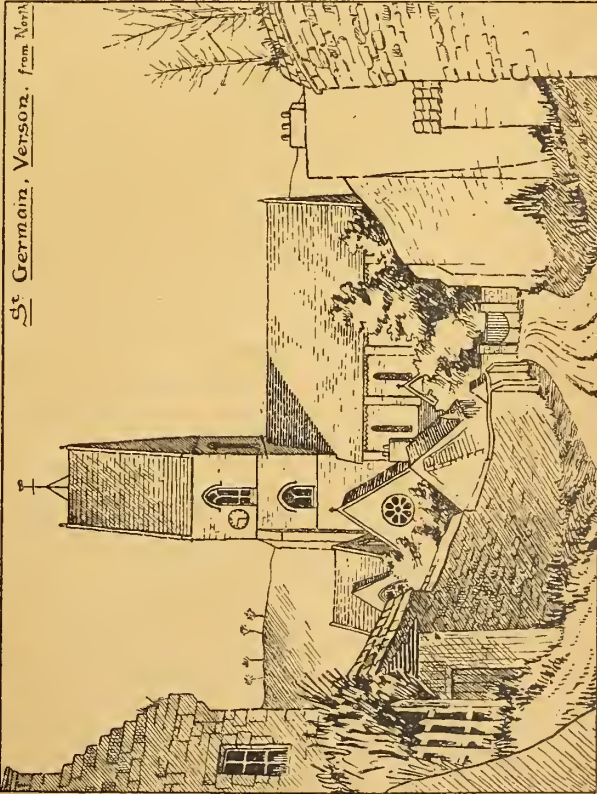
Eglise de St Germain, Versson — from S.W.



Eglise de St Jean, Caen
West Tower from
Rue Jean Renaud.



St Germain, Versson, from North



Sketch Plan
St Germain, Versson.

West Elevation
J.C. Hawes.

Building Intelligence.

BACUP.—New central schools for the Bacup School Board, were opened on Saturday last. They will accommodate 825 children, in two departments—500 boys and girls, and 325 infants, each in a separate building. They are planned on the central hall principle, the former having 8 classrooms of various sizes, and the latter 3 classrooms and recess for gallery. The whole of the buildings and boundary-walls are faced with local stone, lined with bricks. The joiner's work is of pitch-pine, varnished, and the arrangement for cloak and teacher's rooms, lighting, heating, ventilation, &c., are of the most modern and complete character. The various branches of the work were executed in separate departments by local men, the cost being upwards of £9,000, including the new road. The architect is Mr. Thos. Bell, of Burnley, under whose superintendence the work has been carried out.

BRIDGNORTH.—The new buildings of the Bridgnorth and South Shropshire Infirmary were opened on the 17th inst. The infirmary is erected on the pavilion principle, and containing, in addition to the accommodation necessary for the administrative staff, eighteen beds for patients, irrespective of the arrangements made to deal with out-patient cases. The designs were prepared by Mr. Maidman, of Edinburgh, and the building contract has been carried out by Mr. Merton Hughes, of Birmingham.

EDINBURGH.—At a meeting of the Fever Hospital Sub-Committee of Edinburgh Town Council, held last Friday, Mr. Morham, City Superintendent of Works, submitted sketch plans of the new fever hospital buildings to be erected at Colinton Mains. The committee approved generally of the plans, and instructed Mr. Morham to have them lithographed and described, so that they might be taken into further consideration. The buildings, which bear a considerable resemblance to the plan of the Royal Infirmary, will be reached on the west by a road passing Craiglockhart Hydropathic, and at the east by a road, about three-quarters of a mile in length, running from Comiston road alongside the road leading to the poorhouse. In the centre of the buildings are the administrative offices, including the servants' and nurses' homes, these pavilions being three stories high. To the east of the main corridor are the scarlet-fever wards, two stories high, and including observation and isolation wards. The west side is occupied by wards for patients suffering from diphtheria, typhus, typhoid, erysipelas, hooping-cough, chicken-pox, and measles.

HARROGATE.—The Harrogate Cottage Hospital was reopened on Saturday last. The "Clarence Wing" added will accommodate nine beds. Off-duty rooms, and new bedrooms for the staff have also been built at the head of the building. The old staff bedrooms have been made into wards, so that altogether forty patients can now be accommodated, whereas formerly only twenty-four could be admitted. The architect is Mr. Marshall, of Harrogate. The total cost of the new works was estimated to be about £2,700.

LANGHOLM.—The memorial-stone of the Thomas Hope Hospital was laid at Langholm on Monday afternoon. The hospital, which is far advanced towards completion, has a breadth of about 200ft., while the other way, inclusive of lodge, the measurement is 144ft. The architects are Messrs. Woodd and Ainslie, London. The material used in its construction is the white freestone of the district. The walls, which are thick and massive, are of bull or rock-faced work, with quoins and principal stones in bold tooled work, with fine proportioned gables, pediments, and circular dormer windows. It has a tower in the centre, with turrets, and finished off with battlements. The whole is under the superintendence of Mr. R. K. Duncan, clerk of works. The estimated cost of the building, exclusive of site, is £17,000. The building is in the Border style of architecture.

LARKHALL.—The new academy, erected by Larkhall School Board at a cost of over £7,000, was formally opened on Saturday last. The new school is situated in Union-street, adjoining the present academy. The style of architecture is a free treatment of Scottish Renaissance, simply treated. The walling is of local free-stone, and the slating of Buttermere light green slates, with red ridge tiles. Playground space and playsheds are amply provided. Internally the school is

planned upon the central-hall principle, comprising a series of classrooms, varied in size to suit the different standards, grouped on two floors round a central hall, to which each section of scholars have separate access, as well as separate stairs to the upper floor. Accommodation is provided for 798 scholars. The plans are arranged, however, with a view to a future extension of the school to 1,100 places. The total cost of the building is expected to be under £8 per scholar. The architect is Mr. John B. Wilson, A.R.I.B.A., and I.A., Glasgow.

OBAN.—The West Highland Cottage Hospital, Oban, N.B., has just been opened. It has cost £2,600, all included. The plans were competitive, and out of a large number sent in under motto, those by Mr. Woulfe Brennan, architect, Oban, were selected as the best, and his design has been carried out in full. The building, which is treated in the cottage style, suited to the locality, is most picturesque, and is of Bonawe granite, with freestone dressings; the ridges are of red tiles, and the chimney cans are of the same material. The large wards are heated with Shorland's Manchester grates. Messrs. D. and A. Munn, Oban, are the contractors for the masonry and joinery. As at present designed, the accommodation is for 12 beds, besides two private wards, and nurses' accommodation.

SAUGHALL.—On Tuesday the new church of All Saints', Saughall, between Chester and Hawarden, was dedicated. The plan consists of nave, with north aisle of four bays, chancel, with organ-chamber on the north and vestries on the south, a west-end central baptistery, and a south-west porch. The nave is 54ft. long and 24ft. wide, and the floor slopes up slightly towards the east. The chancel is 26ft. long and 18ft. wide, with apsidal east end. Open screens on the north and south screen it from the organ-chamber and vestries. Over the western portion of the chancel is arranged a low tower with a broached spire, covered with shingles. The walls of the church are faced outside and in with red brick, with a dado inside the nave of brown glazed bricks; the sills and dressings are of terracotta. The portion so far built is the nave, with the baptistery and south-west porch, temporary walls being built east of the chancel arch and in the arches of the north arcade. This portion will accommodate a congregation of about 200, and has cost about £1,300. The church has been designed by Mr. Medland Taylor, of Manchester, the contractor being Mr. W. W. Freeman, of Chester.

SEAHAM HARBOUR.—New schools adjoining the Primitive Methodist chapel, Seaham Harbour, were opened on Saturday, the 19th inst. The new buildings comprise three classrooms and minister's vestry, &c., on the ground floor, and a large, well-lighted school with open roof on the first floor. A new stone porch has been added to the chapel, which has been renovated and improved. New roof-lights have been put in. The classrooms are divided with folding partitions. Mr. White, of Sunderland, is the contractor, and the works have been carried out under the supervision of the architect, Mr. Sidney Walton, of Sunderland.

SHEFFIELD.—The phenomenal activity in the building trade shows no sign of waning, although it has continued for several years. Builders, contractors, and architects have still as much work on their hands as they can execute, both as regards domestic and commercial requirements. Among new erections which have been decided upon are the church at Hunter's Bar, the Woffinden almshouses, the extension of Heeley Church, a pupil teachers' centre at the corner of Orchard-lane and Bow-street, reconstruction of premises in Angel-street, premises for Mr. John Walsh and Messrs. Nicholson, Greaves, Barber, and Hastings at the corner of Fargate and High-street, and many other undertakings. The works in course of construction which are rapidly approaching completion are the High-street buildings, premises in Church-street, and the Prudential Assurance Company's great block in Pinstone-street.

TORQUAY.—Holy Trinity Church, Torquay, was consecrated last week. The new church stands at the bottom of Silver-hill. The tower at the north-west corner is 73ft. high, and is crowned with a parapet from which springs the spire to a height of 92ft., thus making the apex of the spire 165ft. above ground. The tower and parapet are of pierced open Bath stone, with a carved Bath stone pinnacle at each of the

corners. Springing from these are Bath stone flying buttresses, which support the spire. The church consists simply of nave, north and south aisles, two transepts, and chancel with apsidal end. Inside, the church is 130ft. long by 53ft. broad in the nave, the total length of which is 101ft. The open roof is of stained deal, with the exception of that over the chancel, which is of panelled pine. The seats are of pitch-pine, providing accommodation for 720 persons. Fifty-nine incandescent lamps are provided for illuminating purposes. The organ is the same as was used in the old Trinity Church, but it has been renovated and redecorated, and placed on the north side of the chancel, the vestry and offices being on the opposite side. There are no choir stalls. The pulpit and font were specially designed by the architect, and are the work of Mr. H. T. Jenkins, and solely comprised of Devonshire marble. The brass lectern, of modern pattern, is the gift of the architect, Mr. J. Watson, and the reading desk, which stands close by, is of carved oak and ebony, with Ashburton marble pedestal. The chancel floor is laid with red tiles, and the steps are of Ashburton marble finely veined. Heating will be accomplished with hot water. The contract has been carried out by Messrs. Mumford and Vanstone, from designs by Mr. Watson, and by the time the approaches have been completed, the cost will have been close upon £9,000. Mr. Meredith has been clerk of the works.

COMPETITIONS.

WOLVERHAMPTON.—It having been decided that the Lysaght Memorial should take the form of a clock and tower, many designs were sent from various parts of the country. The one selected is that of Mr. Joseph Lavender, and the work will be carried out by Mr. Lovatt, builder and contractor, both of Wolverhampton. The clock will be a four-dial, to strike the hours, to be heard at all the places in the neighbourhood of its erection, and will be the work of Messrs. Smith and Son, of Derby.

ARCHITECTURAL & ARCHÆOLOGICAL SOCIETIES.

YORKSHIRE ARCHÆOLOGICAL SOCIETY.—An excursion was made last week to Mount Grace Priory, near Northallerton, when over 80 members and friends inspected, by permission of Mr. William Brown, the interesting Carthusian Priory of Mount Grace, where excavations are being made for the society by Mr. W. H. St. John Hope. Mr. St. John Hope graphically explained the ruins, stating that though the Priory of Mount Grace was founded in 1397 by Thomas Holland, Duke of Surrey, for monks of the Carthusian Order, and dedicated in honour of the Assumption of Our Lady and St. Michael, yet it was only partly built at the founder's death, and was not completed until the ratification of the foundation by Henry VI., in 1440-1. It was suppressed in December, 1559, when pensions were assigned to the prior, John Wilson, who also received the house and chapel called Le Mount. The ruins of this still remain on the top of the hill behind the Priory. In 1534-5 the clear annual value had been reckoned as £323 2s. 10½d. Since the visit of the society in 1882, the ruins of the Priory have been almost entirely freed from ivy and other noxious plants, and during the spring of the present year the excavations carried out by Mr. Brown and himself had brought to light a number of interesting features. The eastern part of the church has been cleared out, disclosing the base of the high altar, and on the south side of the choir had been uncovered the walls of a side chapel containing the bases of a tomb and two altars. The chapter-house had also been found and cleared, and the sacristan's house identified and partly excavated. Some interesting remains have also been opened up to the west of the church, and three of the houses on the north of the great cloister freed from the accumulated rubbish. Much more, however, remained to be done.

The Congress of German Natural Physicists opened at Frankfurt-on-Main last Sunday, when the foundation-stone of a monument to Dr. Samuel Thomas Soemmering, who is claimed to have been the founder of the electrical telegraph system, was laid. Soemmering, who died in 1830, was a noted surgeon and anatomist of his day, and passed most of his life at Frankfurt.

THE BRITISH ARCHAEOLOGICAL ASSOCIATION.

THE annual congress of this Society was opened on Monday, under the presidency of the Lord Mayor. The members and visitors assembled at the Mansion House at noon, where they were received by the Lord Mayor and Lady Mayoress on behalf of the Corporation, by whose invitation the reception was held. The Lord Mayor afterwards occupied the chair, and the business meeting proceeded.

The inaugural address was delivered by the Venerable R. Thornton, Archdeacon of Middlesex. His subject was "The Progress of Archaeology and the Utility of its Researches." His views were that, just as history was no longer confined to the recapitulation of events, but takes scientific consideration of causes and effects, social, moral, and political, so antiquarianism has become archaeology, and had changed from mere collecting of antiquities into a true science of investigation, and in this way, as chronology had been termed the eye, so archaeology had become the foot and hand of history. Most important assistance has thus been given to what is termed the Comparative History of Religions, so that many were inclined to consider the word history in this connection as bearing its original and wider sense of orderly research. The position of archaeology amongst the sciences might be thought to be best expressed by saying that while history dealt with what men had done, archaeology dealt with what they had made. The knowledge of man's physical, visible, tangible productions, and the use of them, was a wonderful aid to the study of what he had achieved, or failed to achieve, in action. Schliemann's researches at Mycenæ had thrown new light upon Homæric and Homeric times; and a suit of 14th-century armour gave no little help in understanding the battles of Crécy and Poitiers. The archaeologist was a valuable helper in collecting and classifying different objects which told of the religious beliefs of ages gone by. We knew by the archaeologist's help the worshipers of Egypt, Assyria, Babylon, Persia, Greece, Rome, Scandinavia; and India, Polynesia, Australia, Mexico, and Peru contributed to our knowledge of the varied ways in which humanity had contemplated the Supreme. To the right understanding of the one true religion archaeology has contributed no inconsiderable part; and the researches into the written, painted, and sculptured remains of the great nations of old had been of inestimable value in the testimony they had borne to the truthfulness of our sacred books. They had shown that the Hebrew people were cultivated, and that those they came in contact with were cultivated also, Hittite, Canaanite, and Jebusite, and that the Samaritans had a literature of their own long before the Sheikh Abraham led his people southwards beyond the stream of Phrat. If we turned to secular history, we found archaeology one of its most trustworthy aids. Where would Egyptian history be without the archaeological researches of Bruce, Champollion, Lepsius, Birch, and others? Without them early Egyptian history would be confined to a few passages in Scripture and a book of Herodotus. So, too, would Assyrian and Babylonian history be without the researches of Rich, Layard, Rassam, and Rawlinson. Some day, perhaps, like materials would fill up the blank pages of Carthage, and some Punic Layard would give us the full story of the rise, decline, and fall of that ancient Mistress of the Seas. It was not, however, with the researches in foreign lands that our British archaeology was solely concerned. We had the antiquities of our own land and our own kindred before us. Celtic, Cymric, Romano-British, Scandinavian, Saxon, Anglian relics afforded a wide field for scientific study. Still further there was a department of archaeology which was neither identical with nor assistant to, recorded history—namely, that relating to the periods called Pre-historic; and these researches showed that our early history did not begin with the Celts, but that an earlier race preceded them.

Monday's proceedings were terminated, after visits to Rahere's church of St. Bartholomew the Great, the Charterhouse, and the Temple, by a reception at the Guildhall. On Tuesday, St. Alban's and Hatfield were visited; on Wednesday an excursion into Kent included Maidstone and Leeds Castle, the second excursion, on Thursday, being devoted to Rochester Cathedral, Castle, and mural defences. To-day Lambeth Palace and Church will be the sources of interest, and Fulham Palace and Church.

To-morrow will conclude the Congress by a visit to Waltham Abbey, Epping Forest, and Chingford. On Wednesday, the Clothworkers' Company, of which Dr. Phocé Spiers is a Warden, entertained the members at a *soirée* in their Hall.

ADAPTABLE SPECIFICATIONS.—X.*

SLATING: FACTS AND MEMORANDA.

VARIOUS KINDS OF SLATES.—*Bangor, Carnarvon, and Portmadoc* Slates are those most in use for common work. The towns after which they are named are not the places at which they are quarried, but those at which they are collected for sale and exportation. The Bangor slates come chiefly from the Penrhyn quarries at Bethesda. The Carnarvon ones come from Llanberis, Nantlle, and other places from eight to twelve miles distant; and those which bear the name of Portmadoc from the Festiniog valley. Blue and grey are their prevailing colours, but a very good green slate is also found at Nantlle near Pen-y-gros, Carnarvon. All these slates, when properly selected, are hard and durable. With the exception of the green ones, which cost about half as much again as the others, their tints are seldom very pleasing, and since, for reasons of economy, they are split extremely thin, they produce a roof surface almost destitute of "texture." Some old houses at Penrhyn, near Portmadoc (not the Penrhyn near Bangor), are covered with a strong rough slate of a soft cloudy grey tint, and this possibly might still be obtained there if there were any demand for it.

At *Whitland Abbey* (near Narberth, Pembroke-shire) rather thick green slates of agreeable colour are quarried. They were considerably used some years ago in church-building throughout South Wales; but their durability has been questioned. In London they were used at St. Columba, Haggerston, and at the Marquis of Westminster's Schools, Buckingham Palace-road. The smaller sizes were then advertised to be laid complete, in and near London, at about the same price as ordinary plain tiles.

"*Eureka Green*," "*Permanent Green*," and other slates of similar shades, whose places of origin are not stated, are offered by slate merchants. It is understood that some of them come from Germany. For the sake of cheapness in carriage, they are usually split thin, and give, therefore, a rather tame-looking and ineffective surface when laid. Many of them are hard and sound, but they vary much, and great care is needed, with all foreign slates, to insure that the bulk are supplied equal in quality, as well as in colour, to the sample. Moreover, when it becomes necessary to reject a portion of them for this reason, the difficulty may arise that there are no more of the right quality in England, and a building partially slated with them may be delayed for many weeks till a fresh supply is imported.

Westmoreland Green Slates are more expensive than most of the above, except perhaps the Carnarvon greens; but they are usually quite satisfactory, both as to colour and durability. At the Elterwater Quarry the rates and sizes were recently as follows: "Best" slates (so-called from their size rather than from their colour and quality) are sorted from 36in. to 20in. long. They cost about £5 11s. per ton delivered in London, or about £4 15s. per ton at the quarry, and a ton will cover about 2½ squares. "Seconds" are equal in every way to best, but being smaller—that is, from 30in. to 12in. long—and of various widths, they only cost £3 5s. per ton at the quarry, or about £4 in London, and a ton covers from 2 to 2½ squares. "Best Peggies" are from 14in. to 7in. long—they are equal to the others in quality and colour. They cost £3 10s. per ton at the quarry, or £4 6s. in London, and a ton will cover from 2½ to nearly 3 squares. Westmoreland slates do not run in courses of uniform depth. They are sorted so that the courses are widest next the eaves, and get narrower and narrower as they approach the ridge. The narrow ones are generally the most effective in appearance, and have most play of light and shade over their rough edges.

Devonshire and Cornwall Slates do not appear to be much exported for roofing purposes. In their native districts they are, or were not long since, used in curious and effective ways which go far to do away with the monotony which has given Welsh slating a bad name, and which has caused it to be so largely superseded by different kinds

of tiling. For instance, all sizes of slates were used in the same roof, the large ones being laid like quoins, for the verges and edges of gables, and very small ones forming the main part of the surface. Two, three, or more courses of the latter then ranged with a single course of the verge-slates. Projecting slates, again, standing out several inches, were built into the mortar joints of the walls where a roof abutted against them, to throw off the water, and to save the expense of lead flashings. Slate hanging—sometimes as at Totnes, more odd than beautiful, but sometimes, too, as in a few old houses at Penzance, really artistic and suggestive—protected the houses from driving rains. There is much to admire in the thoughtfulness and ingenuity with which the slaters of old did their work. Amongst Cornish slates those from the Old Delabole quarries, near Camelford, have a high reputation. The slates are hard and durable, and light grey or greenish in colour.

"*Stone Slates*," so called, were formerly in general use throughout Rutland, Northamptonshire, and parts of Oxfordshire and Gloucestershire. They vary in tint from cream colour to brown. They are thick, heavy, and not remarkably durable, but their quiet tone suits well with that of the limestone rubble of these districts. There are quarries at Collyweston, near Stamford; at Sevenhampton, near Cheltenham; and at Stonesfield, Naunton, and elsewhere in the counties of Gloucester and Oxon. In Rutland, they are usually fixed by the Collyweston slaters, who bed them in a thick mass of mortar. In modern work in Oxfordshire, however, Stonesfield slates appear to be laid dry, which is probably the safest plan for all slates unless their texture is extremely soft or brittle.

Leicestershire produces, at *Swithland* and *Groby*, some very hard slates, which seem little known. They are said to be practically imperishable, to be excellent in colour, and very suitable for steps. There are other slates whose durability is beyond question, but which do not split freely, and which therefore come into the market chiefly as blocks or sawn slabs. Some of the Welsh slates are extremely durable. Close to the sea, at a little station called *Pensarn*, between *Barmouth* and *Harlech*, in North Wales, there is a disused church, surrounded by an ancient burial ground. The tombstones are chiefly of slate, and though they are in a most exposed situation, inscriptions more than a century old are as sharp and unworn as if they had just been cut.

Sizes of Welsh Slates, and Width of the Courses, allowing for a 3in. lap:—

Doubles are 12in. × 8in., and the courses show 4½in. wide.
Doubles are 13in. × 6in., and the courses show 5in. wide.
Ladies are 14in. × 12in., and the courses show 5½in. wide.
Ladies are 16in. × 8in., and the courses show 6½in. wide.
Viscountesses are 18in. × 10in., and the courses show 7½in. wide.
Countesses are 20in. × 10in., and the courses show 8½in. wide.
Marchionesses are 22in. × 12in., and the courses show 9½in. wide.
Duchesses are 24in. × 12in., and the courses show 10½in. wide.

Sawn slate slabs may be obtained from 3ft. to 10ft. long, from 1ft. to 5ft. wide, and from ½in. to 3in. or more in thickness. They may be obtained self-faced by splitting, or with two planed faces, the former being about 10 per cent. cheaper than the latter.

Bangor slate crushes, on the average, with about four tons to the square inch; and weighs from 170lb. to 180lb. per cubic foot. The plane of cleavage in Welsh slates is not often the quarry-bed, but is frequently at right angles to it.

TILING: FACTS AND MEMORANDA.

Tiles, in shape, are of two main classes: those which, like pantiles, interlock, and those which, like common plain tiles, are nearly flat, and are laid on the same principle as slates. In the former class, innumerable forms, often very ingenious, have been patented. But, except for sheds, workshops, and similar buildings, few of them get into general use. For this there are several reasons. One is the difficulty of fitting them to irregularly shaped roofs, and especially to those that are "out of the square." Another arises from the fact that ornamental forms (and most patent tiles are intended to be ornamental) will not bear unlimited repetition. The type which

looks well in a small sample may appear altogether "overdone" on a large roof. But the main cause of their non-adoption is a mechanical one. Unlike slates and plain tiles, interlocking tiles, of whatever pattern, only consist, when fixed, of a single thickness. A crack or hole in any tile, therefore, at once lets the rain through the roof, and this defect, along with the trouble involved in getting patent tiles from a distance when perhaps only one or two require to be replaced, has led to their removal, even where they have been laid for years. This happened, amongst other places, at a number of stations on the Chatham and Dover Railway, which, when first built, were chiefly noticeable for the peculiarity of their tiling.

Plain tiles differ both in colour and surface. Those of the old-fashioned type, made, for instance, in Kent and Essex, have a surface much like that of a good sand-moulded brick, which is frequently covered, in the course of years, by minute vegetation. The Reading, Maidenhead, and Bracknell tiles are superior specimens of this type. They may be obtained red, dark red, and strawberry-coloured. Broseley, and other Staffordshire and Leicestershire tiles, have a smooth surface, more like that of a pressed brick, and the Ruabon tiles are similar, but of better quality. They are supplied to order either red, brown, brindled, or blue, the last being the most expensive. Good red tiles are made at Rowland's Castle, Hants, and chocolate-brown ones at Beaulieu in the same county. Glazed roofing tiles do not appear to be made in England at present, though they were effectively used on the Continent in the Middle Ages.

Plain tiles are usually 10 in. by 6 in., and from 1/2 in. to 3/4 in. thick. Fir laths for tiling are 1 1/2 in. by 1 in., and oak tiling laths 1 1/2 in. by 1 in., or more.

Plain tiles, laid with a 2 1/2 in. lap, form courses 4 in. wide, and are said to be "laid to tin gauge." With a 3 1/2 in. lap, the courses are 3 1/2 in. wide, and with a 4 1/2 in. lap, they are 3 in. wide. A square of plain tiling weighs on the average about 15 cwt.

Pantiles measure 13 1/2 in. and 9 1/2 in., and are about 1/2 in. thick. A square of pantiling weighs about 8 cwt.

OAK SHINGLES.—These are laid on the same principle as plain tiles. They are usually 1 ft. long and from 3 in. to 4 1/2 in. wide. They are laid to about a tin gauge, and from 900 to 1,000 will cover a square. The cost per square depends on that of the shingles. If they are sold at 7s. per hundred, a square will cost from 75s. to 85s.

SPECIFICATION: PART VII.—SLATING AND TILING.

VII. 1. BANGOR SLATING.—Cover all the following roofs, namely, those of with best Bangor "ladies" slating, of a colour approved by the architect, with 2 1/2 in. lap; each slate nailed with two good [copper] [composition] nails; the slating to have double eaves, and the joints to be properly broken. Execute all cuttings to hips, valleys, and all other places requiring it.

VII. 2. WESTMORELAND GREEN SLATING.—Cover the following roofs—namely, those of—with Westmoreland green slating of the sizes known as "seconds," but of best quality, and of colour approved by the architect. The slates to have a 3 in. lap, and to be squared and sized in courses gradually diminishing from the eaves to the ridge; the joints to be properly broken, and the slating to have double eaves.

VII. 3. GIVING UP ALL SLATING PERFECT.—Give up the building for use with all the slating sound and perfect, and maintain it so till the last payment under the contract.

VII. 4. CLOSE HIPs.—Very carefully cut and mitre the close hips, and set them watertight [in oil mastic of dark colour] [by slating in with each slate a properly shaped and bent soaker of 3 lb. lead, covering the hip]. Every slate to the hips must have two nails in it.

VII. 5. RIDGES.—Put to all ridges a [red] [blue] ridge-tile in cement, to be selected by the architect, the ridge being of the prime cost value of [9d.] [1s.] per foot run.

VII. 6. TORCHING TO SLATING.—Well and carefully torch the slating of the following roofs—namely, those of—by pointing each joint on the underside with lime and hair.

VII. 7. SLATE CISTERNS.—Provide and fix where marked on plans [two] slate cisterns of best Delabole slate, each cistern with 1 1/2 in. bottom and inch sides, grooved and put together with oil cement, so as to be and remain perfectly

water-tight. There are to be two galvanised iron bolts outside at each angle. The cisterns are to have all necessary holes cut for fixing plumbers' work. One cistern over is to be [5ft. by 2ft. 9in. by 3ft.] inside, or of equal capacity in sizes to be approved by the architect; and the other over is to be [3ft. 6in. by 4ft. by 3ft.], or of equal capacity as above; but the exact dimensions must be arranged to suit the spaces left for the cisterns.

VII. 8. URINALS.—Form the urinal shown, with inch sawn and rubbed slate divisions, 6ft. high and 22in. wide, made good in cement to a groove 1 1/2 in. deep in the brickwork of the wall; the divisions to have rubbed rounded edges, and two rounded corners to each division. Put 3/4 in. slate, sawn and rubbed back, 4ft. high, fixed with countersunk copper screws to stout plugs in walls, and put proper sunk slate trough, 14in. by 2in., with stopped ends and hole for fixing plumbers' work.

VII. 9. TILED ROOFS.—Cover the following roofs—namely, those of with [best Broseley brown] [best Kentish dark red] plain tiles of a colour approved by the architect, laid to a 3 1/2 in. gauge on 1 1/2 in. by 1 in. best Dantsic fir laths [the whole well torched at each joint on the under side with lime and hair], and left perfect at completion, and made good up to the time of the final payment. Form proper double course at eaves, pointed up. Form tile verges by laying a course of plain tiles with butting joints to form the soffit, and bedding the roof tiles on these in Portland cement. Provide and fix proper valley tiles, and galvanised-iron hip-hooks to the hips. The hip tiles are to be [rounded, like valley tiles reversed]. Provide and fix in cement to all ridges ridge tiles to be selected by the architect, value [one shilling] per foot run, prime cost.

VII. 10. TILE FINIALS AND VENTILATING TILES.—Provide and fix where shown on the drawings No. tile finials, p.c. [10s.] each, and No. ventilating tiles, p.c. [7s. 6d.] each—all to be selected by the architect.

VII. 11. PANTILING.—Cover the roof of with pantiling, laid to a 10in. gauge [and bedded in hair and ash mortar], and where this roof abuts against the walls, form proper filletings in cement.

PRINCIPLES OF PERSPECTIVE.*

PART I. of this little treatise comprises the elements of perspective, the definitions, methods of projection, elementary processes, limitation of the field of vision, architects' perspectives. They are sensibly treated; and in Part II., "Advanced," these subjects are more fully considered, and the perspective of solids, shadows, and reflections are dealt with. Mr. Swinstead treats perspective with a thorough grasp of the principles, and in a manner which must be conducive to the interest and progress of the student. Many of the difficulties are explained. For example, Chapter IV. explains how it is that a perspective projection is not necessarily the exact appearance of the object. The theory of a cone of rays from the object which represents the equal space round the central visual ray in all directions ought to be mastered. These rays in fact form a cone the vertex of which is the eye. By perspective, the object is drawn on a surface, the eye being placed at the position required, and the representation coincides with the appearance, however extended the field of vision. But when seen from any other point than this fixed position of the eye, the representation would convey a distorted appearance. One or two useful illustrations of this fact are given, by the representation of a vertical column. The representation on a picture plane of such an object is subject to this distortion—viz., that the extremities of the column, those points being remote from the spectator's eye, vanish—i.e., the vertical lines representing them on the plane appear to vanish upwards and downwards—a fact which we see in photographs of towers and lofty objects. But it is explained that the picture plane is also subject to this foreshortening, because it is foreshortened in every direction as it extends from the centre of vision, and to the same extent as the original object, and this is proved geometrically by a diagram, in which the

optical angles subtended by the extremities of the column are less than that opposite the eye. Next, the author explains the perspective representation of an oblique cone of rays cut by the picture plane obliquely; also of a sphere or globe, which, when not directly opposite the eye, is represented as an ellipse. The same principle is exemplified in a row of columns parallel to the picture plane—one of the vexed questions among students. In all these instances it is shown that if the eye is in its true position in relation to the picture plane, the appearance of the perspective representation will exactly agree with that of the object; in the case of a colonnade, the varying lengths of the sections of columns at the picture plane is compensated by the visual angles. The chapter on the "Limitation of the Field of View" is also worth attention by architects and draughtsmen. For instance, it is desirable that the object should be placed with regard to the position of the eye, so that no part of its representation falls beyond an angle of about 30° with the line of direction or visual ray (a cone of 60° with the eye as its vertex being considered the limit of comprehension), so that when any part of the object falls beyond the angle of 30° the effect is unpleasant when seen from another point of view. The book will be found to contain all that is necessary to teach the principles of this art, and the questions given from the South Kensington Exam. papers will be found very useful to those preparing for the examinations.

SEWAGE DISPOSAL.*

IN a small brochure by Mr. Alfred J. Allen, entitled, "Some Observations on Sewage Disposal," the author deals with an old and threadbare subject in a somewhat new fashion. Mr. Allen's remarks are at least sensible, and his theory, or at least his method of dealing with our town sewage, is practical. He shows in brief that the existing methods of disposal are wasteful and generally cumbersome; that the covered sewer and drain are costly and dangerous modes of getting rid of our town sewage; that our rivers are polluted, our tracts of land for sewage farming near our towns detrimental; that our sewers generate sewer-gas to a dangerous extent, which forces its way past all traps and open ventilating devices. There is nothing, he contends, to be said in favour of the underground sewer except its convenience. The author refers to the earth-closet of Mr. Moule and the pail system as great improvements. One valuable point in the earth-closet system is that it deals with sewage in detail, so that the house is independent of drains. But for towns it is admitted the earth system is impossible. Giving up all idea of utilising the excreta of a town as manure, and experience seems to support this view, the author proceeds to unfold his plan. Sewage is an enemy to be got rid of and destroyed. Mr. Allen asks, "To what simple and more efficient process can we subject offensive matter of all kinds than the direct action of heat?" An intense heat is the best and quickest purifier known, and upon this principle he proposes a "special apparatus to be attached to each closet for the purpose of subjecting its contents to a high temperature," and for a working hypothesis he supposes a "cubic construction of brick or stone, with a flue leading to the top of house, a short pipe communicating with the closet, and an iron evaporating pan with gas-jets underneath. A close-fitting door is provided in front, through which the pan may be withdrawn, and to complete the isolation of the converter, the necessary air for combustion may be taken directly from the outside. The air being admitted under the pan and heated by the gas-jets, will pass up behind it, and there be deflected, so as to sweep across its inner surface from back to front before escaping up the flue." It is thus thought that any liquid in the pan will be driven off as vapour, and the solid desiccated and reduced to ash under the great heat above and below. The action described by the author is simple. On pulling up the plug or handle the valve at the bottom of pan will open, and allow the contents to flow into the converter, the valve automatically closing, as it does now, and this same action would turn up the gas-jets in the converter, and subject the diluted sewage to a high degree of heat, and thus convert a large portion of it into gas, which would escape. The plan thus combines the convenience of a water-

* The Theory of Perspective: for the Use of Candidates for the Elementary Examination of the Department of Science and Art, and Art Students in General. By CHAS. H. SWINSTEAD, Art Master, North London School of Art, Hornsey School of Art, and Christ's Hospital. London: Simpkin, Marshall, Hamilton, Kent, and Co.

* London: L. E. Newnam and Co., Finsbury-street, E.C.

closet with the sanitary advantage of a destructor and the dispensing with all drains. A great many who read this little pamphlet will, no doubt, raise objections to the scheme as one open to certain annoyances—the escaping gas would be obnoxious, the possibility of the apparatus getting out of order, the jets not lighting, and the consequent uselessness of the closet; the periodical removal of the converter or pan, &c.; but these objections are small compared with the very many inconveniences and dangers arising from the soil-pipe and drain system, to say nothing of the vast saving in cost that would result by dealing with the sewage in detail, and getting rid of it at once. Mr. Allen's idea is, at least, as practicable as many that have been thrown out, and the principle of fire-destruction is a sound one, at least. That enemy to man, the microbe germ of disease, would be eliminated, if not destroyed.

CHIPS.

The Metropolitan Asylums Board have decided to add an isolation infirmary to their asylum at Caterham, at an estimated cost of £5,200.

Lord Rowton's company is erecting another large model lodging-house, as the third of its series. The first is close to Vauxhall Station; the second, opened last year, is in the King's Cross-road; and the one in course of erection is at Newington Butts, near the Metropolitan Tabernacle. This will be the largest of the three. Its general characteristics will be the same as those of the others, but whereas the last one erected has beds for about 670, the new one will accommodate 800 inmates. The foundations are in, and the walls are rising.

The Aberdeen Town Council propose to acquire an acre of ground on Balmoral-road for the erection of 26 two-story cottages for the working classes, according to sketch-plans by Mr. John Rust, jun., city architect, who has been instructed to prepare working plans and procure tenders from contractors.

On Friday Mr. George Edwards, builder, of Washbrook, near Ipswich, drove into the latter town, and went to the shop of Messrs. A. Stearn and Son, plumbers and decorators, in Upper Brook-street. While conversing on business matters he suddenly fell forwards, dead. At an inquest on the same evening, before the coroner for Ipswich, medical evidence was given to show that death resulted from syncope, due to heart disease, and the jury returned a verdict accordingly.

The board of guardians of the Dartford district contemplate erecting extensive additions to the workhouse, and have employed their architect, Mr. G. H. Tait, M.Inst.C.E., of that town, to carry out the work.

It is proposed to restore the chancel of Lacock Church, Wiltshire, as a memorial to Dr. W. H. Fox-Talbot, F.R.S., the inventor of photography. A committee has been appointed to carry out the work of restoration according to the plans of Mr. Harold Brakspear, architect.

Herr Muthesius, an eminent German architect, who has lived a long time in Japan, India, Egypt, and Italy, has been appointed Architectural Attaché to the German Embassy in London.

Mr. James Brown, a Manchester architect, was attempting to enter a train at Prestwich, on Monday, when he fell between the carriages and the platform. He was so terribly injured that he died a couple of hours after his admission to the hospital.

An application by the Leeds Corporation for sanction to the borrowing of £270,000 was the subject of an inquiry before one of the inspectors of the Local Government Board. Of the total sum £150,000 is required for waterworks purposes, £100,000 for sewerage works, and £20,000 for the erection of public baths in Holbeck and Hunslet.

The old chapel at Glossop belonging to the Wesleyan Reform Union is to be pulled down, and a new chapel is to be erected on the site.

The memorial stones were laid on Thursday week of a new Wesleyan Reform chapel at Measborough Dyke, Barnsley. The new building is to cost £973.

The ancient church at Maentwrog in the Vale of Festiniog, Merionethshire, is undergoing restoration, mainly at the expense of Mr. W. E. Oakeley, who is the chief owner of the largest slate quarries in the neighbourhood.

Application is about to be made for the issue of a faculty by the London Consistory Court to sanction the taking of the front portion of the churchyard of St. Peter Cheap, for the widening of Wood-street, Cheapside.

Mr. Geo. W. Willecks, an inspector of the Local Government Board, has held an inquiry at Folkestone with reference to an application to borrow £650 for widening Cheriton-road, near More Hall, and £700 for the purchase of land as the site of public baths.

TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. All communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondents.]

It is particularly requested that all drawings and all communications respecting illustrations or literary matter should be addressed to the EDITOR of the BUILDING NEWS, 332, Strand, W.C., and not to members of the staff by name. Delay is not unfrequently otherwise caused. All drawings and other communications are sent at contributors' risks, and the Editor will not undertake to pay for, or be liable for, unsought contributions.

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NOTICE.

Bound copies of Vol. LXIX. are now ready, and should be ordered early (price Twelve Shillings each), as only a limited number are done up. A few bound volumes of Vols. XXXIX., XL., XLI., XLVI., XLIX., LI., LII., LIV., LVIII., LIX., LX., LXI., LXII., LXIII., LXIV., LXV., LXVI., LXVII., LXVIII. may still be had, price Twelve Shillings; all the other bound volumes are out of print. Most of the back numbers of former volumes are, however, to be had singly. Subscribers requiring any back numbers to complete volume just ended should order at once, as many of them soon run out of print.

RECEIVED.—J. T. King.—Cestrian.—F. W.—E. A. and Co.—J. R. (Bangor).—Engineer.—B. E. S.

Intercommunication.

QUESTIONS.

[1551].—**Prices.**—What is a fair remuneration for pricing bills of quantities and estimates generally for builders and others?—MAVIS.

[1552].—**Heating Iron Church.**—Can any of your readers recommend an efficient and economical system of heating by hot water a temporary iron church, containing about 25,000 ft., by means of stoves visible in the church?—CHURCHWARDEN, 46, Warwick-gardens, W.

[1553].—**Testing Level.**—I would be much obliged if some of your scientific and engineering readers would explain in your valuable columns how to test a levelling instrument (say the Y), as a large number of people using such instruments do not know whether they are in perfect adjustment?—LEVEL ADJUSTMENT.

[1554].—**Architects' Charges.**—I received instructions to cover about two acres of land with property. My arrangements were 1 per cent. from the proprietors, in addition to 1½ per cent. I was to receive from the builder, which was understood between self and clients. I confirmed in a memo. about the 1 per cent. between self and clients. All went well until about half was complete. I prepared all plans, passed them, prepared specifications, and obtained tenders. One contractor died; another failed. I finished the portion in hand when the contractor failed. After that my clients thought they would buy all their own material and employ labour, and, without in any way finding fault (except for delay caused by the contractors) or consulting me, they carried this into effect, leaving me to do the best I could. They are using my plans, and they refuse to pay me for the remaining portion, although I consider I am fully entitled to it, having everything ready. Of course, when it definitely came to my knowledge, I wrote them, asking for my further instructions, to which I received a curt reply. My commission of 1 per cent. was based to carry out all this. I have very little fear of contesting. As to the 1½ per cent., what position do I hold as regards this? I certainly think I am entitled to it—I have suffered loss to that amount through their change of ideas, which I have nothing to do with. Any opinions or decisions would be gladly received by—A CONSTANT SUBSCRIBER.

[1555].—**Parquet.**—Would any of your readers inform me as follows? What sort of flooring (parquet) they would recommend for a country church, as to

materials for bed, floating for ditto, and joints? I believe there is a certain composition used for the two last, in lieu of pitch.—NOVICE.

REPLIES.

[1550].—**Ironwork.**—I think "Student" will find the best books on constructional ironwork are the following:—Rivington's "Notes on Building Construction," Vol. IV., 15s. (Longmans and Co.); H. Adams, "Strains in Ironwork," 5s. (Spon); G. A. T. Middleton, "Strains and Structures," 4s. (Batsford); F. Campin, "Constructional Iron and Steel Work," 3s. 6d. (Crosby Lockwood). The first book mentioned deals with the question chiefly from a theoretical point of view, and is a capital textbook for beginners, especially those whose acquaintance with mathematics is but slight. Mr. Campin's work is a new one, and seems to be well adapted for practical use, the chief structural applications of iron in modern buildings being dealt with.—H. BUSBRIDGE.

LEGAL INTELLIGENCE.

COMMITTAL OF A BIRMINGHAM BUILDER.—At West Bromwich Police Court, on Monday, before the stipendiary (Mr. N. C. A. Neville), Thomas Butler (61), builder, of Herbert-street, Small Heath, was charged on remand that in 1892, at West Bromwich, being the trustee of certain property—money, deeds, and instruments in writing—for use and benefit of Emily Bradley, of Sheepwash-lane, Great Bridge, and others, he unlawfully appropriated the same to his own use. Mr. A. Caddick appeared to prosecute, and Mr. Ladbury, of Birmingham, defended. Mr. Caddick explained that the prisoner was appointed a trustee under the will made January 31, 1877, of the late Mr. Joseph Whitehouse, boat-builder, of Horseley Heath, Tipton. After appointing Thomas Butler and his brother, William Butler, and his wife, Mary, trustees, the deceased gave instructions that the property was to be kept in trust for the benefit of his wife for life, and afterwards for the benefit of testator's children. The wife predeceased testator in August, 1878. The testator died on October 21, 1882. At his death William and Thomas Butler took possession of all his deeds and papers, and instructed Mr. A. Caddick to prove the will. This was done on November 28, 1882. In affidavit for the purpose of probate, the gross personal estate was sworn at £5,852. From that certain deductions had to be made. The will was proved on December 15, 1882, and afterwards the Butlers carried on the trust themselves, and dealt with the estate entirely. About the beginning of 1892 the suspicions of the tenant-for-life, Emily Bradley, were aroused. Applications were made for accounts to be furnished, but without success. William Butler died in 1886, and from that time forward the prisoner dealt entirely with the affairs himself. Prosecutrix instructed Mr. Caddick to take proceedings, and these were instituted in 1893 in the Chancery Court. They, however, failed to find the prisoner, who, it was believed, had decamped. An order was made by the Court at the beginning of 1896 for prisoner to pay within 14 days £1,450. Early in August it came to the knowledge of Mrs. Bradley that prisoner was in the district, and a warrant was obtained for his arrest. Mr. Caddick gave details of the estate left by testator, showing that after making certain deductions for debts, funeral expenses, &c., the net personal estate was sworn at £4,703 9s. The personal estate consisted of company bonds, cash in hand and at the bank. It had sunk to £1,515 7s. The total deficiency was £3,717. Police-constable Farrell deposed to arresting prisoner at the Queen's Hotel, Steelhouse-lane, Birmingham. The prosecutrix, Emily Bradley, gave evidence that her father left altogether about 32 houses at Small Heath, Acoek's Green, and West Bromwich. After the death prisoner and his brother took possession of the affairs, which had never been settled. Prisoner was committed for trial at Staffordshire Assizes.

A PAINTING TRADE DISPUTE.—LESLIE AND CO. (LIMITED) v. TUCKER AND OTHERS.—The hearing of the motion, in the Chancery division (before Mr. Justice Chitty, sitting as Vacation Judge), for an injunction restraining the defendants in this action till the trial or further order from issuing or publishing a poster or placard stating that the plaintiffs, a firm of house decorators and painters, had employed painters at labourers' wages, was continued. Mr. Eustace Smith appeared for the plaintiffs, and Mr. Leresche and Mr. Cozens Hardy, jun., for the defendants, who were painters formerly in the employ of the plaintiffs. Mr. Longman, the poster of the placard, who was also made a defendant, appeared in person. Mr. Cozens Hardy referred to the evidence on the part of the defendants, the effect of which was that the representation contained in the placard was true; that this statement was not published maliciously or for the purpose of injuring the plaintiffs, but for the protection of their own trade interests. He also pointed out that there was no allegation on the part of the plaintiffs that the preparation for painters' work had in the past been done by labourers. Mr. Eustace Smith said he had the evidence of large employers of labour that it had always been the practice to employ labourers for that purpose. The plaintiffs

had followed the same course of business for many years without complaint by any of the defendants. He submitted that this was one of the strongest cases that could exist of damage to the plaintiffs if the placard was allowed to continue, while no damage could result to the defendants from an interim injunction. Mr. Justice Chitty asked Mr. Cozens Hardy whether he thought he could stop those placards, and whether he had inquired of his clients how they would like to be placarded. Mr. Cozens Hardy observed that, owing to the recent case of Lyons and Wilkins, the defendants were prevented from watching and besetting. They said that what the plaintiffs were doing was injurious to the class of painters, and they did not see how they could protect themselves except by placards. Mr. Justice Chitty, after suggesting that it could be done by circular, proceeded to give judgment. He said there was no doubt power in the Court to restrain a malicious libel, but an injunction ought not to be granted except in the clearest cases. It was an offensive mode of libelling a man to placard him, and he should have been well satisfied if the defendants had considered that what they had already done was sufficient for the purpose, and had been willing to refrain from using the placard for the future. But they said that what they had done was right, and they would not give an undertaking to discontinue the placard. If they continued it they would run the risk of a jury finding more strongly against them by way of damages by reason of their continuing to publish what, in the result, might be found to be a libel. But as they said the statement was true in substance and in fact, he had no alternative in the present stage of the case but to make no order on the motion. The costs he would make costs in the action.

THE LONDON BUILDING ACT.—At the North London Police Court, on Tuesday, Mr. Thomas Richards, solicitor, of 44, Finsbury-square, E.C., was summoned before Mr. Paul Taylor for a penalty in respect to an alleged irregularity in the erection of a block of buildings in Stoke Newington-road, of which he is the freeholder. The summons, which was taken out under the London Building Act of 1894, charged the defendant with disobeying a notice from Mr. J. Douglass Mathews, the district surveyor, to block up certain openings which had been made between the shops. The circumstances were as follows:—The buildings in question consisted of a row of six shops with dwelling rooms over, and which were described as flats. The original intention of the owner was that each shop and set of flats should be separate, but when the premises were offered for letting a firm, named Beavis, took all the shops, intending to establish a co-operative stores. For their purposes, however, it was necessary that each shop should communicate. The freeholder thereupon undertook to make the necessary communications, and holes were cut in the walls and double iron doors were fitted to each party-wall. The district surveyor assented to the work being done, and was satisfied until he discovered that the upper part of the shops were being let out in flats. As the Building Act provides that doors can only be fitted to party-walls in premises in one occupation, the district surveyor proceeded against the builder for an irregularity, but the summons failed on the point that the builder had left the premises at the time the notice was served. Mr. Gill now contended that the proceedings were out of time so far as the present defendant was concerned. Section 152 of the London Building Act provided that where the notice could not be served on the builder, it should be served within 21 days upon the owner. In the present case he should prove that the work was completed on March 16, and that the notice of irregularity was not served on the freeholder until July 21 last. Mr. Mathews said he was afraid, on the section quoted, that the district surveyor was out of time with these proceedings; but he wished to point out that the proceedings originally were taken against the builder, who was served with the notice within the legal period. The builder's summons was adjourned from time to time, and it was not until quite recently that it was decided to proceed against the freeholder. Mr. Paul Taylor asked if the service of the notice within 21 days had been held to be essential. Mr. Gill: Yes, sir; time is very important in these matters, as frequently large sums of money are expended on buildings after the builder has left. Mr. Paul Taylor said the case failed on the point that the notice was not served in accordance with the provisions of section 152. He also noticed that the summons was not taken out until September 17. The summons was dismissed.

The new Technical School for Women, which has been erected under the auspices of the Surrey County Council, in Hubert-road, South Wimbledon, and is to be opened in a few days, is a structure of red brick, built at a cost of £2,500. It consists of two floors. The largest room will be set apart for recreative purposes, and is to contain a billiard-table. Another is to be fitted up as a laundry.

Our Office Table.

ANOTHER society is about to be formed, and the first general meeting is to be held in October to settle the constitution already formulated by a provisional committee under the chairmanship of Mr. G. C. Haité, Mr. Lindsay P. Butterfield being the hon. secretary and treasurer. The proposed body will be called the Society of Designers, with a subscription of half a guinea. Whether or not such a society is needed remains to be seen; but in any case, it must accomplish much more to justify its existence than the Society of Illustrators has hitherto done. Meetings are to be held at least four times a year, after ten days' notice, and a promiscuous assembly seems to be not at all improbable. The premises at present have not been determined on, and no programme has been formulated. Indeed, the exact object of the proposed society is by no means self-evident, neither are the names of the committee sufficiently well known to afford an ample guarantee that the drawings of works to be submitted before election will be judged by a competent tribunal. The suggestion that sometimes societies of this sort are merely set on foot to add glory to the names of their inventors and leading officials may be dismissed for what it is worth, and if really good work is to be forthcoming in consequence of any such combination as that proposed, it clearly is worthy of our readers' consideration and support. The cognomen adopted is a very wide one, sufficiently catholic to admit all shades of opinions and practice. The crux of the difficulty remains unsolved, and if the society should develop, a by-law will certainly be required to regulate the proceedings of that body.

It is satisfactory to learn that reforms are at last being introduced into the management of South Kensington Museum. A scientist, instead of a soldier, has been appointed Chief of the Circulation Department, in the person of Mr. W. W. Watts, formerly a Temporary Assistant Geologist in the Geological Survey. The military element is also being gradually reduced in all the other departments. This year there are 25 inspectors, of whom eleven are civilians and 14 are soldiers. Last year the total number was 40, of whom 17 were civilians and 23 soldiers. There is still room for improvement, particularly in the London Inspectorate of Drawing.

MOORGATE STATION, over which, nearly two years ago, some sensation was aroused by its being officially reported to be in a dangerous condition, has almost ever since been in process of reconstruction, and is now practically finished. What building remains to be done on the spot has not to do with the station, but will consist of a handsome block of buildings on the road-level, comprising shops and offices. The station itself is virtually complete, and is one of the most convenient and satisfactory on the Metropolitan line. The new booking-offices have for some time been in occupation, and full accommodation is now provided for all the five companies using this station. There are two wide Portland stone entrances leading into the booking-offices, from which broad staircases lead down to a "circulating space" 80ft. long by 40ft. wide.

By Christmas it is hoped that the enormous building that has been set up as an extension of the Post Office Savings Bank will be completed, and the great host of employes now scattered around the Central Office in Queen Victoria-street will be able to be housed here. For a long time past the original building has been wholly inadequate to the work, but the addition about to be made ought to meet all requirements for many a long day to come. The new building is a vast square pile of six floors. It lies at the back of the old office, from which it is separated by Knight-rider-street, which, however, is bridged over, so that the two huge edifices become one, extending virtually from Queen Victoria-street to Carter-lane.

The repair annually undertaken of the fabric of the Houses of Parliament is being carried out this recess on a larger scale than usual. The principal task is in connection with the House of Commons. All the woodwork is being thoroughly cleaned, and when the decorations have been renewed members will hardly recognise the place. When the House of Lords was similarly taken in hand four years ago the greatest caution had to be exercised lest the gilding which abounds there

should be injured. In the House of Commons, however, there is not the same difficulty, and already the fine carved oak, which is the glory of the building, is beginning to wear a new aspect. Seeing that this is the first time the Commons' Chamber has been thoroughly overhauled since the opening of the New Palace of Westminster in January, 1847, it is not surprising that much of the woodwork was found to be thickly incrustated with dirt. But the oak has mellowed with age, and after being carefully scrubbed, its beautiful grain stands out far more distinctly than before.

DURING the week new mains have been laid in Piccadilly, and some very old wooden pipes were removed. These pipes were made from trunks of trees, and averaged between 5ft. and 6ft. in length, being about 18in. in diameter at the largest end, and 9in. to 1ft. at the smaller end. The bore appeared to be about 6in. They probably belonged to the old Chelsea Waterworks. In the 17th century there were in Hyde Park a number of pools communicating with one another. They were fed by a small stream, the West Bourne, which, rising on the western slope of Hampstead, passed through Kilburn and Bayswater, and then intersected the park, which it quitted at Knightsbridge on its way to join the Thames at Millbank and Chelsea. These pools used to supply the western parts of London with water, until a complaint was made that so much was drained away that it left none for the deer. These were probably afterwards the source of the circular reservoir which is to be found in old maps of Hyde Park (about 1737), and which belonged to the old Chelsea Waterworks. From it, along the pipes now brought up in Piccadilly, were supplied not only Kensington Palace and the "suburb" of Piccadilly, but also the new buildings about Oliver's Mount (now Mount-street), and the northern parts of Westminster.

The National Trust for the Preservation of Buildings of Historic Interest, Natural Beauty, or Architectural Value, has issued its annual report, which shows that it has not been idle. It was instrumental in the preservation of the Trinity Almshouses at Mile-end, and in preventing the obliteration of the Wall of Antoninus. The Pre-Reformation clergy-house at Alfriston, Sussex, has been purchased, and will be restored as soon as the £350 required is subscribed. The purchase of Barras Head, the headland facing the ruins of Tintagel Castle, is hindered for want of funds. The Trust is considering the possibility of purchasing Cowper's Garden at Olney, Cole-ridge's Cottage at Nelles Stowey, where "The Ancient Mariner" was written; Dr. Johnson's birthplace at Lichfield, and the Old Joiners' Hall at Salisbury.

ACCORDING to the *Genie Civil*, when the conduit from the military water tower of Setif to the Citadel was replaced, the interior diameter of the pipe was found to have been reduced from 4 to 7 centimètres (1.57in. to 2.76in.) by incrustation, and as it was desired to relay these pipes on another line, they endeavoured to clean them by immersion in a bath of dilute hydrochloric acid; but after several applications of the acid no results were perceivable, probably because the deposit was schistose rather than calcareous. After the failure of this attempt two lengths of pipe were placed on the ground parallel to each other, and about 6ft. apart; across them was placed a layer of 15 pipes, then 15 in the opposite direction, and so on up to seven or eight rows. The interstices between the pipes having been filled with combustible, the whole was set on fire, and after it had cooled the pipes were scraped out and cleaned. Out of 137 pipes about 10ft. long that were thus treated six only were rejected on account of cracks, and the cost of the operation was about 58 centimes per lineal metre, or about 3 cents per lineal foot.

WIND-PRESSURE has lately been debated by engineers. Since the St. Louis tornado, and the recent destruction in Paris by a cyclone, attention has been directed to the question. The experimental data, however, at our command are unreliable; all we can estimate upon are the pressures registered by actual winds. The St. Louis disaster shows that the wind may occasionally be so strong as to overturn a locomotive, and one authority upon this fact calculates that the pressure in this case could not have been less than 93lb. per square foot. The modern tall buildings did not come within the path of the tornado, so there is no evidence to show whether they would have withstood the force of the gale. We much doubt if some of them would have resisted the

force. Architects and engineers, in the face of recent destructive wind-pressures, will do wisely to take these exceptional forces into account when designing lofty structures.

It has long been held from practical experience that the network of wires now found in many towns protects those places from the effects of lightning, and probably also prevents many thunderstorms from breaking over them. An official inquiry has been recently made in Germany as to the influence exerted by telephone wires on atmospheric electricity, with a view to set at rest the question whether danger from lightning-stroke is increased or diminished by a close network of wires. According to *Das Wetter*, the inquiry has shown that the wires tend to weaken the violence and diminish the danger of the lightning-stroke. Returns obtained from 340 towns provided, and from 560 not provided, with a telephone system, show that the danger varies in the proportion of 1 to 4.6 between the two cases.

THE most noteworthy feature in connection with the new Prussian State Railway, which is now in course of construction between the industrial centres of Remscheid and Solingen, will be the viaduct spanning the Wupperthal at the little town of Müngsten. When completed, the structure will be the loftiest of its kind on the European continent, eclipsing, both in height and width of its main arch, the celebrated Douro bridge at Oporto. It will, moreover, prove the most costly piece of work hitherto undertaken by the Prussian State Railway Department. The total height of the Douro bridge is 62 metres, or about 204ft., whereas the viaduct at Müngsten will attain an altitude of 107 metres, or about 353ft. As regards the span of the centre arch, the one at Douro measures 160 metres, while that at Müngsten will be 170 metres. Upwards of 1,700 tons of iron-work will be required for the principal arch, and the total quantity of iron employed on the viaduct generally will amount to 4,000 tons. Six colossal side pillars will form a support for the remaining portion of the bridge. The piers are already completed; but it will occupy some time yet before the two massive main beams are placed in position, this part of the undertaking being necessarily attended with considerable difficulty. The cost of the viaduct is estimated at 2,500,000 marks, or £125,000.

At the meeting of the British Association, Mr. John Coles referred to the value of photographic surveying, and showed how photographs taken with an ordinary camera may be utilised in filling in the details of a map. That excellent results could be obtained from this method of surveying was plainly shown by the large amount of good work that had been done in this manner by the department of the Surveyor-General of the Dominion of Canada. It was pointed out, however, that weather was a most important factor, and on that account photography could never be introduced as a means of surveying of the highest class, though it would be useful for the purposes of surveying mountainous districts and new countries.

LAST Friday a Roman altar was unearthed on the removal of the surface soil in preparation for excavating upon the site of the supposed Roman station of Veratinum (i.e., Wilderspool), and a few yards to the west of the Roman road, of which an interesting section 40in. thick has been exposed. The discovery was made by Mr. Thomas May, of Warrington. The material of which the altar is composed is the soft red sandstone of the locality. It bears no mark or trace of an inscription or lettering having been carved upon it. Its proportions are regular, and the altar is quite perfect except where a small fragment was broken off at the left-hand corner of the base. The back of the stone is undressed, showing it was intended to be set up against a wall. It consists of three well-proportioned features—viz., a capital, a shaft, and a base, and the following are its dimensions:—The capital measures 12½in. in length, 8½in. in breadth, and about 5½in. in height; the shaft is 9½in. high, 11in. wide, and 8½in. thick; and the base is about 14in. long, 10½in. broad, and 6in. high, so that the total height of the altar is only 20½in., which is unusually small.

MR. R. CLIPSTON STURGIS, in the *Cosmopolitan*, lately contrasted the English and American suburban residence. The American house is said to lack individuality and seclusion, while the English residence is characterised by these

qualities. He attributes this difference partly to the greater attention given to the surroundings of the English house, and also to the use in England of more durable building materials than wood, which is generally employed in the United States. Another writer traverses these remarks, and says that the reason why the English residence is superior is not because of the material, but the way wood is used. The American builder prefers showiness to quietness, variety to harmony, elaboration to simplicity, &c., and from the design of recent American houses we think this contention is just. The American builds his house for show, for ostentatious entertainment, and not for quiet individual tastes and habitation. The writer says the American house seems to be built as a place which may be proudly exhibited to visitors or to entertain guests. "They are not well fitted for occupation by any family which finds its best pleasures in hours of privacy and domesticity." There is much to be said for this estimate of the American house.

AN American journal refers to a new material for window-panes, which has been previously noticed by us—a "fire-resisting glass," in which the sheets of glass are formed upon wire-netting imbedded in the glass. By this arrangement sudden heating and cooling, as by water thrown upon the hot glass, are said to be harmless. The obscuration of the glass by the wire-netting must be taken into account. The "wired glass" will, no doubt, be useful for warehouse windows and skylights. The idea probably originated from the imbedding of iron or steel rods and netting in concrete or plaster slabs for partitions, which have been found a valuable means of stiffening plaster partitions.

MEETINGS FOR THE ENSUING WEEK.

SATURDAY (TO-MORROW).—Devon and Exeter Architectural Society (Plymouth Branch). Excursion to Truro, to visit Cathedral. Leave Millbay Station 11.5 a.m.; Devonport, G.W.R., 11.12 a.m.

FRIDAY.—King's College, Strand, W.C. Architectural Classes. Conversazione and Distribution of Prizes. 8 p.m.

THE Exeter Town Council have decided to take immediate steps with a view to improve the channel in the estuary at Exmouth, which, it is asserted, is silting up rapidly through the removal of large quantities of gravel from Bull Hill adjacent, for exportation. Dredging operations on an extensive scale are contemplated, and the entrance of large vessels to the river will be thus much facilitated.

THE premises formerly known as the Royal Albert Brewery at Windsor are being rapidly converted into a central electric-light station. The mains will shortly be laid in the principal streets, and a number of establishments have already been wired. Windsor Castle (which has its own electrical plant), Windsor, Eton, and Eton College are now chiefly lighted by the local gas companies, but there are already a few private installations in the district. The company is expected to commence its service about November.

AN Ilkeston architect, Mr. George Haslam, a former town councillor, was shockingly injured about the face and head on Thursday week, owing to his cycle collapsing whilst riding at Castle Donington. Several hours elapsed before he recovered consciousness, but his injuries are not expected to prove fatal.

ST. John's Church, Downshire Hill, Hampstead, which was closed at the end of last year, was reopened on Sunday. Mr. Horace Field, architect, gave the structure a thorough examination last January, and found that it was in a very unsatisfactory condition. The work of renovation was taken in hand by Messrs. Dove Bros., of Islington; but a further delay was caused through the nine weeks' strike of the plasterers. The roof is now practically new, and tie-rods have been added to prevent its exerting a thrust on the walls; the latter have also been buttressed on the south side. The bell-tower has been renewed, and a bell, which is said to be a melodious one, has been obtained. The electric light has been carried out by Messrs. Drake and Gorham, of Westminster.

Auchengramont parish church, Hamilton, was reopened last Sunday, after being closed for several months. Very considerable internal redecoration has taken place, under the direction of Mr. J. B. Wilson, architect, Glasgow, the various tradesmen employed being:—Painters and decorators, John Kemp and Son; joiners, J. and D. Maxwell; plumber and gasfitter, W. P. Mitchell; builders, Purdie and Co.; upholsterers, Miller Brothers; and organ builders, Messrs. Mirlees. Mr. Arnott was master of works.

WATER SUPPLY AND SANITARY MATTERS.

ANDOVER.—The corporation of Andover have had an order for an injunction given against them to restrain them from polluting the River Anton, and have instructed Mr. Edward Tidman, C.E., F.S.I., Westminster, to report to them as to the best practicable means to be adopted to prevent the discharge of sewage into the river and further disposal of the same, to satisfy the requirements of the Local Government Board. Mr. Tidman has already commenced his investigations.

CHIPS.

At Denton, Major F. H. Tulloch, M.Inst.C.E., inspector to the Local Government Board, held an inquiry at the Denton Free Library last week, respecting an application of the urban district council for power to borrow £1,500 for technical instruction purposes.

The Victoria Institute, Worcester, has been opened. The institute combines a public library, a museum, art gallery, school of art, technical school, and a secondary school. The buildings have been erected at a cost of £42,000. The first stone of the institute was laid by the Duke of York in April, 1894.

The Dudley Port Board Schools, Staffordshire, are being warmed and ventilated by means of Shorland's patent Manchester grates, the same being supplied by Messrs. E. H. Shorland and Brother, of Manchester.

The Midland and Great Northern will begin the construction of their new line from North Walsham to Mundesley next week, and the long-talked-of opening up of the lesser-known stretches of the Norfolk coast will therefore be an accomplished fact. The line will curve southwards, so as to allow of a station at Knapton, from which point the coast villages south of Mundesley can be easily reached.

New R.C. schools have been opened at Ventnor. Messrs. J. G. and W. Jolliffe, of Bonchurch, were the builders.

On Monday week, at the office of Mr. W. L. Daniel, official receiver, Merthyr, a meeting was held of the creditors of Thomas Morgan, builder, Tylacelyn-road, Penygraig. The gross liabilities were estimated to amount to £2,164 13s. 5d., and the deficiency was set down at £1,714 13s. 5d.

The exhibition of the plans for the reconstruction of North Bridge-street has revived a rumour that an Edinburgh syndicate is prepared to take the whole matter off the hands of the town council on what they consider very favourable terms for the city. The offer has been spoken of as amounting to something like this, that if the whole area is transferred to them they will deal with the present tenants, and erect any buildings on the area after it is cleared that may be sanctioned by the town council.

A loan of £15,000 for East Looe proposed water-works has been applied for by Liskeard Rural District Council, and the Local Government Board have decided to hold an inquiry.

It is expected that in June, 1897, the new Mater Infirmerum Hospital, Belfast, will be completed. It is being erected from the design of Mr. Fennell, M.R.I.A.I., and the site has a frontage of 230ft. to the Crumlyn-road and occupies an area slightly over one acre. The hospital is built on the "pavilion" system, the central one being for administrative work, the pavilion on the east side being for males and that on the west side for females.

The salary of the borough surveyor of Denbigh has been advanced from £80 to £100 a year. The proposal to erect a town-hall at Heullau, a village within the borough, falls through for the present.

A syndicate is promoting the construction of a light railway from Saltfleetby, through Saltfleet, Somercotes, Grainthorpe, Marshchapel, Northcotes, Tetney, and Humberstone to Cleethorpes. Messrs. Allen and Jeyes, of Queen Victoria-street, are surveying the ground.

Plans for a new theatre at Llandudno, by Messrs. Andrews and Butterworth, architects, Manchester, have been submitted to the district council.

The new East Park at Wolverhampton was opened on Monday. The borough engineer has superintended the laying out of the land. There is a cricket and football ground, a children's playground, and a swimming-bath.

The new branch bank of Messrs. Barclay and Co., Felixstowe, was opened on Monday. The buildings are situated on the Parade, and were designed by Mr. Brightwen Biyoun, Ipswich, and built by Mr. Thomas Ward, Felixstowe.

At Tuesday night's meeting of the Vestry of St. George's, Southwark, London, Miss A. Elliott, assistant sanitary inspector at St. Helen's, Lancashire, was appointed sanitary inspector to the vestry by 22 to 16. There were 22 candidates.

LIST OF COMPETITIONS OPEN.

Morley—Board Schools (Central Hall) for 1,030, and cookery-room for 70	None offered	R. Brown, Clerk, Morley	Sept. 28
Farnham—School Infirmary		E. Kempson, Clerk to Managers, 121, West-street, Farnham	Oct. 13
Gorton—Laying Out Cemetery	3 ggs.	R. T. Holland, Clerk, Town Hall, Gorton	" 24
Belfast—New City Hall (Assessors, A. Waterhouse, R.A., and J. C. Bretland)	£300 divided	S. Black, Clerk to Corporation, Belfast	" 25
Poplar—Coroner's Court, Mortuary	£30, £20	W. H. Farnfield, Clerk, 117, High-street, Poplar	" 26
Malmö, Sweden—New Gasworks	3,000, 2,000, & 1,500 Swedish crowns	Corporation Gas Works Offices, Malmö, Sweden	Nov. 1
Bootle—North Board School for 1,000 children (local architects only)	No premium	F. K. Wilson, Clerk, Balliol-road, Bootle	" 11
Douglas, I.M.—Municipal Buildings	£40, £20, £10	T. H. Nesbitt, Town Clerk, Douglas	" 21
Newport, Mon.—Hospital (£16,000 limit of cost)	£100, £50	J. K. Stone, Secy., 39, High-street, Newport	Dec. 1
Rhos-on-Sea, Colwyn Bay—Laying-out Building Estate	£100, £30, £10	J. F. Kent, Rhos Abbey, North Wales	" 5
Kieff, Russia—Theatre (£48,000 limit, 1500 seats)	£280, £160, £120, £76, £32	Imperial Society of Architects, 83, Quai de la Moika, St. Petersburg	" 15
Sunderland Corporation—Artisans' Dwellings	£160 and two lesser premiums	Municipal Authority, St. Gilles, Belgium	Feb. 1
Kirriemuir, N.B., Parish Church Hall	£50, £30, £20	Town Clerk, Sunderland	—
Kesteven District Lunatic Asylum (C. H. Howell, Assessor)		Jos. Richardson, Clerk, U.C., 4, Town Hall-square, Bradford	—
Eccleshill (Bradford)—Sewage Disposal	£20, £10		—

LIST OF TENDERS OPEN.

BUILDINGS.

Farrington-street, E.C.—Underground Convenience	Commissioners of Sewers	H. Montague Bates, Guildhall, E.C.	Sept. 29
Durham—Mortuary, County Hospital	Felling School Board	C. H. Fowler, Architect, The College, Durham	" 29
Felling Shore—Board School Additions	School Board	H. Miller, Architect, Felling, Co. Durham	" 29
Swadlincote—Board School Classrooms	School Board	T. Buckley, Gresley Wood House, Swadlincote	" 29
Penarth—New Board School	School Board	J. H. Phillips, St. John's Chambers, Cardiff	" 29
Coventry—Factory, Holyhead-road	H. Williamson and Co.	H. W. Chattaway, Architect, Trinity Church-yard, Coventry	" 30
Ipswich—Pair of Houses at Sewerage Pumping Station	Corporation	E. Buckham, Borough Surveyor, Ipswich	" 30
Cameron Bridge, N.B.—Distillery		C. C. Doig, Architect, Elgin	" 30
Llandudno—Police Cottages	Carnarvon County Council	J. H. B. Roberts, Clerk, Carnarvon	" 30
Aberystwith—Alterations to 49, Terrace-road	Clapperton and Co.	—, Peake, Bath-street, Aberystwith	Oct. 1
Windermere—Fever Hospital	Joint Urban District Councils	G. Gatey, Clerk, Windermere	" 1
Blaenau—Girls' School	School Board	Grierson and Bellis, Architects, Bangor	" 5
North Devon—Woolacombe Bay Hotel, Additions	Arnold, Perrett, and Co.	A. Halsey, Secretary, Wickwar Brewery, Glos.	" 5
Bury St. Edmund's—Steam Laundry	Directors of Co.	Cecil W. Greene, Secretary, 59, Abbeystreet, Bury St. Edmund's	" 6
Reading—Passenger Station	Great Western Railway	G. K. Mills, Secretary, Paddington Station	" 6
Bethnal Green, E.—Workhouse Infirmary	Guardians	Giles, Gough, and Trollope, Architects, 28, Craven-st., Strand, W.C.	" 6
Bethnal Green—Infirmary	Guardians	Giles, Gough, and Trollope, Architects, 28, Craven-street	" 6
Plymouth—Boot Inn, Rebuilding	Owners	Hooker, Matthews, and Co., Solicitors, Plymouth	" 7
York—Show Yard	Yorkshire Agricultural Society	Marshall Stephenson, Blake-street, York	" 7
Caerwar—Infant School Extension	Llanwona School Board	A. O. Evans, Architect, Post Office Chambers, Pontypridd	" 7
Reading—Station Sorting Office	H.M. Office of Works	Hon. R. B. Brett, Secretary, 12, Whitehall-Place, S.W.	" 7
Ilkeston—Wesleyan Chapel	Committee	G. Haslam and Son, Architects, Euclid House, Ilkeston	" 7
Bromley, Kent—Houses in Glebe-road	Corporation	F. W. Stocker, Architect, 90-1, Queen-street, E.C.	" 8
Brighton—Additions to Town Hall	School Board	F. J. Tillstone, Town Hall, Brighton	" 9
Llantrissant—Masters' House	Kensington School District	J. J. Evans, Sunnyside, Penarth	" 9
Hammersmith—School Superintendent's House		J. H. Rutherglen, Clerk, Marloes-road, Kensington	" 9
Stanningley—Four Houses and Shop		Ryercroft and Firth, Architects, Bank-buildings, Bradford	—
Bradford—House and Shop, Carlisle-road		F. Moore, Architect, 40, Sunbridge-road, Bradford	—
Stonehaven—Granite Villa		J. A. Souttar, Architect, 42, Union-street, Aberdeen	—
Keswick—Rebuilding Stabling, Duke of Wellington		A. D. Kaye, Architect, 4, Albion-place, Leeds	—
Exmouth—Wesleyan Chapel and Schools		W. J. Morley, Architect, 269, Swan-arcade, Bradford	—
Buttershaw, West Riding—Two Houses		Brayshaw and Dixon, Architects, Bowling Old-lane, Bradford	—
Belfast—Two Houses, University-avenue		J. G. Lindsay, Architect, 6, Chichester-street, Belfast	—
Ovenston, Yorks—Farmhouse		J. Robert Shaw and Son, Architects, 55, Tyrril-street, Bradford	—
Gateshead—Thirty Dwellings in Flats, Saltwell-lane	Committee	E. Bowman, 52, Westgate-road, Newcastle	—
Nuneaton—Galley Common National Schools	Brain and Co.	J. R. Veall and Son, Architects, Wolverhampton	—
Cardiff—Additions, Halfway House Hotel	Committee	Jones, Richards, and Budgen, Architects, Cardiff	—
Sheerness—Conservative Club	Ryder and Leyland	Win. J. Shearburn, Architect, Dorking	—
Harrogate—Two Houses		W. Lupton, North Lodge, New Park, Harrogate	—
Hull—Repairs 23 Houses		75, Charles-street, Hull	—
Newland—Alterations Property		N. Swindle, Chemist, Keswick	—
Leeds—Pulling down House		J. W. Watson, 21, New Station-street, Leeds	—
Harrogate—House	C. H. Young	J. M. Fawcett and Sons, 26, Albion-street, Leeds	—
Town—House		Hpkiss and Bassett, Architects, Aherdovey	—
Bury (Lanes)—Stables, Butcher-lane	Sutton and Co.	F. Cartwright, C.E., Phoenix-yard, Bury	—
Sheerness—Club	Trustees	E. Pover, Architect, Faversham	—

ENGINEERING.

Ovenstone, Pittenween—Reservoir	Joint Water Committee	A. C. Macintosh, Town Clerk, Pittenween, N.B.	Sept. 28
Berlin—Iron Bridge (1,800 tons)	Official	Herr Gier, Regierungs- und Bauamt, Berlin	" 28
India—Railway Carriages, Vans, Girders, and Signals	Bengal and North Western R. Co.	E. L. Marryat, Secretary, 237, Gresham House, E.C.	" 28
Cilfrew—Two Bridges, and Footpath Construction	Blaenhouddan Parish Council	D. M. Davies, 58, Water-street, Neath	" 29
Farrington-street, E.C.—Underground Convenience	Commissioners of Sewers	H. Montagu Bates, Guildhall, E.C.	" 29
Belper—Waterworks	Urban District Council	G. and F. W. Hodson, Engineers, Loughborough	" 29
Belper—Waterworks, No. 2 Contract	Urban District Council	J. Pim, Clerk, Bridge-street, Belper	" 29
Northallerton—Water Supply Work	Rural District Council	Fairbank and Son, Engineers, 17A, Lendal, York	" 30
Liverpool—Heating and Hot-Water	Guardians, Smithdown-rd. Infirmary	C. O. Ellison and Son, Architects, 22, St. Thomas-street, Liverpool	" 30
Nilgiri—Railway Waggon and Coaches	Nilgiri Railway Co.	J. A. Kelman, Secretary, 251, Winchester House, E.C.	" 30
Cape of Good Hope—Mossel Bay to Oudtshoorn Railway (75 miles)	Cape Government	T. R. Price, Acting Manager, Cape Town	" 30
Camborne—Winding Engines at Dolcouth Mine	Directors	F. W. Thomas, Secretary, Camborne	" 30
Hunslet, Leeds—Railway Works	Great Northern Railway Co.	W. B. Myers-Beswick, Engineer, 31, Park-square, Leeds	Oct. 1
Wick—Harbour Improvement	Wick Harbour Trustees	D. W. Georgeson, Secretary, Wick	" 1
Madrid—Iron Bridge	Spanish Government	Dirección General de Obras Publicas, Madrid	" 3
Rosenthal—Iron Bridge	Official	Königliches Wasser Bauamt, Lehindamm	" 3
Elland—Tunnel Outfall	Urban District Council	M. Paterson, C.E., 35, Manor-row, Bradford	" 5
Morecambe—Sea Wall, Carriage Way, &c.	Urban District Council	J. Bond, Surveyor, Council Offices, Morecambe-st., Morecambe	" 5
Bonar Bridge—Works of Water Supply	Sutherland County Council	A. Argo, County Clerk, Golspie, N.B.	" 5
Crossness—Outfall, pipes and valves	L.C.C.	C. J. Steward, Clerk	" 6
Ditto Ditto, Triple Expansion Engines	L.C.C.	Ditto	" 6
Havana—Floating Dock	Spanish Government	Commercial Department, Foreign Office, S.W.	" 7
Frith Hill, Godalming	Reservoir Water Co.	H. J. Collier, Secretary, Godalming	" 7
Old Sodbury—Engines and Pumps	West Gloucester Water Co.	J. James, Clerk, 110, Cannon-street, E.C.	" 8
Bucharest—Foundation Bridge (about £64,000)	Official	Director, State Railways, Bucharest	" 10
Dorstone—Two Highway Bridges	Bredwardine R.D.C.	C. Griffiths, Clerk, Hay	" 10
Morley—Electric Lighting Plant	Corporation	E. B. Hopkins, Town Clerk, Morley	" 14
Leamington—Bore, part steel lined	Corporation	E. de Normanville, Engineer, Town Hall, Leamington	" 14
Whitehaven—Intake Works	Water Committee	J. S. Brodie, Engineer, Town Hall, Whitehaven	" 15
New Malden, Surrey—Machinery for Sewage Disposal Works	Urban District Council	W. H. Hope, Eng., Gate House, Portsmouth-rd., Kingston-on-Th.	" 15
Durham—Subway at Penshaw Station	North-Eastern Railway Co.	C. A. Harrison, Central Station, Newcastle-on-Tyne	" 16
Wellington, Salop—Cast-iron Water Mains, Excavating, &c.	Urban District Council	G. J. Monson, Engineer, 45, Walker-street, Wellington, Salop	" 16
Shrewsbury—Main Drainage Engines and Crane	Corporation	H. C. Clarke, Town Clerk, Shrewsbury	" 22
Naj Hamadi, Kinch Line, Upper Egypt—Metallic Bridges	Official	Col. Western, Broadway Chambers, Westminster, S.W.	" 39
Jassy, Roumania—Baths Installations	Municipal Council	N. A. Bogdan, Secretary, Jassy	Nov. 5
North Wales—Pumping out Slate Quarries		R. Parry Jones, Talysarn, North Wales	—
Burnley—Sewage Outfall Plant	Corporation	W. T. Fullalove, Clerk, Burnley	—

FENCING.

Hove—Oak Park Fencing (2,800 lin. feet)	Corporation	H. Endacott, Town Clerk, Hove	Sept. 28
Dartford—Park Pale Fencing	Met. Asylums Board	T. Duncombe Mann, Clerk to the Board	Oct. 5

PAINTING.

Wellingborough—Cemetery Buildings	Burial Board	W. Lewin, Clerk, Wellingborough	Sept. 29
Manchester—Rental Property	Midland Railway Co.	J. Williams, Secretary, Derby	Oct. 2
Marylebone Workhouse	Board of Guardians	A. Saxon Snell, 22, Southampton Buildings, W.C.	" 3
Birmingham—Interior Parish Offices	Board of Guardians	W. Bowen, Clerk, Edmund-street, Birmingham	" 5

ROADS AND STREETS.

Sevenoaks—1,110 c.yds. Road Metal	Urban District Council	H. J. Thompson, Clerk, Sevenoaks	Sept. 28
Eccles—Drainage and Paving, Wellington-road.	Corporation	G. W. Bailey, Town Clerk, Eccles	" 28
Shipley—Street Paving	Urban District Council	The Hall, Windhill	" 28
West Bromwich—Street Works	Corporation	J. T. Bayrs, West Brouwich	" 28
Battersea Park—Road Materials	L.C.C.	Parks Department	" 28
Leeds—Saud and Gravel	Sanitary Committee	Scavenging Depot, Crown Point, Leeds	" 30
Middleton, Lancs—Street Works	Corporation	F. Entwistle, Town Clerk, Middleton	" 30
Lee, S.E.—Road Repairs.	District Board of Works	G. Whale, Clerk, Old Charlton	" 30
Waterloo—Street Works	Urban District Council	F. S. Yates, Town Hall, Waterloo	Oct. 1
Newmarket—Granite and Slag to March 31, 1897	Urban District Council	S. J. Enniou, Clerk, Deva Chambers, Newmarket	" 3
King's Norton—Kerbing and Metalling	Rural District Council	23, Valentine-road, King's Heath	" 5
Selly Oak—Making-up Weobley Park-road	Rural District Council	E. Docker, Clerk, 83, Colmore-row, Birmingham	" 5
Paddington—Thames Ballast Shingle (400 cubic yards)	Vestry	F. Dethridge, Clerk, Harrow-road, W.	" 5
Southend-on-Sea—Making-up Five Roads	Corporation	Wm. Gregson, Town Clerk, Southend	" 6
Southampton—Tar-paving Footpaths	Corporation	G. B. Nalder, Town Clerk	" 6
Aldershot—Broken Granite (1,500 tons)	Urban District Council	W. E. Foster, Clerk, Victoria-road, Aldershot	" 6
East Barnet—Materials to September 29, 1897	Urban District Council	H. York, Surveyor, Council Offices, Station-road, New Barnet	" 8
Old Trafford—170 yards of road	Manchester Gas Committee	City Surveyor, Town Hall, Manchester	" 8

SEWERING.

Camberley—Sewer, Upper Gordon-street	Frimley Urban District Council	W. J. Hodgson, C.E., High-street, Camberley	Sept. 23
Colne, Lancs—Sewers	Corporation	T. H. Hartley, Borough Surveyor, Town Hall, Colne	" 28
Willesden—Sewer Works	Willesden U.D.C.	O. C. Robson, Dyne-road, Kilburn	" 29
Bredbury and Romiley—Sewage Disposal	Urban District Council	J. W. Bain, Clerk, Bredbury	" 29
Burton—Earthenware or Stoneware Pipes	Corporation	T. N. Whitehead, Town Clerk, Burton	" 30
Burton—Sewer Construction	Corporation	T. N. Whitehead, Town Clerk, Burton	" 30
Pleashley and Shirebrooke—Sewers	Blackwell Rural District Council	G. H. Hibbert, Clerk, Mansfield	" 30
Raunds—Sewers	Thrapstone R.D.C.	Sharman and Archer, Wellington-boro'	" 30
Lee, S.E.—Sewers, Burnt Ash Hill (1,140ft. of 12in.)	District Board of Works	G. Whale, Clerk, Old Charlton	" 30
Rotherham—Sewer, Corton Wood	Rural District Council	B. Godfrey, C.E., 26, Moorgate-street, Rotherham	Oct. 3
Saffron Walden—Sewage Disposal	Corporation	W. Adams, Town Clerk, Saffron Walden	" 5
Paignton, Devon—Additional Sewers	Urban District Council	F. W. Puddicombe, Clerk, Paignton	" 5
Southend-on-Sea—Laying Sewers (1,245ft.)	Corporation	Wm. Gregson, Town Clerk, Southend	" 6
Hunslet—Sewer Works	Rural District Council	S. Shaw, Engineer, Union-street, Dewsbury	" 14
Eccles, Lancs—Brick Culvert (745yds., 3ft. by 2ft.)	Corporation	A. C. Turley, Borough Engineer	" —

STEEL AND IRON.

Valetta, Malta—Iron Columns and Steel Joists	Official	Crown Agents to Colonies, Downing-street, S.W.	Sept. 28
India—Cast-iron Piping	Official	E. G. Burls, Director-General of Stores, India Office, Whitehall	" 29
Punjab—Switches and Crossings	Southern Punjab Railway Co.	Urban Broughton, Secretary, 70, Cornhill, E.C.	" 30
India—Steel Axles	Rohilkund & Kumaon Railway Co.	E. L. Marryat, Secretary, 237, Gresham House, E.C.	Oct. 5
Bradford—Roof of Clothing Premises	Milnes and France, Architects, Bradford, Yorks		" 5
Alexandria—Bridge Works (Iron)	Administration of Railways	Chief Engineer to Administration, Alexandria	" 30
New South Wales, Australia—Steel Rails (150,000 tons)	Government of New South Wales	Sir Saul Samuel, 9, Victoria-street, S.W.	Dec. 30

Trade News.

WAGES MOVEMENTS.

LEEDS.—After lasting twenty weeks, the strike in the Leeds building trade has been settled, and work was resumed last Monday. At a conference on Saturday, at which both the employers and men were represented, after a prolonged discussion the men's demands as to wages were agreed to, two or three minor points as to the working of the rules being left over for future consideration. The dispute has of late been confined to the bricklayers and their labourers, who receive an advance of a half-penny per hour, the joiners and others having previously been advanced.

NOTTINGHAM.—No settlement of the plumbers' strike has been arrived at, and there is every probability that the threatened lock-out of the whole of the building trades in the town will be resorted to. Indeed, notice has already been given by the Master Builders' Association to the trade societies affected of their intention to lock out the workmen at the end of the month, unless there is a change in the tactics of the societies with regard to the plumbers' strike. This strike commenced in July, and when non-unionist plumbers were set to work on any "job," all the other workmen engaged on the same building were at once called out on strike by their respective societies. The master builders contend that this is a violation of the rules which had been agreed to by their association and by the representatives of the workmen, one clause being to the effect that before any general suspension of work takes place a meeting of six representatives of each side shall be held to try to settle the difference. The masters, moreover, regard the action of the societies as a covert attempt to oust all non-society men from the building trade. They have, therefore, decided on a general lock-out, unless the non-unionist plumbers be allowed to resume work, and a pledge be given against a recurrence of the strikes. Should these conditions not be complied with—and this does not at present seem likely—more than 5,000 men will be locked out at the end of the month.

THE BUILDING TRADES IN THE NORTH.—A largely attended meeting of building trades workers of Inverurie was held in the Town Hall on Saturday evening. The question under consideration was the reduction of the working hours, and the meeting was addressed by representatives of the mason, joiner, painter, plumber, and slater trades in Aberdeen. A motion approving of the reduction of the working hours to nine per day, and resolving to take steps to further the movement, was unanimously adopted. A committee was appointed to arrange for a joint conference of employers and operatives to further consider the subject. At present all the trades, with the exception of the plumbers, work 10 hours a day. The Huntly operatives are moving in the same direction.

STRIKE OF PLASTERERS AT THE ROTHERHITHE TOWN HALL.—Mr. Howell J. Williams, builder, of 13 to 18, Bermondsey-street, S.E., formerly L.C.C. for Rotherhithe, complains strongly of the action of

the Plasterers' Union in ordering a strike of plasterers at the new buildings of the Rotherhithe Town Hall. He describes that action as extraordinary, and contrary to the average Englishman's sense of fair-play and justice. He adds: "About three or four weeks ago I received a communication from the secretary of the Plasterers' Union (forwarded to me while I was on a short vacation in North Wales) calling my attention to the fact that that the 'solid' plastering at the Rotherhithe Town Hall had been intrusted by me to Mr. Chessell, and that the union objected to any plastering being done by him, and hinting that unless I paid off Mr. Chessell and his men there would be a strike. I did not act upon this proposition, but was informed a few days later that the union had ordered all the union men working on the ceilings to strike, and remain out until Mr. Chessell and his men were discharged. The only reason given was that Mr. Chessell and his four sons had themselves continued to work and persevered in carrying on an urgent plastering work during the late strike some months ago—obviously nothing to do with the Rotherhithe Town Hall, and they were now going to pay him out, and, if possible, drive him and his sons out of the trade, although Chessell was conforming in every way to the rules agreed to by the trade, and being quite willing, and even desirous, of employing union men and paying full rate of wages of 10d. an hour. For some days this strike was maintained, until the architects, for the sake of getting on with the work, instructed Mr. Chessell to withdraw from the works for two or three weeks to allow the men engaged upon the decorative plaster ceilings to complete their work without his presence. Had I been in town I should never have agreed to such a proceeding; but upon my return, finding things as I have described, I left matters as they were. The union men were allowed to resume work on the ceilings; but the officials of the union intimated that unless a pledge was given that Chessell and his sons and non-union men should not again be employed, they would again call out their union men, even though Chessell and every non-union man had already been sent off the works to satisfy them. As no self-respecting employer could, in my view, give such a pledge, I refused, and on Saturday morning the plasterers were called out, and a strike is now being maintained by the Plasterers' Union, not because of anything obnoxious to them at present existing on the works, but because at some future time, after the plasterers engaged upon the decorative ceilings have completed their work and left their job, I may employ Chessell and his sons and non-union men again."

It is said that the various contracts in connection with the construction of the works for giving a water supply to the Coolgardie Goldfields, West Australia, will be given out about the middle of October, and that nearly all the piping and steel girder supports for the aqueducts will have to be obtained from England. The cost of the works is estimated at £2,500,000, that being the amount which the Legislative Council of the colony has sanctioned, and the construction will probably take just over two years.

CHIPS.

The Red House Tavern at Woking has recently been enlarged by the addition of a saloon-bar, coffee and billiard rooms. Mr. R. Clamp, of Woking, is the architect.

On Wednesday the foundation-stones of a new chapel at Portmadoc were laid. Messrs. O. M. Roberts and Son, Portmadoc, are the architects, and the cost will be about £4,000.

At a meeting of the Weston-super-Mare Markets Committee on Wednesday a letter was read from the architects, Messrs. Price and Wooler, recommending the carrying out of a modification of the first and second schemes, their estimate for which would be £550 more than that for the second scheme as submitted to the Local Government Board. The committee recommended the adoption of the architects' proposals. The council subsequently resolved that Messrs. Price and Wooler be instructed to prepare amended plans and estimate accordingly, that the clerk forward a copy of the same to the Local Government Board, and that he make application to that board for sanction to a loan of £3,567 for carrying out the necessary works, the time for repayment thereof to be extended over the longest possible period. The resolution was subsequently confirmed at a special council meeting.

The General Purposes Committee of the Darwen Corporation, on Monday, decided to appoint Mr. Smith Saville, of Burton, to the position of borough surveyor, at a salary of £350 per annum. The vacancy arose through Mr. Stubbs, the previous surveyor, having obtained a similar post at Blackburn worth £700 per annum.

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TENDERS.

Correspondents would in all cases oblige by giving the addresses of the parties tendering—at any rate, of the accepted tender: it adds to the value of the information.

BELPER.—For the erection of a house for Mr. Herbert Strutt. Mr. Maurice Hunter, A.M.I.C.E., M.S.A., Belper, architect. Quantities by Mr. John Watson, F.S.I., 62, Whitefriargate, Hull:—

A.	B.	C.
Walker and Sons, Wirksworth —		
£483 10 0 ...	—	... £4,114 10 0
Wheeldon Bros., Belper —		
448 10 0 ...	—	... 4,025 2 1
Walkerline, Derby —		
312 0 0 ...	135 0 0	... 3,725 0 0
Ford and Co., Derby —		
460 8 6 ...	—	... 3,695 13 2
Hingley, A., Derby —		
325 0 0 ...	125 0 0	... 3,646 9 6
Walker and Slater, Derby —		
—	—	... *3,629 7 5
Hibbert, T. R., Belper —		
—	*152 0 0	... —
Gillet, H., Belper —		
*325 16 8 ...	—	... —

A.—Plumber, gasfitter, and hellhanger. B.—Painter and glazier. C.—Other trades. * Accepted.

GOSPORT.—For warehouses and offices at Forton, Gosport, for Messrs. Farham and Son. Mr. H. A. F. Smith, Star Chambers, Gosport, architect:—

Lea and Son ...	£4,660 0 0
Crood, J. ...	4,537 0 0
Rapley, J. W. M. ...	4,426 0 0
Hill, W., and Co. ...	4,404 0 0
Dash, C. M. (accepted) ...	4,389 0 0

All of Gosport.

HOCK, HANTS.—For the erection of two houses at Hook, for Messrs. S. W. and M. Woolland. Mr. Henry L. Florence, 3, Verulam Buildings, W.C., architect. Quantities by Mr. J. F. Bull, 30, Bedford-row, W.C.:—

Thurnwood, J., Basingstoke ...	£2,465 10 11
Musselfwhite and Son, Basingstoke* ...	2,134 0 0

* Accepted.

KETTERING.—For asphaltting the laundry yard at the workhouse, for the board of guardians:—

Barlow, A. (accepted) ...	£33 2 0
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LONDON.—For engineering works in the proposed new administrative block at the workhouse, Northumberland-street, W., for the guardians of St. Marylebone parish. Mr. A. Saxon Snell, F.R.I.B.A., architect. Quantities by Messrs. Northcroft, Son, and Neighbour:—

Fraser and Fraser Bow ...	£8,930 0 0
Young and Co., Pimlico ...	8,250 0 0
Betty and Sons, Westminster ...	7,790 0 0
May, J. and F., Holborn ...	7,683 0 0
Rosser and Russell, Charing Cross ...	7,503 0 0

LONDON.—For the erection of the new Administrative Block at the workhouse, Northumberland-street, W., for the guardians of St. Marylebone parish. Mr. A. Saxon Snell, F.R.I.B.A., architect. Quantities by Messrs. Northcroft, Son, and Neighbour:—

Holloway, H. L., Deptford ...	£51,000 0 0
Gregory and Co., Clapham Junction ...	50,879 0 0
Bird, S. G., George-street, W. ...	50,395 0 0
Stimpson and Co., Brompton ...	50,125 0 0
Yerbury and Sons, Kilburn ...	49,900 0 0
Wall, H., and Co., Kentish Town ...	49,171 0 0
Chessum and Sons, Haggerston ...	48,950 0 0
Wall, C., Chelsea (accepted) ...	48,500 0 0

SOUTHAMPTON.—For road-making and drainage to Hollybrook Avenue Estate, Shirley, Southampton, for the County of Hants Land and Building Society, Ltd. Mr. W. B. Hill, F.S.I., surveyor:—

Playfair and Toole, Southampton ...	£850 0 0
Butt, J. ...	633 11 4
Osman ...	645 0 0
Jenkins and Sons ...	644 0 0
Batten, W. V. ...	618 9 0
Saunders, H., & Co., Bournemouth* ...	566 0 0
For fencing to the above estate:—	
Fletcher and Son, Eling ...	153 16 4
Smith, J. B. and Son, Baddesley* ...	148 5 0

* Accepted.

SOUTHAMPTON.—For rebuilding the Dorsetshire Arms, St. Mary's-street, Southampton, for Messrs. Aldridge and Son, Bedford Brewery. Mr. W. B. Hill, F.S.I., architect and surveyor:—

Brinton and Bone ...	£879 0 0
Stevens, H., and Co. (accepted) ...	890 0 0

SOUTHAMPTON.—For the erection of a house and shop on the Hampton Park Estate, Swaythling, for Mr. John Henry Smith. Mr. William Burrough Hill, F.S.I., architect and surveyor:—

Cawte, Southampton ...	£1,700 0 0
Udall, J. J., and Co., Southampton ...	1,396 0 0
Playfair and Toole, Southampton ...	1,347 0 0
Jenkins and Sons, Southampton ...	1,337 0 0

SOUTHAMPTON.—For alterations and additions to the Old Farnhouse, Mount Pleasant, for Messrs. Scrase and Co., Ltd., brewers. Mr. William Burrough Hill, F.S.I., architect and surveyor:—

Playfair and Toole, Southampton ...	£400 6 0
Bagshaw and Son, Southampton* ...	390 0 0

* Accepted.

STOCKINGFORD, NUNEATON.—For the erection of National Schools for 316 children, including drainage, boundaries, and formation of playgrounds. Messrs. J. R. Veall and Son, Wolverhampton, architects:—

Gough, H., Wolverhampton ...	£1,813 0 0
Willcock, H., & Co., Wolverhampton ...	1,776 0 0
Wilson, J., Nuneaton ...	1,698 0 0
Simpson, J., Nuneaton ...	1,561 0 0
Kelly and Son, Foleshill ...	1,539 0 0
Wincott, T., Nuneaton* ...	1,435 12 3

* Accepted subject to alteration.

WOKING.—For building a small grain warehouse and shop on the Chertsey-road, for the trustees of the late Roht. Daws. Mr. Roht Clamp, A.R.I.B.A., Woking, architect. Quantities supplied:—

Whithurn, J., Woking ...	£618 0 0
Harris, J., and Son, Woking ...	599 0 0
Mitchell Bros., Shalford ...	510 0 0
Norris and Sons, Sunningdale ...	445 0 0
Hooker, G. (late Sims), Basingstoke* ...	432 0 0

* Accepted.

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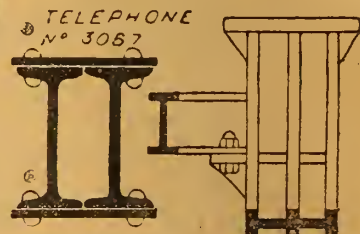
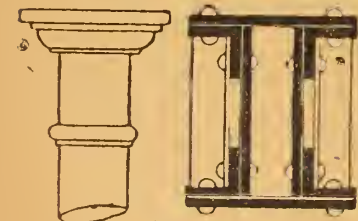
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A REVIEW AND A CONTRAST.

WHEN reviews of the national progress during the last sixty years of the present reign are being written from loyal and other motives, it may serve a useful purpose if we glance at a few of the changes in architectural style and construction which have taken place during the same period of time. Any consecutive record or chronicle of the Victorian era would, in our limited space, be more of a catalogue of events of little or no interest. Those who can look back during a great part of that time—and there are a few of us who can—will find much to be thankful for and much more to hope for. There has been a great deal which we would gladly consign to oblivion—a record of failures and tentative experiments which have, however, been steps in the evolution of the art as we see it to-day. Architecture itself has passed through a period of speculation, through a mist of uncertainty and chimera to a region of fact, honesty, and practical definition. In the early 'thirties, it could scarcely be called a living art—it was simply an archaeological revival of forms which architects took up at their will, and which, under the guise of "Orders" and "Styles," they gave to their buildings. So far as it went, building was sound and substantial; but it had little or no connection with architecture in the sense it is now understood; there was little sympathy between them. Those who wrote on architecture seemed to be unaware that the art had anything to do with materials or with construction and requirements, as if these utilitarian qualities were beneath the attention of the designer in the Classic Orders. The Greek or Roman styles or "modes" of architecture had to be copied, no matter in what material, and the duty of the architect was to design his façades and interiors upon the best models or upon certain rules without reference to constructive exigencies. Thus it was with the hidden roof behind balustrades and parapets: its construction and framing were designed to suit the façades instead of becoming the motive and *raison d'être* of the design as it would be now. Apartments and their dimensions were ordered by the intercolumniation or the external breaks in the façade, and even doors and windows were made to balance each other, or to conform with certain canons of Vitruvius or Palladio and other compilers. The chimney, now made so important a feature in our domestic architecture, was concealed, or appeared in the shape of pedestals and terminals. These disguises and vagaries which manifested themselves in the 18th century were promoted by the erroneous teaching of the art which was found in such books as Peter Nicholson, Batty Langley, and others who did not confine themselves to construction, but who published books for the guidance of young architects, such as the "Principles of Architecture," which appeared early in the present century. The number of works giving façades and details according to Classic rules, or examples of Roman buildings, temples, &c., were clearly answerable for these designs. It was not thought heresy if even Gothic were disguised in the garb of the Classic Orders, as may still be seen in a few of the residences and "restored" churches of the early part of this century;—and does not the mere mention of the contrast presented by our churches now with those of sixty years ago awaken our memory

to the vastness of the change that has been accomplished? It is only here and there in a remote country town that one may see the flat-ceiled roof over the nave, a series of columns in bad Classic, carrying an entablature instead of arches; panelled and dentilled gallery fronts and "three-decker" pulpits in the "churchwarden" style of that benighted era of church art. Look at the restorations carried out by Wyattville at Windsor Castle, Sir Robert Smirke at York Minster, B. Ferrey, Thomas H. Wyatt at Llandaff Cathedral and various churches, or the restorations of Edward Blore at Peterborough, Ely, Winchester, Glasgow, and many other cathedrals and churches—men all eminent in their day. Happily many of these "restorations" have been themselves restored or removed; but they represent the sum-total of Gothic design and feeling of the early part of the century, when, as at Ely, Peterborough, Winchester, Salisbury, and Lichfield, cement and stucco were employed, and ornaments and figures were cast and moulded in the same materials. What was thought to be good Gothic in 1840 would shock any average architect of the present day. And it was not only the misuse of material, but the imperfect knowledge of the style, the arch-curves, the jamb-mouldings, the tracery. This was not confined to restoration only; the churches built in the Pointed styles where there was nothing to be copied or followed, look now painfully prim and meagre in the light of our modern work. Take, as instance, the Perpendicular church of St. Luke's, Chelsea, which, with all its "correctness," would horrify any Gothickist of to-day. And what seems strange is that the Latest phase of Gothic, and the most expensive, found the largest number of admirers, whereas many of our best modern examples adopt a simple, Early treatment.

The domestic architecture of the time of which we speak shared in the same illusory spirit. Everything was Gothic or Tudor, and as Fergusson has said, nothing was "thought of but Gothic castles, abbeys, villas, and pigsties." Wyatt the arch-restorer had whetted the public taste by his "convent in ruins" at Fonthill, and soon followed a host of builders, of whom John Nash was the leader, prepared to build anything, from a pavilion to a cottage, in the same pliant and popular style, and at any price, in stucco or lath and plaster. But the pseudo-Classicist was as active as the Gothickist. There were those who preferred a Greek rendering of houses and churches, a heavy Classic style which may still be seen in the squares and crescents of Bath, of Brighton, of Regent's Park, Bloomsbury, and many other squares in the Metropolis. Several typical churches built in this style still remain, like those of St. Pancras, St. Mark's, Kennington, and St. Peter's, Eaton-square—heavy and inexpressive edifices as they were when first built, but certainly a trifle more tolerable than "Carpenter's Gothic." The two rival styles continued to be practised for some years; the pseudo-Medievalists captured all the churches and schools, while the Classicist devoted himself more to secular work. The progress of the former style was shown in such a great work as Barry's Houses of Parliament, in many fine parish churches by Scott, like those at Camberwell and Doncaster; while of the latter, or Greek revival, we have St. George's Hall, Liverpool, by Elmes, and a number of edifices in London, like the British Museum, Royal Exchange, and Italian works by Barry and the Smirkes in Pall Mall. One remarkable point is the dual practice of these men in both styles, often with such success. Then Elmes, of St. George's Hall fame, was also the architect of a Gothic college at Liverpool. It seems needless to compare the Classic and Gothic of the time of Barry or Smirke with those of to-day, to trace the progressive advances made in recent

developments of the Classic. We cannot even speak in the same breath of the style of that conscientious Gothickist, Sir Gilbert Scott, as soon in his earlier churches, and the work which is done to-day. There is a different ring about it—a new spirit animates the modern Gothic designer. Mere style-revival has been succeeded by a new motive—organic development. We now design on the principle of finding out the actual requirements of a building and making mere style, so-called, subservient. It is no longer style that dominates the building, but the organised construction which develops a style. And this change has had a remarkable effect in entirely remodelling our treatises and handbooks and our practice. Early in the century we had such books as Ware's "Complete Body of Architecture" and Gwilt's "Encyclopædia," the latter published in 1842, both of them representing all that an architect was required to know in theory and practice. The author of these works assumed that it was only necessary to teach an architect to build with stability, and according to certain academical rules of architecture, and that he had only to apply such knowledge to every kind of building. But the modern system is just the reverse. It begins with the actual building and its requirements, and proceeds from them to develop a scheme of architectural style suitable for its particular purpose; and this is the proper and only principle for the growth of architecture. It is nothing less than adopting Bacon's system of philosophy—the experimental—to architecture; of studying facts, and from them deducing the true principle of design. A vast change has been the consequence of this new conception: it has revolutionised the whole system of architectural teaching; it has made it necessary for our architects to study plan and technical details and materials to understand the organic functions of building before they can learn anything of art. And the change has been felt in the literature of architecture. Instead of Rickman, or Parker, or Bloxam being the best book to teach the elements and classification of Gothic, and which was put into the hands of the student half a century ago, he has now the able works of Viollet-le-Duc, Fergusson, Sharpe, and other expositors who have taught that certain developments of style can be best learned by investigating the requirements and constructional methods of those periods. Even the student's textbook of styles deals with modes of development and by comparative methods like Professor Banister Fletcher's work. There is no book of principles so useful as the history and constructive details of the Mediæval edifice, no textbook so thorough as a personal examination of a building. The professional journal, like the BUILDING NEWS, has largely superseded the portfolio of drawings, and the treatise on principles and practical details. Typical examples and plans have more value in these days than styles for the architect. We have had also our analysts and synthesists; every feature of old work has been examined, analysed, and classified, and through these means we have come to learn a great deal more of fundamental principles than we did early in the century.

Lastly, we may refer briefly to the education and practice of architects. In the early "forties" the pupil learned how to draw correctly the "Five Orders," to distinguish the Greek from the Roman models. Drawing, and some knowledge of construction such as was taught then from books like Vitruvius, Gwilt, Rondelet, "L'Art de Bâtir," Tredgold, and Nicholson formed the main staple of his education. Measuring and estimating were taught in a fairly thorough manner, for there were excellent measurers and surveyors. We have only to see how this limited course of professional knowledge has been extended, how much more thoroughly we study style

and construction, and how these branches have developed and become specialised. One of the most important and significant events during the Victorian era has been the rise of contracting as a system. It has not only altered the relations of architect and client, but architect and workman, for good or bad. Before it, as our elder readers know, the separate tradesman system for each trade prevailed, a system that still exists in the North. This plan had the advantage of securing skilled artificers, and of bringing the architect into contact with them and the building. No one can deny the quality of the work then done. The architect had the entire control, and often engaged the workmen, and purchased the materials. The work was afterwards measured and valued, so that the actual cost was ascertained. With the demand for cheaper work, the one-man or contractor system came into existence. No doubt, there are advantages in making one man responsible, and in saving separate agreements; but the question is still, Does it produce the best results? The disparagement of skilled labour is the sorriest feature in the change. We can erect larger and cheaper buildings, and nearly all our modern edifices have been so undertaken. The one-contract, or competitive plan, has brought other changes, and in a certain degree has altered the whole of our architectural practice. Under it, cost has become the main factor in building. Trade itself has accommodated itself to the demands of the contractor. The quantity surveyor is an offspring of the contract, and it is well to note how the original architect and surveyor have been broken up, and how many vocations have arisen. We have now a number of special branches of the profession: first the business as well as the art architect—the one who employs and carries out contracts on commission; and, second, the mere “ghost,” who is the real designer in the background. Then we have, third, specialists in different sorts of building—workhouses, hospital, technical schools, baths and washhouses, municipal buildings, and a host of other; fourth, there are engineer-architects, building, land, and estate surveyors. The modern competition has brought about the separation of the architect's business in a manner our forefathers had no conception. In the days of Sir W. Chambers and Sir John Soane clients were content to accept the careful drawings, tinted in ink or sepia, of the architect; the expert artist was almost unknown. Again, many of the profession, like the late Edward Blore, were skilled as surveyors, and did a good deal of the work that now falls to the quantity surveyor, contractor, and clerk of works. Alfred Bartholomew, whose “Practical Specifications” was one of the notable treatises on constructive architecture published in 1840, foresaw the separation between the architect and the engineer, and raised a note of warning by comparing the constructive excellence of mediæval building with the unscientific modes of construction in his day, which was the result of a dishonest system of architecture. All this is changed with the dethronement of the pseudoism of the time. Our architects now know how to control their forces to counteract pressures, to construct arches, vaults, and floors, as well as ever did the old builders. In design and the decorative study of materials how much has been accomplished it is almost superfluous to say, due largely to the systematic study of art in our schools; while concurrently with it, as a sort of reaction, the technical instruction of our architects and artificers is a development of hopeful augury.

ALTERATION AND CONVERSION OF BUILDINGS.

THE ever-changing tenure of buildings and premises of certain descriptions is a cause of much trouble to those who have

to administer building acts and by-laws in our large towns. When a person leases or purchases a building for any particular purpose, he believes he has a right to make any alterations or changes of structure that may be necessary for the object he has in view. If he has purchased the leasehold or freehold of a number of dwelling-houses, and is minded to convert them into one large boarding establishment or co-operative store, he believes he has a right to do so, till the official authority declares he must give due notice of his intention, and submit plans for approval. If he attempts to make the necessary alteration by pulling down party-walls, or by making openings in them, he may be sharply reminded that these alterations will bring his premises under the name of a “new building,” with all the consequences of having to conform to the Act of Parliament. For example, the original intentions of owners and builders are often frustrated by alterations, which cause no little trouble to those who administer the London Building Act. By a few unimportant alterations—the building of a partition or two, or making a few extra openings, it may be possible to convert a building not intended for habitation into a dwelling-house; in other instances we have heard of the conversion of one large house into two dwellings by the erection of a partition and a new entrance and staircase. More commonly a number of houses or shops are joined together by making openings of communication, and large business premises made. So much trouble has been given to district surveyors in the past by these and other surreptitious alterations, that in the late remodelling of the Act a section has been inserted dealing with conversions of buildings, defining clearly as far as possible certain conversions which cannot be made without permission of the council. These “rules as to conversion” may be found in section 211. They have been so framed as to meet all the cases likely to arise. How many a building constructed for a stable or coachhouse has been turned into a dwelling-house! The first rule prevents this being done. Turning into one house two or more dwelling-houses is not so often attempted; but the next rule prevents anyone from converting one house into two or more dwellings—a kind of alteration which is often made in converting a large house into tenements. Another important rule is that which precludes a shop being used as a dwelling-room or part of a dwelling-room, or the more common desire to convert a whole or part of a house into a shop. The latter alteration is very often made by putting in a breastsummer in front and converting the front below it into a plate-glass window. These rules are qualified by the words “in such manner that a building or part of a building so converted as aforesaid when converted will not be in conformity with the provisions of this Act relating to the class of buildings to which the building when so converted will belong,” which means, in plain language, that such alteration will not be allowed unless it conforms with the provisions of the Act required for buildings of its class. The effect of the law is thus plainly to prevent a building erected for one purpose to be changed into another. The wisdom of the enactment cannot be called into question, for if any one could turn a number of houses into a warehouse for the storage of goods, or convert them into an hotel, or make one large concert-room by clearing away all inside partitions and floors, it may be seen how the purpose of a building statute could be frustrated, and to what serious dangers the public may be exposed. Hundreds of speculators would be doing these things without any guarantee that they are fit or safe for the object. In that part (XVI.) of the London Building Act, 1894, which provides for “Miscellaneous offences against the Act,”

new clauses have been inserted expressly intended to guard against these and other alterations. Section 206 is framed to show the limit of exemption as regards buildings of Government and other departmental uses which are exempted under the Act. It provides that any building or structure so exempted or privileged shall remain so only so long as it is used for its original purpose, or retains the character by reason whereof it is so exempt; and the next clause states that unless the consent of the council is obtained, no alteration is to be made of any building that when so altered will not be in conformity to provisions for new buildings, except in certain cases, as when a party or external wall has been taken down or destroyed by fire to the extent of one-half, in which case the remaining portion of the wall not in conformity with the Act shall be made to conform or be taken down and rebuilt.

Perhaps the section which most interferes with the rights of owners in the Metropolis, and very seriously restricts the operation of the builder and architect, is 209, which makes every addition to, or alteration of, a building amenable to the provisions of the Act. When it can be shown, indeed, that any such addition or work is done in the course of “necessary repair” not affecting the construction of any external or party-wall, the builder is exempted. The words “necessary repair” is a wide and ambiguous term, and may include anything from mere pointing, painting, or whitewashing to substantial reconstruction, and the definition is a question for the Court only. Already many disputes have turned on this clause, and more are likely still to arise.

We have yet to dwell on another question that affects a large class of alterations. How is the law to be applied to buildings erected before the Act came into force? Section 210 exempts all buildings erected before the commencement of the Act to which no objection could have been taken under any previous law. As to buildings in progress at the time the Act came in, or which is to be carried out under a contract made before the Act came into force, they are, by section 212, also exempt, but subject to the Acts previously existing. This clause has already been the subject of dispute in the courts. In a few recent cases attempts have been made by district surveyors to bring these buildings under the new law. It is their duty to survey such work pursuant to notice given under section 38 of the old Act, and he has to make use of much discretion in the matter. As to contracts, the distinction has been made between a “building contract” and a “building agreement.”

It is important in all these cases that a notice by the surveyor in case of irregularity is served within the statutable time, and section 152 lays down the period. The other day, at the North London Police Court, a builder was summoned for disobeying a notice from the district surveyor to block up certain openings which had been made between a row of six shops with dwelling-rooms over, and which were called “flats.” The original intention of the owner was that each shop and set of flats should be separate, but they were let to a firm who wanted to convert them into co-operative stores. For this purpose each shop should communicate, and the freeholder made the necessary openings in the walls, and double iron doors were fitted. This was agreed to by the surveyor till he found the upper floors were being let out in flats, as openings can only be made in party-walls in premises in one occupation. He thereupon proceeded against the builder; but the summons failed because the builder had previously left the premises before the notice was served. The section provides that when the notice cannot be served on the builder, it should be served within 21 days upon the owner. As the

notice of irregularity was not served within that time the case was dismissed. The builder was served with the notice of irregularity within the legal time; but the summons was adjourned from time to time, and it was not till some time afterwards that it was decided to proceed against the freeholder. The decision shows the importance of serving the notice in accordance with the section, and it is also a lesson to owners, as showing that the law takes cognisance of any change of intention in the occupation of premises.

MAXIMUM LOADS FOR BUILDINGS.

AUTHORITATIVE statements as to the maximum safe loads which materials will bear are often so misleading that no reliance can be placed upon them. Municipal bodies may do wisely, therefore, in acknowledging certain standards which builders, architects, and engineers may accept. The London County Council have power to make by-laws and regulations as to certain standards with regard to cement, concrete, the quality of the substances of which walls may be built, the dimensions of wooden breast-summers, dimensions of joists, plastering materials; but they have not yet published any schedules of loads that may be taken as safe for different purposes. The city authorities of the Western States have, in some instances, adopted ordinances of these data, and we now hear that the City of Buffalo has also issued a series of regulations and stipulations for the erection of buildings, which lay down the maximum loads which may be applied to soil, brick, concrete, iron, steel, and wood. We do not assert that these loads may be taken in all cases as correct data; but it may give our readers an idea of the extent of this ordinance if we draw attention to a few of its numerous sections. Section 143 deals with foundations and masonry materials, and provides that "solid natural earth or dry clay" is not to be loaded with more than $3\frac{1}{2}$ tons per square foot, although it is true this load has often been exceeded in the case of high buildings and chimney shafts. On concrete in foundations the weight is not to exceed 4 tons per square foot, although some textbooks give from $2\frac{1}{2}$ to 3 tons. But is lime or cement concrete intended? Mr. Grant's tests may be taken as fair results of the compressive strength of Portland cement concretes having different aggregates and matrices. Taking ballast, one sample compresses at 81.6 tons per square foot, the proportion being 6 to 1; with Portland stone the result was 162 tons; with slag 92 tons. The highest results are thus obtained by the stone aggregates, next to which pottery forms a strong aggregate, having an affinity for cement by its angularity. The tests made with the same aggregates, but with various matrices, show, of course, the highest results with Portland cement, and that 1 to 6 concrete is stronger than 1 to 8. Lime concrete is less certain. The maximum load allowed for dimension stone in foundations is not to be more than 6 tons per square foot. If the beds are dressed to uniform surface, with inch joints laid in cement mortar, 7 tons per foot is allowed; but for rubblestone work laid in the same mortar, the load is not to exceed 5 tons. Professor Unwin, in his "Testing of Materials," observes that for piers the pressure does not reach 10 tons per square foot, though in some lofty structures and tall buildings it may reach 20 to 30 tons, and in some arch rings 40 or 50 tons per square foot. These figures are wide, and seem to justify the limits laid down above. Unwin says the crushing resistance of stone tested in small cubes is seldom less than 250 tons, and often reaches 1,000 tons or more per foot. But these cubes are selected for testing, and therefore, cannot fairly represent a large squared block.

Single blocks in cubical form are also, it must be remembered, much stronger than aggregates of blocks or rubble stone. In this connection it may be as well to say that the crushing strength of stone is reduced when bedded on lead or any plastic substance—a point which hardly agrees with ordinary practice, and architects and engineers often specify deal or lead plates for bedding. A layer of plaster, according to the same authority, is found better for preparing the faces on which the crushing pressure acts for testing. The practice of introducing lead or deal has been found to diminish the resistance. The crushing load on 4 in. cubes of Portland stone has been found to be 57,665 when bedded on two mill-boards, and for lead 45,65 tons.

To resume our reference to the Buffalo ordinance, we may take the maximum loads given for brickwork. Common brick laid in lime mortar must not exceed 3 tons per square foot; in cement mortar 5 tons is the load; for hard-burned bricks in lime mortar 6 tons; in cement mortar, 9 tons. Sect. 145 says: "The loads permitted for isolated brick piers, whose heights are greater than six times their least dimensions, shall be 20 per cent. less than those above given."

We next come to cast iron. When subjected to crushing strain, as in bearing-plates, may be loaded to 15,000lb. per square inch, but compression strain not to exceed 13,000lb. per square inch. Tensile strain is not to go beyond 3,000lb. For cast-iron pillars a formula is given which is well known. The minimum thickness of cast iron in columns is not to be less than three-fourths of an inch, and no column of cast iron is to exceed in height 30 times its least horizontal dimension without having lateral support. All ends of columns are to be turned true, and all columns are to be tested and inspected, &c. Plate girders are to be designed according to a certain formula, and other formula are given for regulating the strength of riveted wrought-iron columns, steel columns, wooden pillars, and beams, which may be found in the textbooks. Regulations are also imposed for the connections of all structural ironwork for proportions of trusses, brackets, &c. If made of steel, all girders, beams, corbels, &c., are to be proportioned that the maximum fibre stress will not exceed 16,000lb. per square inch, or if made of iron, will not exceed 12,000lb. These rules are reasonable on the whole, and do not err on the side of over-caution. They are worth the attention of all authorities.

WROUGHT IRON AND STEEL IN CONSTRUCTIONAL WORK.—II.

By JOSEPH HORNER.

THE general processes involved in the extraction of iron from the ore, and its conversion into the manufactured products of commercial irons and steels, are probably familiar to a large proportion of the readers of this journal. An extended account of these processes may, therefore, be considered unnecessary. But it is possible that a good many readers may have but hazy ideas of the *rationale* of these processes, and of the precise shades of difference between these products.

Moreover, those who possess a general grasp of the subject may yet be desirous of refreshing their memories. A concise account of principles involved in the methods by which wrought iron and mild steel are produced may, therefore, suitably preface the account of their applications. Without this knowledge it is impossible to understand the characteristics, and the reasons for the special adaptations of these materials.

Cast iron is produced from the ores of iron by a direct process of smelting. Both wrought iron and steel can also be, and are obtained in a direct way from the ore. But this is not the usual practice adopted for the production of large quantities of iron and steel, nor would it be the most economical, neither would it yield the best products. With a few unimportant exceptions, crude pig iron, containing something like 5 or

6 per cent. of elements other than iron, is first obtained, and then remelted for the production of malleable iron, or steel. Attempts have been made to substitute direct methods for these indirect ones, but with so little success that nearly all the wrought iron and steel which is now manufactured is made in the indirect way. The exceptions are the primitive methods, still followed in semi-barbarous countries, and the partial mixing of ore with pig in some of the open-hearth steel-making processes.

In the diminutive primitive furnaces of Africa, India, Burmah, and other countries the ore is always reduced by means of charcoal, and the blast is supplied by hand-operated bellows. The ore and charcoal are broken up into small fragments, and blooms of a few pounds' weight reward the labour of several hours. The reactions in the furnaces are substantially as follows:—Nearly all the ores used are hæmatites, which are impure peroxides of iron (ferric oxides), the combining proportions of the iron and oxygen being represented by the formula Fe_2O_3 . Rich hæmatite ores contain 60 or 70 per cent. and upwards of ferric oxide, the remainder consisting of earthy and other foreign matters. These are charged with alternate layers of charcoal upon a bed of charge of charcoal. The blast from the bellows entering by the tuyeres meets with highly-heated carbon (charcoal), and the resulting combustion yields carbon dioxide. This gas, in passing through the upper layers of charcoal, takes up more carbon, forming carbonic oxide. As this again passes through the now highly-heated and porous ore, it takes up oxygen therefrom, becoming again carbon dioxide, and ultimately leaves the iron reduced to the metallic state. The carbonic oxide gas is, therefore, the *reducing agent*, withdrawing the oxygen from union with the iron by virtue of its own superior affinity to oxygen.

The slag or cinder results from the union of the earthy matter of the ore with a portion of the iron oxides which have been reduced from the ferric to the ferrous condition. Silica is one of the principal constituents of the earthy matter with which the metal is associated. This element readily unites with protoxide of iron, forming a silicate of iron. A portion of this slag or cinder separates from the iron, and is tapped from the furnace. A smaller portion still remains with the reduced iron, rendering the latter spongy, and the subsequent hammering which the bloom undergoes effects the expulsion of this intermixed cinder from the iron.

The temperature of the furnaces is very much lower, and more irregular than that of our blast-furnaces. The waste of metal in the former is, therefore, very great, because unreduced oxide of iron forms the base of the liquid slag. In modern blast-furnaces lime is used as the base, and then nearly the whole of the oxide is reduced. But the temperature of the primitive furnaces is not sufficiently high to permit of the employment of lime, and if it were, then at that high temperature highly carbonised cast iron, as in our own blast-furnaces, would be produced, and neither malleable iron nor steel. Again, in the primitive smelting, the molten iron, already carbonised by the gaseous compounds of carbon, comes at the bottom of the furnace into contact with the *slag*, which is rich in oxide of iron. The oxygen of the latter then takes up carbon from the iron, leaving it variously carbonised, according to the conditions existing in the furnace at any given period. The products of the native furnaces, therefore, often consist of a mixture of steel and iron. Then the blooms are either broken up and the pieces sorted according to quality, or they are raised to a welding heat and hammered well, which renders them more malleable. If it be desired to produce steel, a larger proportion of charcoal is used than when malleable iron is employed and the blast is softened.

In all the primitive furnaces, both ancient and modern, the ore has been smelted thus in direct contact with charcoal, the carbon in which reduces the iron by combining with the oxygen in the ores. The metalloids in the ore pass into the slag, but the reduction is so imperfect that a large proportion of the iron also is lost in the slag. The iron and steel so obtained is almost invariably very good, and the production of either iron or steel is to a great extent under the control of the smelter by altering the proportions of fuel and ore, and in regulation of the blast.

The Catalan furnace has been used for the direct extraction of iron in Western Europe, certainly from 1293, and probably anterior to

that down to the present time. The early furnaces of this type were supplied with blast by means of bellows, the later ones by means of the *trompe*, an automatic blast induced by a descending column of water on the same principle as the injector. Except for this method of obtaining blast, the furnaces themselves are similar to the primitive hearths. The *Stückofen*, or High Blooming furnace, was essentially the Catalan furnace extended in height, its height ranging from 10ft. to 16ft. Cast iron as well as malleable iron was produced in it, often against the wish of the smelter. It was, therefore, at once the latest development of the furnace for the direct extraction of malleable iron, and the earliest form of the blast furnace for the production of cast iron. After the *Stückofen* came the *Blauofen* furnaces, which were similar to their predecessors, but taller, often being as high as 25ft. Even these, though used largely for making cast iron, were still employed when necessary for the production of malleable iron.

These furnaces, the Catalan, *Stückofen*, and *Blauofen*, together with the Swedish *Osmund* furnace, supplied the iron of Europe for centuries. Even after their products had been mostly superseded by the cast iron of the later blast furnaces, they lingered on, some even surviving to the present day. And as the blast-furnace was a direct and obvious development from the Catalan and *Stückofen*, so too, the early cast iron was first converted into malleable metal in hearths not differing essentially from the Catalan furnaces. In modified forms, these hearths still survive in the so-called Lancashire hearths, used to-day in Sweden and Russia. It was not until a little more than a hundred years ago that the modern process of puddling was invented, following a few years after the great revolution effected by the successful employment of coke in the blast-furnace. One cannot fully realise the magnitude of the industrial changes that have been due to these two innovations.

Previous to the invention of puddling by Henry Cort, in 1784, though malleable iron had been probably made for a couple of thousand years, most of it must have been prepared by the direct extraction of very small quantities at a time in a charcoal fire. After the development of the blast furnace, indirect processes became possible. The smith would then be able to procure pigs of cast metal from the smelter, and refine these on his hearth, still in contact with charcoal. By Cort's method the use of charcoal was rendered unnecessary. Previous to 1784, small plates of rolled wrought iron were obtainable. Bars were hammered out by the smith as he required them. There were no other sections made or used. No angles, tees, rail sections, zeds, channels, or H-joists. Hence, the use of wrought iron was restricted to a very few and unimportant applications. At this period the era of wrought iron for structural purposes commenced. Afterwards, larger masses were operated on in the puddling furnace than could be treated on the hearth, and at a lower cost. In the hearth charcoal was the fuel mostly used, and this was becoming scarce in consequence of the reckless consumption of it by the ironmasters. In the puddling furnace coal was burnt. The invention of the rolls, also by Cort, permitted of the formation of all sections. An impetus was thereby given to the production of both cast and wrought iron for structural purposes. When the puddling furnace was invented, Dr. Johnson had just ceased to haunt his beloved Fleet-street, and the mutterings of the first French Revolution were nearly audible! But from that period the world's industrial history has changed its course.

The direct processes, though suited to the production of small quantities of iron in countries in which charcoal was cheap, rich ore plentiful, and labour of little account, are not adapted for the production of large quantities, with inferior ores and sulphurous fuel. They were, moreover, very wasteful of metal, much of it disappearing with the slag in the form of oxides and silicates. Hence, as large masses of malleable iron came to be in demand, it was found more practicable to abandon the direct process, and effect a division of labour, relegating the making of the cast iron wholly to the blast furnace, and that of malleable iron wholly to the finery and puddling furnace.

It is not necessary to enter minutely into detailed accounts of the different methods of puddling adopted for the production of wrought iron, since we are more concerned with broad principles than with details of metallurgy. Broadly speaking, they fall into two divisions—the dry puddling,

and the wet puddling, the latter being also termed the pig-boiling process. The former is the one invented by Cort. The latter was invented by a Mr. Hall, of Tipton, about the year 1820. The latter method has almost entirely displaced the former; but when the best possible grade of iron has to be made, even to-day, the old, costly, dry-puddling process is still used. The Lowmoor iron is thus made as it was a century ago. So is Swedish and Russian iron. The differences in the dry and wet puddling processes are these:—

Both are conducted in reverberatory furnaces; but in the wet puddling or pig-boiling process the original sand bottom of Cort is abandoned, and there is substituted a bed of solid oxidised compounds of iron, and above it a stratum of liquid slag or cinder, the chief compound of which is protoxide of iron. The process is termed "wet" in allusion to the liquid bath of slag in which the iron is immersed. In the dry puddling processes the oxygen of the air plays the principal part in the purification of the pig, and the fettling occupies a secondary place. In wet puddling the conditions are reversed; the oxygen of the air is less active than the liquid slag and scale which form the bath. In the conduct of the earlier or dry puddling process, it is necessary that the iron subject to purification shall be white, having its carbon almost wholly in the combined form. The reason is, that the impurities are oxidised mainly by the action of the oxygen in the air drawn from the fireplace by the chimney-draught. In order that this shall have sufficient time to act upon the iron, it is essential that the latter shall remain in a pasty condition for some time before fusion. If it melts at once, it sinks below the slag, and is comparatively unaffected by the oxygen in the atmosphere. Now only white iron passes through this intermediate pasty state—grey iron does not; hence if grey iron is used, as it largely is, it is necessary to refine it first of all. The product of the primitive furnaces and open-hearth furnaces of the Middle and later Middle Ages was always white iron. Since the production of grey iron in the blast-furnaces, the finery has been a necessary intermediate stage to dry puddling. But grey iron can be puddled by the wet process without refining, because oxidation is produced by immersion in the liquid bath of slag.

When grey cast iron is refined into white preparatory to dry puddling, the conversion is effected on the hearth of a "melting down," or of a "running-in" furnace, by the agency of blasts of air directed down through several inclined tuyeres on the molten metal lying on the hearth. The iron becomes white, purified by the partial decarbonisation of the iron, and by the oxidation of the larger proportion of the silicon. And into the slag formed by the combination of silica with ferrous oxide much of the phosphorus and sulphur enters.

The economy of the wet puddling furnace over the intermediate finery or hearth consists mainly in this—that the use of charcoal is almost essential to the production of a pure iron in the finery, while coal can be used in the puddling furnace. Coal and coke contain sulphide of iron, which injures the quality of iron brought into contact with them. Charcoal is free from this impurity; also the cost of refining is saved.

During the conversion of cast iron into malleable iron, the chemical reactions are essentially the same, whether the process is effected in the finery or in the puddling furnace. The graphitic carbon is converted into combined carbon. This is oxidised to carbonic oxide by means of free oxygen in the air, or by means of oxygen in the oxides of iron in the fettling. The elements silicon, sulphur, and phosphorus are oxidised and enter into the slag in combination with iron. Silica is an essential element in the puddling furnace, because of its affinity for the protoxide of iron which forms, and because it acts then as a flux to the metal, cleaning the surface of the oxide, and so permitting of the welding of the lumps. Cort's puddling furnaces had bottoms of sand; in the modern furnaces other silicious materials are more conveniently used. Some silica also is produced by the oxidation of the silicon present in the pig.

In the process of refining for malleable iron, the endeavour is to get rid of the silicon, sulphur, and phosphorus first, since the carbon can always be got rid of readily, and if it remains in the iron during the elimination of the other elements, it helps to keep the charge in a liquid condition. The following table from Sir I. L. Bell shows

the gradual separation of the metalloids from the pig to the malleable iron:—

	Carbon. Per Cent.	Silicon. Per Cent.	Sulphur. Per Cent.	Phosphorus. Per Cent.
Cold-blast iron, Bowling, Yorks	3.656	1.255	.033	.565
Cold-blast iron, as refined metal	3.342	.130	.025	.490
Malleable iron from refined metal	.226	.109	.012	.064

ADAPTABLE SPECIFICATIONS.—XI.*

PLASTERERS' WORK: FACTS AND MEMORANDA.

THE materials used in plasterers' work are chiefly the natural limes, and especially chalk lime, plaster of Paris, various kinds of cement, and sand. The natural limes—so-called because they are prepared by simply burning natural limestones, and not by combining different materials artificially—are the basis of ordinary plastering. Cements are sometimes added to ordinary lime-plaster, which is then said to be "gauged" with them, and sometimes again they are used alone or mixed with sand. Some of them are adopted because of their weather-resisting qualities, as, for instance, Portland cement. Others, like plaster of Paris, have the merit of setting rapidly. They are thus adapted for taking castings from moulds, and when added in various proportions to ordinary plaster they cause it to harden, and thus enable internal works to be quickly completed. Besides these, there are cements, like Keene's and Parian, whose excellence consists in the specially smooth and hard surface they afford, which, by particular treatment, can even be polished and made to resemble marble.

1. *Lime Plastering*.—Plaster in olden times was usually thin and in one coat only. It was made up with a large amount of hair, or sometimes in the Middle Ages with chopped tye-straw, and hence was light and comparatively flexible. For this reason it was less liable to crack—especially in ceilings—than our modern "three-coat" work, though, on the other hand, it must have been considerably less fireproof.

Chalk lime, though almost worthless for walling and concrete, is used by preference in the south of England for internal plastering. The first coat, or "coarse stuff," has 1 or 1½ part of sand to 1 of lime by measure, and there should be 1lb. of hair to 3c.ft. of this mixture. The "fine stuff" or last coat, is simply pure lime slaked with little water, and mixed up till as thick as cream: it is then allowed to settle, and the superfluous water left to evaporate. For good work, a small quantity of white hair is mixed with it. It is most important that the floating coat should be fairly dry before the final or setting coat is put on, otherwise the surface of the plastering will be full of cracks. If, again, any particles of lime, either in the coarse or the fine stuff, remained whole when the stuff was slaked, they will subsequently "blow," and form ugly pits in the face, even though the particles were no bigger than a pin's head. If they are larger, and occur in the "coarse stuff," they may even force the plastering off the wall. In making "coarse stuff," the lime is stronger if simply slaked instead of being "run" with a large quantity of water. When it has been thus slaked by throwing a little water over it, the sand should be added to it in proper proportion: the nearly dry lime and sand should then be mixed up, made into a heap, and left, protected from rain, for three or four days. It should next be sifted, and mixed up with water to the proper consistency for the use of the plasterer. "Fine stuff" is usually "run"; but if it contains particles of core, even this will not always prevent it from "blowing." Discolorations in plaster are commonly the result of careless, dirty workmanship. Smoky bricks, however, will stain plaster through its whole thickness.

Thames sand is rather too coarse and "short" for plasterers' work. Sharp pit-sand is better. Road sand, and especially that scraped from roads which have been gravelled, answers well, if perfectly clean—if, for instance, it has been exposed to the rain in thinish layers for some years after being scraped up. But it is so difficult to insure this, that it is safer to avoid this class of sand altogether. When fresh, it is usually full of

organic refuse and ammonia compounds. In this state it is an extremely unwholesome material, and as some of the substances it contains have a strong affinity for moisture, it may keep the walls damp for years. Soft red brickbats, ground to powder, may be substituted without injury for half the sand in the coarse stuff, provided they are uniformly mixed with it.

In ceilings, the laths should break bond. The length of the laths should be changed every yard or two, so that one set will stretch across the joists to which the other set have been fastened, and so on alternately. The laths should not be fixed closely together, but about $\frac{1}{2}$ in. apart, so that the first coat of plaster may pass between them sufficiently to hold the ceiling up. Double fir laths should be used, and long, sound hair. All these rules the ordinary plasterer honours more in the breach than in the observance. He frequently puts his laths too closely together; he sometimes nails the ends of one row over those of the next; then, to make a level surface, he has to put on a quite unnecessary thickness of "coarse stuff," the lime in which has been weakened by being "run," instead of being slaked and sifted, as above advised. The hair mixed with this "coarse stuff," too, is generally short, and sometimes rotten; while, even if it is of fair quality, it is used, perhaps, much too sparingly. The result is that ceilings commonly crack, and sometimes fall, and while they are made needlessly heavy, put up with no proper key, and composed of spoilt lime and short or rotten hair, these failures are likely to recur. Some of these evils may be avoided by gauging the coarse stuff with Portland cement, which, of course, adds considerably to the cost. For superior work, goats'-hair, which is longer, may be substituted for cow-hair; but this, again, means an increase of price. New ceilings should not be whitened; whitening acts on fresh plastering, and injures it.

Blue lias lime was once extensively employed in external plastering. It is said to make very good work, but sets so slowly that workmen expend a large amount of labour on it before they leave it alone. For filling in the spaces of half-timbering, and for other outside purposes of the kind, lime and hair gauged with Portland cement answers well. If a smooth surface is required, this may be formed of fine putty, also gauged with Portland. The external plastering used for dressings on old brick houses—for instance, in Huntingdonshire—is very thin, and apparently consists of nothing but lime, sand, and hair. A thin coat of plaster was sometimes used externally in the latest Gothic period as a covering to brick mouldings—for instance, at Layer Marney, Essex.

The old-fashioned stucco, which has almost gone out of use since the introduction of Portland cement, was composed of three-parts of sand to one of hydraulic lime. The wall was thoroughly wetted before applying it: the stucco was first laid on in a liquid state like whitewash, with a brush. Afterwards a coat was applied as in ordinary "rendering," and was floated if desired. Stamped plaster, or "parquet-work," and carved plaster, are both found in old domestic architecture, and where well executed, have lasted with little injury for centuries.

2. Portland Cement.—A description of the qualities required in Portland cement for walling will be found in "Memoranda for Excavating and Foundations." Cement which is only to be used for plastering does not, however, need either the strength or the slow-setting qualities which are so desirable in bricklayers' work. A quicker-setting sort, weighing only about 97lb. to 100lb. to the bushel, is of more service to the plasterer. It should have a light colour of a bluish-grey cast, and should become too hard to be easily broken with the fingers in 36 hours after it is made up for use. For external facing two parts of sharp fine gravel are commonly used to one of cement for the first coat. The finishing coat is formed of equal measures of cement and sand. Where Portland cement is put on in successive coats, one coat should on no account be allowed to dry before the others are added, and before the work is begun the wall should be well wetted. In hot weather, cement surfaces in course of completion should be screened from the sun. It is essential that the sand should be sharp, and, where colour is of importance, it should be quite free from iron.

If sea-sand is used, it should be thoroughly washed to remove the salt: not because salt would interfere with the setting, for it does not; but to avoid subsequent damp. Portland cement should

not be painted till it has stood six or eight months.

Before Portland cement is used in quantity, it should always be emptied from the sacks or casks on to a dry floor, mixed together in bulk, and left exposed to the air for at least 48 hours. Next, the cement and the sand or gravel should be thoroughly mixed *dry*, in the proper proportions, before adding the water, which should be cold. It is important not to put too much water, but only just enough to bring the mixture up to the right consistency for use. Great care must be taken that the sand, gravel, or other materials which are added to the cement are quite free from clay, loam, and dirt, and that the sand is clear and crystalline. No more cement should be mixed up at a time than can be used before it sets, and it must on no account be mixed up again after it has begun to set, as it will then never harden properly. Cement of a deep colour, inclining to redness, should be avoided; light-coloured or bluish-grey samples are usually more to be depended on in every way.

3. Roman Cement was formerly the only kind in the market. Though nominally cheaper than Portland, it will take less sand. It varies greatly in quality, and at best has no special merits to recommend it.

Medina cement is a superior kind of Roman of a lighter brown, and very quick-setting.

4. Selenitic Cement is prepared by adding to certain hydraulic limes, before they are slaked, a very small proportion of plaster of Paris. Barrow or similar limes are preferred. This cement is cheap, will take a considerable quantity of sand, and has been much used. It sets faster than lime, and so allows walls to be finished rapidly; but is said to require much more labour in working than ordinary plastering does to bring it to a good face. It is also liable to be injured by small cracks, which appear on the surface, and are called "fire-cracks"; these take off considerably from the praise due to it for hardness and other merits. Selenitic cement must never be gauged with plaster of Paris.

5. Plaster of Paris is gypsum deprived by heat of its water of crystallisation. There are two qualities—the coarse, which is chiefly used for mixing with, or "gauging" common lime plastering, to make it set faster; and the fine, which is used for mouldings, cast ornaments, &c. Lime plastering, gauged with plaster of Paris, is often full of fine cracks, perhaps from unequal expansion or shrinkage in its component substances. Plaster of Paris is only suited for indoor use.

6. Keene's Cement is a compound of plaster of Paris and alumina, and is only fit for internal work. Two qualities, coarse and fine, are manufactured. The fine is of a very pure white, and much harder than ordinary plaster. By repeated trowelling, wetting, and retrowelling, it can be made to take a high polish. It is also valuable for arrises, chamfers, skirtings, and mouldings. It should be set on a ground of Portland cement.

7. Parian Cement appears to be formed of plaster of Paris and borax. It works more freely than Keene's, but is not so suitable for mouldings. If good, it can be painted 24 hours after it is laid. It is recommended to begin the painting with a mixture of gold size, red lead, and turpentine, and to put the subsequent coats on this. Parian is not adapted for outside use.

8. Martin's Cement is similar in appearance to Parian, but goes further, and is so more economical. It is said to be more cohesive than Portland cement, and to bear a pressure of more than 4,000lb. to the square inch before crushing. It can be painted on as soon after being laid as Parian; and it is also claimed that any kind of wall-paper can be hung on it, even while it is quite new, without discoloration. Plaster of Paris must on no account be mixed with Martin's cement, nor must Portland be used as a ground for it. It is made in three qualities. The coarse, for a ground, should be used in the proportion of 1 part to $\frac{1}{2}$ part of clean sand. This ground should be $\frac{1}{2}$ in. thick, and should be finished with pure cement $\frac{1}{4}$ in. thick. When set, the face may be polished like marble, the small cavities being filled with a stopping-stone or putty-powder. Wood or zinc trowels are recommended for this cement; and if iron tools are used on it, they should be constantly cleansed in strong lime-water. Where the cement is to be painted, these last precautions are unnecessary. Martin's cement is only intended for internal work.

9. Sgraffito is a kind of decoration executed by means of two layers of cement, one (usually the under one) darker than the other. A ground of

one part of Portland cement to three of sand is first laid on the wall. After about three days, when this has set, the coloured coat is added. It may be formed of one part of Portland, one part of sand, and one part of colour. The other coat, which forms the surface, may be of one part of selenitic cement to one of Aberthaw lime, or two of selenitic lime to one of silver sand. The outline of the decoration is traced on the upper surface, and then very carefully cut down to the second coat, so that the colour of the latter is visible through the spaces which have been cut away. This is the process recommended a few years ago by Mr. Heywood Sumner at the Institute. For internal work, a very thin coating of white lime on a ground of cement forms, as was pointed out long since by Mr. G. T. Robinson, a good arrangement on which to work in *sgraffito*.

PLASTERERS' MEMORANDA.

A bundle of laths contains about 500ft. Single fir laths are about $\frac{1}{2}$ in. thick, and double fir laths about $\frac{3}{4}$ in. thick. One superficial yard takes about 25 laths 4ft. long (that is, one-fifth of a bundle) and 100 nails. Two hods of plaster are about one bushel; three bushels of ground lime are one bag; and 11 bags are one ton. 21 striked bushels of sand or lime are one cubic yard; two yards of lime are one ton; 14lb. of plaster are one bag; $1\frac{1}{4}$ bushel of plaster are 1cwt.

200lb. of Portland cement (or two cents) are one bag, by London custom. In the Midland counties 224lb. of Portland (or 2cwt.) are one bag. One cask of Portland holds about 4c.ft. and weighs about 400lb. gross. One sack of Keene's cement is 2cwt., and one sack of Parian the same.

Jhilmil patent metal lathing is kept in sheets 6ft. by 2ft., 6ft. by 1ft. 6in., and 6ft. by 1ft. The present price is 1s. per yard super., unfixed.

Laths come chiefly from Memel and other Baltic ports. They should be free from knots and splits. In some districts reeds are used instead of laths. Fibrous plaster is plaster on a ground of coarse canvas or wirework. Lime-whiting is done with chalk lime mixed with water. White-wash is made of fine chalk or "whiting" mixed with water and size.

ROYAL PHOTOGRAPHIC SOCIETY'S EXHIBITION.

THIS photographic annual show in the galleries of the Royal Society of Painters in Water Colours, Pall Mall East, has just been opened—the forty-first exhibition held by this Photographic Society, which was founded in 1853, its first president being Sir Charles Eastlake, P.R.A. The present gathering is smaller than usual and more select in character, the works numbering some 350, chosen from about 1,100 submitted for selection. The standard aimed at by the committee of judges is in a general way higher than heretofore, and in the Art section the names of Messrs. F. P. Cembrano, jun., Col. J. Gale, B. W. Leader, A.R.A., G. A. Storey, A.R.A., and W. L. Wyllie, A.R.A., are a sufficient guarantee of care and artistic discrimination. Much skill in displaying the prints has been shown, groups of portraits and groups of views being kept distinct, while in framing the pictures most of the exhibitors have realised the advantage of employing a colour in harmony with that of their prints. A notable instance of cleverness in this direction is Mr. Harold Baker's study of Shakespeare's birthplace (No. 209), a charming interior, set in a bronzed gold frame perfectly in accord with the tone of his carbon print. Dr. Page May has, among some skillful work, two good views of Egyptian architecture, called by him "Memories of the Desert," a grand study from Komombo (120), and (216) the Ruins of Karnak, as seen from over the Sacred Lake. An exceedingly fine series of our cathedral interiors has been produced by Messrs. Bulbeck and Co., who for their North Choir Aisle at Norwich are deservedly awarded a medal. Mr. John Bushby also takes a like prize for a most artistic photograph of the great Lion Portal of Trau Cathedral, Dalmatia (57). Mr. H. W. Bennett has some excellent views from Ely Cathedral, and the West Door of Lichfield Cathedral, by Mr. Edgar R. Bull (322), we noticed with pleasure, for its well-defined detail without hardness. The Chantry or Beauchamp Chapel at Warwick (338) is done justice to by a photogravure, exhibited from the studio of Mr. Harold Baker, and the platinum print, by Messrs. Bolas and Co., of Salisbury Cathedral choir, is to be noted among several other like views shown in

a similar manner by the same firm. That of Lincoln Lady Chapel is a particularly happy picture judged from an architectural standpoint (279). As a pictorial subject, few surpass Mr. Seymour Conway's Hay Mill, near Ludlow, grouped in the middle distance over the waterfall—a quaint sample of picturesque building, nestling charmingly within exquisite surroundings. Richard Keene, Ltd., are not strong in the exhibition this year; but the doorway and a corner from York Cathedral, in sepia platinum (160 and 161), serve to maintain the high standard of their founder's masterly work as a photographic artist. Mr. George Scamell's pretty street view from the village of Chidingstone (59) we have noted for the well-known old houses which it shows so well and artistically. Mr. W. T. Greatbatch is to be congratulated on his capital study of the crypt at Much Wenlock, a carbon print of delicacy and finish. The catalogue this year is a new and improved departure, which commends itself highly as a great advance upon the old untidy lists at one time issued by this same society. The illustrative plates really make the book well worth keeping, greatly adding to the interest of the exhibition, and the style and method adopted indicate that someone at the head of affairs is well alive to the needs of the Society in keeping pace with the times in these not unimportant matters. The exhibition is distinctly one of photographs judged as photographs, and not as a gathering of made-up prints aiming at imitation of water-colour monotypes, in which the main idea of their producers seems to be to make their work as unlike photographs as possible.

GRAPHIC STATICS.—III.

THE following proposition, which is called the Triangle of Forces, follows easily from the Parallelogram of Forces. It may be enunciated thus:—If three forces acting at a point can be represented in magnitude and direction by the sides of a triangle taken in order they will be in equilibrium. Let ABC (Fig. 8) be a triangle whose sides, AB , BC , CA , are respectively parallel and proportional to the three forces, P , Q , R , which act at the point O , then these forces are in equilibrium. This is easily seen if either of the sides of the triangle ABC be taken as the diagonal of a parallelogram, of which the triangle ABC is half. In the figure, AD is drawn parallel to BC , and CD to BA . Then forces represented by AB and AD will, by the Parallelogram of Forces, have a resultant, which is represented by AC ; that is, the resultant of AB and AD is equal and opposite to the force which is represented by CA . Therefore the resultant of P and Q is equal and opposite to R , and therefore the three forces P , Q , R must be in equilibrium. (In the figure, the angles POQ , QOR are 135° and 105° respectively, and the scale of forces 1" to 200lb.) Careful attention should be given to the enunciation.

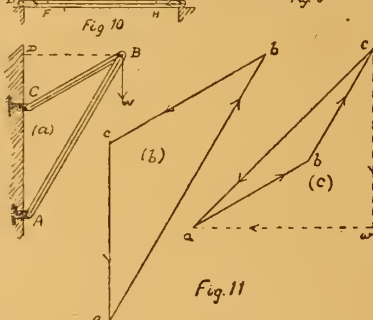
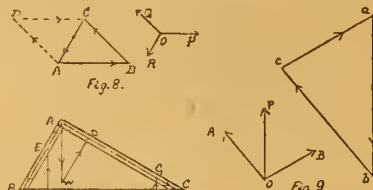
Observe that the sides are to be taken in order, which means that if AB represent one force, then the other two will be represented by BC and CA ; this is indicated by the arrow-heads drawn in the figure. For equilibrium, the arrow-heads, which show the directions in which the forces act, must all point in the same direction round the triangle. Observe also that the three forces represented act at a point; and that, therefore, the three sides of the triangle cannot represent the forces in position, as the two sides and diagonal of the parallelogram of forces may, but only in way of action, as Todhunter expresses it. In fact, a little consideration will convince the student that forces represented completely by the sides of a triangle taken in order would have a tendency to produce rotation in any body on which they acted, and therefore could not be in equilibrium. It may not be out of place here to say that any force acting on a body in any other way than through the centre of gravity of the body will be partly expended in producing rotation.

The triangle of forces may be used for finding the resultant of two forces which act at a point, and also for resolving a given force into two components in given directions, since when any number of forces are in equilibrium, any one of them is equal and opposite to the resultant of all the others.

To resolve a given force into components in two given directions, we have simply to reverse the given force, and complete the triangle of forces by drawing the other two sides of the triangle parallel to the given directions. We thus find

the two forces which, acting in the given directions, will balance the reversed force, and which are, therefore, equivalent to the given force.

Example (Fig. 9):—Resolve the given force P of 1,000lb., which acts vertically upwards, into two others, which act along lines inclined 40° and 60° respectively to the vertical. Here ab represents the reversed force P , the angle abc is 40° , and the angle cab is 60° . It is evident that if forces such as are represented by bc and ca were to act at any point O in the line of action of P , they would produce the same effect as that produced by the force P acting at the same point. These forces are, therefore, components of the force P . They are found to be about 880lb. and



650lb. respectively, and would act along OA , OB , as shown in the figure. The scale used in Fig. 9 is 1in. to 500lb.; but this is much too small for accuracy; 1in. to 100lb. would be much more suitable.

Let us now work out a few problems by means of the triangle of forces. Let ABC , Fig. 10, be a triangular frame, the members AB , BC , CA of the frame being connected by smooth hinges at A , B , and C , and the frame resting in a vertical position on smooth horizontal supports at B and C . The angle ABC is 60° , and the angle ACB is 30° . Let a weight of 150lb. be suspended from the pin of the hinge A , and find the forces brought thereby into action in each of the bars of the frame (force scale, 1in. to 200lb.) Note: That the weights of the bars do not enter into this question. Since the hinges are smooth, the bar AB is acted on by only two forces—one from the pin at A , and the other from the pin at B . These two forces must, therefore, be equal and opposite, so then they must act along the line joining the centres of the pins at A and B . Similar reasoning holds for the other bars. We may say, then, that the forces in the bars act along the axes of the bars. Since the frame is at rest, each point of it is in equilibrium. At the point A there are three forces acting, namely, the weight of 150lb. and the forces exerted by the bars BA and CA . Draw, therefore, WD parallel to BA , and meeting CA at D . Then AWD is the triangle of the forces which act at the point A , whence we find that the force along BA is 130lb., and that the force along CA is 75lb., each acting towards A . And because these forces act towards A , and that, by the Third Law, action and reaction are equal and contrary, we see that the weight brings pressure to bear on each of these bars, and that the forces exerted at their other ends by these bars will be equal and opposite to those just found. At the point B we have the known force of 130lb. acting along AB towards B , and two other forces, at present unknown—one in the bar BC , the other the vertically upward force exerted by the smooth support at B . In BA , take BE equal to WD ; draw EF vertically to meet BC at F ; then EBF is the triangle of the forces for the point B , and thus we find BF to represent the force (65lb.) exerted by the bar BC ; while FE represents the upward force (113lb.) exerted by the support at B .

The amount and nature of the effect of the weight on each bar, and of the forces exerted by each bar, are now known. They are compressive

forces of 113lb. and 75lb., acting on the bars AB AC respectively, and a tensional force of 65lb. acting on the bar BC , and forces acting in the bars, in opposition to these, and equal to them respectively. There is, therefore, no need to work out the triangle of the forces for C ; but it will be worth while to work it out, if only as a check on some of the other work. In the figure, CGH is the triangle of the forces at C , GC being made equal to the known force of 75lb., and we find CH (65lb.) for the force exerted by the bar BC , and HG (37lb.) for the upward force exerted by the support at C .

The check consists in noticing that we should get equal and opposite forces exerted by the bar BC at its two ends, and that the two upward resistances of the supports (113lb. and 37lb.) are together equal and opposite to the weight (150lb.).

In Fig. 11 (a), AB and BC are two straight bars connected at B by an eye-and-pin joint, and attached to the fixed supports at A and C by means of eye-and-pin joints. If a mass weighing a ton is suspended from the pin at B , find the force exerted by each bar, the bar AB being inclined 30° , and BC 60° to the vertical. Friction to be neglected. (Scale of forces 1" to 1,000lb.) The working is shown in Fig. (b), where ca is equal to 2,240lb., and ab , bc represent the required forces, and are found to be about 3,880lb. and 2,240lb. respectively.

In the last example, suppose the rope WB to be passed over the pin, continued in a horizontal direction, and fastened to the wall at D , as shown by the dotted line BD in the Fig. (a). Find the forces exerted by the bars. The tension of the rope WBD is treated as being the same throughout—i.e., the weight of the rope and the friction of the pin are neglected. The work is shown in Fig. (c). Here cu represents the pull of BW , and wa represents the pull of BD ; therefore ca represents the resultant of these two pulls. This resultant, and the two forces in the bars are in equilibrium. Draw, then, ab parallel to CB , and bc parallel to AB , and we get abc for the triangle of the forces, thus finding the two forces to be each about 1,640lb., and acting towards B . In this example the external forces bring compressive forces on both of the bars. In the last example the bar BC has a tensional force brought upon it. J. C. PALMER.

MUNICIPAL ENGINEERS AT BRISTOL.

ON Saturday, a large number of municipal engineers and surveyors from various parts of the country visited Bristol, to attend the Western Counties District meeting of the Incorporated Association of Municipal and County Engineers. The gathering took place at the Guildhall, and was under the chairmanship of Mr. F. J. C. May, borough engineer of Brighton, the president of the association. Among the members present were:—Messrs. Barber, Balham, London; P. Edinger, Frome; Joseph Hall, Cheltenham; H. D. Williams, Glamorgan; J. T. Hawkins, Somerton; T. L. Lewis, St. George, Bristol; T. H. Yabbicom, Bristol; C. T. Ball, Bristol; T. L. Perkins, Bristol; H. Giles, London; J. Parker, Hereford; F. Ashmead, Bristol; W. F. Prell, Burnham; G. W. Knowles, Clevedon; W. H. G. Kieser, Torquay; F. Parr, Bridgwater; J. Paton, Plymouth; T. J. Hickes, Truro; E. Cook, Abersyeham; F. E. G. Bradshaw, Trowbridge; A. Price, Worcester; J. Gummage, Dudley; R. Read, Gloucester; E. Pritchard, London; G. W. Sadler, Cheltenham; J. Lobby, Hanley; C. Brownridge, Birkenhead; W. T. Scott Bailey, Warminster; J. Wilcox, Birmingham; E. S. Escott, Halifax; Robt. Godfrey, Birmingham; H. Geen, Okehampton; R. J. Thomas, Aylesbury; W. Harper, Cardiff; J. Bell, Swansea; Geo. Walkeys, Llanelly; J. B. Greenwood, Barry; K. Nettleton, Weston-super-Mare; J. C. Pardoe, Barry; J. A. Wright, Bristol; A. Greenwell, Frome; H. M. Bennett, Keynsham; W. Weaver, Kensington; C. Jones (hon. secretary), Ealing; W. H. Savage, East Ham; W. Dawson, Leyton; C. Jones, Teignmouth; A. Fowler, Westminster; J. P. Barber, Islington; A. D. Greatorex, Sutton, Surrey; J. H. Smerley, Richmond, Surrey; G. R. Norrish, London; R. Scorgie, Rotherhithe, S.E.; D. J. Ebbetts, Acton; A. J. Evans, Leyton; E. P. Hooley, county of Notts; C. H. Cooke, Wimbeldon; John Pollard, Westminster; Frank Stenner, Bermondsey; C. J. Gangow, Wood Green; R. H. Hynes, Newport; Jas. Lemon, Southampton; and J. Price, Birmingham.

The Mayor of Bristol gave a hearty welcome to the association, remarking that the value of its work could hardly be over-estimated.

BRISTOL REFUSE AND ITS DISPOSAL.

Mr. T. H. Yabbicom, Bristol city engineer, read a paper descriptive of the corporation destructor and depot at St. Philip's. The depot, he said, comprises a refuse destructor, stable, and workshops, and occupies an area of five acres in the south-east of the municipal area, bounded on one side by the tidal river Avon, across which a girder bridge of 100ft. span was constructed to give access from the part on the west side of the river, and approach roads with easy gradients laid out on embankments. Previous to 1892 the collection of house refuse in Bristol was made by one or more contractors, who were allowed to tip whatever found its way to the carts on land within the borough boundary. In 1891 the author was directed by the sanitary committee to visit several of the great towns, and ascertain the various plans adopted by their local authorities for the collection and disposal of house-refuse, and for the cleansing and watering of the public streets. The report he made resulted in the sanitary committee recommending the council to take into their own hands the collection of the house refuse, the cleansing and watering of the streets, and to put a stop to tipping refuse on sites within the borough. It was decided to build a destructor capable of treating about one-half of the estimated collection of house refuse, and wait the result before proceeding to construct sufficient cells to deal with the whole; low-lying land adjacent to the river outside the borough boundary being rented to receive the surplus. Although the fires were lighted in November, 1892, the heat was applied very gently at first, and it was not until June, 1893, that the cells were worked to their full capacity, when it was found that by damping down on Sunday about 560 tons could be passed through in the six working days, and that by working all seven days the amount specified in the contract with Messrs. Manlove and Alliott—namely, 640 tons—could be just reached; but the clinker was of a soft, inferior character, through the fires being drawn too rapidly. In the autumn of 1893 the author had a steam-blast applied to eight cells on the south side, with the result that there was a considerable increase in the consumption of refuse, and a much higher temperature in the cells on that side, together with an improved clinker. For the past two years the average amount burnt, from 12 o'clock on Sunday night until noon on the following Saturday, has been 650 tons, which averages about $7\frac{1}{2}$ tons per cell during 24 hours. The actual figures for the year ended March 31, 1896, were 33,169 tons burnt, and during that period six holidays of one day each were allowed to the workmen. The firemen or stokers are 18 in number, divided into three shifts of eight hours each, half an hour's rest and mealtime being allowed during each shift, and, as already stated, no work is done on Saturday afternoon or Sunday; but it is doubtful whether it is good for the destructor building to allow the periodic expansion and contraction to take place which result from working at high pressure for six days, and cooling down on the seventh, and whether the cracks and fissures generally found in destructors after a few years' work are not due to this cause. The residue after burning amounts, on the year's average, to a fraction over 34 per cent., but varies considerably from day to day, according as the refuse is drawn from the richer or poorer districts of the city; in fact, some from the east end comes in the form of almost unburnable dust. Of the 11,500 tons of residue, 9,667 were sold or put to some useful purpose instead of being removed to a tip, which would have entailed a further cost of about £725. A vertical engine of 20 H.P., by Tangye, utilises the steam from the boiler, and drives two mortarpans and a stone-breaker. The ground mortar is used on corporation works, and any surplus made finds a ready sale. The rough clinker is an excellent ballast for new roads and footpaths; the finer is useful for tar-paving, and, with Portland cement, forms good artificial stone, either in the form of flagging, steps, window-sills, door-heads, sink-drips, pillar-blocks, and a great variety of purposes. Recently the author has covered the sides and bottom of one of the swimming-baths belonging to the corporation with a layer composed of the residue, Portland cement and chalk, forming a clean, bright, and impervious lining, easily cleansed. A total

of £11,418 was expended before commencing work, and since then £1,412 has been spent on the engine, mortarpans, and shedding. The outlay during the year ended March 31 last for wages of all persons directly or indirectly connected with the work, repairs, and all other charges, not including interest on first cost, amounted to £3,600, and the credit by the sale of residual products to £1,522, leaving a balance of expenses of £2,078—about 1s. 3d. per ton on the amount of refuse burnt. The working of the destructor is superintended by Mr. W. H. Baker. As the land adjoining the destructor was also the property of the corporation, it was decided to construct on it stables and cartsheds. The stabling erected provides accommodation for 120 horses, besides four loose boxes having appliances for surgical cases; there is also an isolation block of four stalls, used as an observation hospital for the suspected animals. A range of stables, provided with seventy stalls, four loose boxes, and two isolation stalls, has been constructed at a depot in another part of the city. At a third place, an old range of stables has been converted into an equine hospital, and the horses connected with the ambulance are stabled at the site of the present fever hospital. The stables, cart-sheds, and all buildings connected with them cost £13,650, and were constructed by day labour without the intervention of a contractor. On the 31st March last, the stud consisted of 191 cart-horses, 3 van-horses, 4 cobs, and 1 carriage-horse. The plant consists of 39 four-wheeled tip waggons, 2 lorries, 104 two-wheeled general purposes carts, 80 slop-carts, 6 Glover's disc water distributors, 6 four-wheeled street-watering vans, 18 two-wheeled water-carts, 31 Glasgow pattern water-barrels, 4 flushing-vans, 8 Barnard Castle scrapers, 12 Barnard Castle rotary brushes, 3 sand-distributors, and 2 snow-ploughs. During the annual period referred to, 367,122 loads of materials were carted, but at times of much work other horses have had to be hired in addition to the corporation stud, to the extent of an average of 37 per day, and 56,565 loads were carted by means of the hired animals. After taking over the work and carrying it out by means of the plant and stud described, it soon became evident that it was necessary to have premises near the depot, where repairs could be readily and quickly made, and the corporation secured a site adjoining and parallel to the range of stables at Albert-road, and there workshops were erected as well as offices and stores. Like the stables, these buildings have been constructed by day-labour, under the direction of Mr. W. H. Baker, and the cost has been met by a loan of £6,100 for construction and furnishing. The author claims no originality in employing the residue clinker to make artificial flagging, as he is only endeavouring to follow in the steps of other members of this Association; neither does his experience lead him to the conclusion that a gold mine is to be discovered in a dust-heap; but at the same time, it has convinced him that a clean, durable material, of pleasing appearance, can be prepared at a much less cost than that of stone, and it is significant that although the factory has been only feeling its way during the last two years, yet the cost of the natural stone flags raised in the neighbourhood has fallen 20 per cent. in price lately. At this reduced price there is a considerable margin in cost to the advantage of the artificial slabs, even when made by hand-labour as at present, though the writer hopes that at no distant date it will be possible to use mechanical power, unfettered by restrictions prohibitive to economical working.

BRISTOL CIVIC ELECTRICAL WORKS.

Mr. J. R. Blaikie, assistant electrical engineer, read a paper upon this subject. Mr. Blaikie gave a description of the principles on which the Bristol central electric lighting station was arranged. He mentioned that the dynamos are direct-driven, no belting or ropes being used, and the boilers are fired by mechanical stokers. The mains from all machines are brought up to the switch-board. Each machine has a separate panel, on which are mounted the necessary measuring instruments, switch, and safety fuses. From the board at the present time run 15 feeders to various parts of the city, some of them over two miles in length. Each feeder has its own instruments mounted on a separate panel. The arc-board is similarly provided with machine and circuit panels. The sub-stations are mostly under the pavements, and are brick-built chambers, 10ft. long, 6ft. wide, and

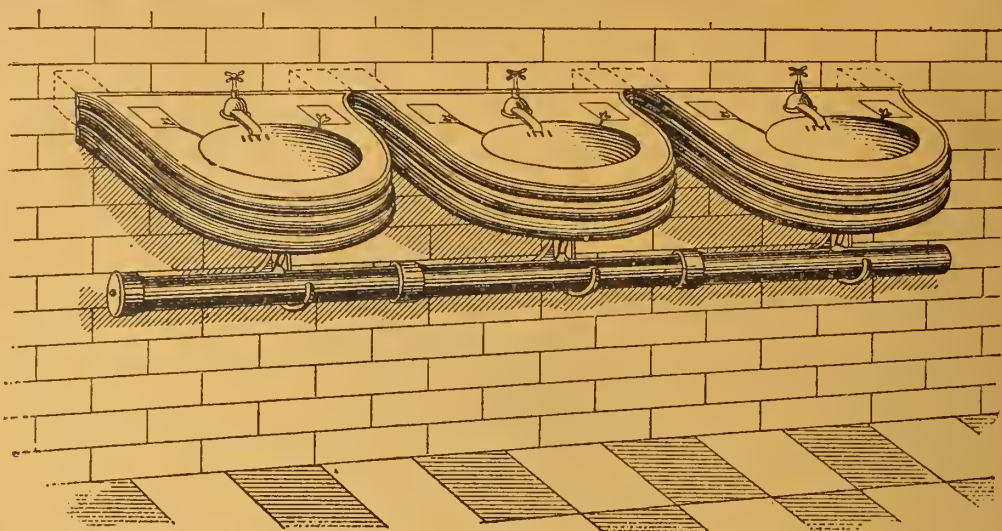
6ft. deep internally. They are spaced out to meet the requirements of each district, and are generally about 500 yards apart. The distributing cables run from sub-station to sub-station, thus making a network. The actual transformers have no moving part whatever. They consist of two coils of insulated wire wound on a laminated iron core. The ratio of the two pressures is proportional to the relative number of convolutions in each coil. As a matter of fact, by an arrangement known as the three-wire system, they are enabled to use double the pressure required for an ordinary lamp, and thus save considerably in the size of the mains. The cables are all lead-sheathed and armoured; they are laid in the ground in about 150 yard lengths, and beyond a covering of loose bricks require no further protection. It does sometimes happen that the sanitary authority, in their enthusiasm for wood paving, drive a steel drift right through a cable, but in such cases it is questionable as to whether anything less than a 6in. armour plate would offer sufficient resistance. All the current is supplied by meter, and when consumed between the hours of 12 midnight, and an hour before sundown, it is supplied at a cheaper rate. This is contrived by means of a clock, which automatically opens a small by-pass to the meter during these hours. With regard to the success of the undertaking, however, it is sufficient to state that the electrical committee intend carrying out extensions during the next two years that will about double the present capacity of the station.

At the conclusion of the morning sitting the party was entertained at lunch at the Council House by Alderman Cope-Proctor. Vehicles were in waiting, and the engineers were afterwards driven to St. Philip's Marsh, where they inspected the depot and destructor. Subsequently they went round the electric lighting station, and afterwards took electric trams to St. George, where they inspected the power station.

SECRET COMMISSIONS.

IN a rejoinder published in the *Times* on Saturday, the Right Hon. Sir Edward Fry remarks that " 'Civil Engineer' has carried the indictment as to the frequency with which secret commissions are offered far further than he should have dared to have done, and his charge had passed unchallenged and uncontradicted. As to the architects," Sir Edward adds, "the Secretary of the Royal Institute of British Architects has abundantly confirmed what I said as to the existence of the abuse and of the regret with which it is viewed by the honourable members of the profession. But I cannot accept his invitation to turn my attention 'more exclusively' to those architects who are not members of the Institute when that body contains, according to the secretary, members whose 'moral guilt . . . has been apparent.' Why should these men be shielded from the finger of scorn? They are the chiefest sinners of all. They bear a pretence of respectability and virtue, and take the wages of iniquity." As to the existing remedies possessed by the injured person, Sir E. Fry points out that a master or principal may recover from his servant or agent every penny which has been received by way of secret commission in his service or agency; a master or principal may, as a general rule, dismiss without notice or payment in lieu of notice any servant or agent receiving a secret commission; a contracting party may repudiate a contract produced in any way by a bribe to his agent. A contracting party may recover from the briber and the bribed, or either of them, any sum which he has paid under the contract, and which, in consequence of the bribe, was in excess of the fair or market price. A contracting party whose agent has been bribed by the other party during the execution of a contract, may, in spite of its being part-performed, rescind it and recover what he paid both to the briber and the bribed.

"A. C. B." supplements Sir Edward Fry's observations as to the penalties that can be enforced on those who take or receive secret commissions, by pointing out that under the Public Bodies Corrupt Practices Act, 1889, every person who corruptly gives or offers or corruptly solicits or receives any gift, reward, &c., as an inducement to any member or officer of a public body doing or forbearing to do anything in respect of any matter or transaction in which the said public body is concerned, shall be guilty of a misdemeanour. In addition to other penalties,



the offender is liable to two years' imprisonment with or without hard labour, or to pay a fine not exceeding £500, or to both imprisonment and fine. He is also liable to be ordered to pay to the public body the amount of the gift, &c., received by him.

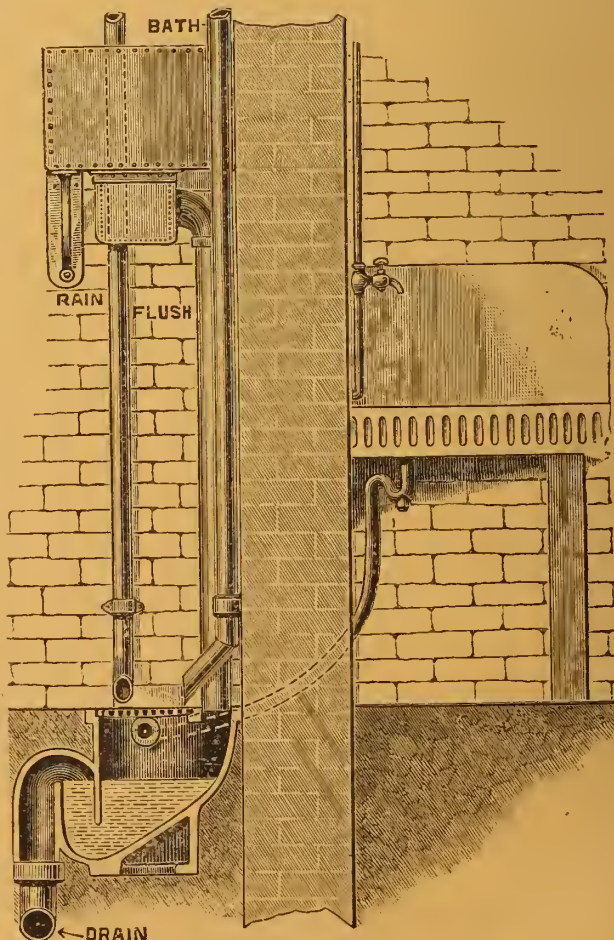
In Wednesday's *Times* Sir Alexander M. Rendel takes up the gage thrown down by Sir E. Fry, and denies, on behalf of the profession of civil engineers, that bribes are frequently offered to its members. He says:—"I have now been for just 40 years the engineer of several of the most important corporate bodies in the country, and for the last 25 years of one of the most important public offices—the India Office—also. As their engineer I have been responsible throughout all these years for the entering into and the carrying out of contracts of all the kinds dealt with by engineers, amounting in value to a sum which I can only guess at, but am safe in putting at not less than 60 millions sterling. Further, the nature of my business has been such as to bring me into constant communication with nearly all the contractors employed in the production of the materials used by engineers, and in a manner so close that I may claim to know with some accuracy the general methods on which they conduct their business. If even a moderate proportion of them were in the habit of 'providing for the engineer,' I must, with my many sources of information, know it, and I do not know it. In the whole course of my professional life I have only been offered a commission three times in all—the last time about 25 years ago—and only once by an English firm. That firm paid dearly for its offence. . . . That there are contractors ready to give, and persons calling themselves civil engineers ready to receive, bribes may be conceded, for, besides that any man may put C.E. after his name, all professions have their rogues. The bulk of the business done by my profession is free from taint—at all events, of this kind. Consider also the inherent improbabilities of the case. An engineer who has taken a commission from a contractor can at any moment be exposed and ruined by him. Do you suppose that a material percentage of the engineers of this country is in this position? . . . Probably," Sir A. Rendel adds, "there was more of this sort of evil-doing in the first part of the century than there has been in the second. The main foundation for this old gossip was the method in which contracts were then almost universally let. The common opinion of those who then had contracts to let was that only the best houses should be intrusted with them, and invitations to tender were sent to such houses only. This system, which is still followed and defended by many, sometimes led to favouritism, which, though as a rule of a perfectly honest type, tended to maintain prices and to hinder invention, and, therefore, ultimately injured trade. For this reason, I have always urged open competition, with the result that all contracts of any importance entered into by my clients have for more than 30 years been advertised in newspapers to the whole world, so that any one who has chosen to do so has been able to tender for them. Advertisement is now insisted on by the India Office for all Indian railway contracts over which the India Office has any control. Not the least of the many advantages of advertisement is that

it makes it practically impossible for the contractor 'to provide for the engineer,' and saves the engineer from the possibility of an attempt to do so."

IMPROVED SANITARY FITTINGS.

WE give an illustration of an improved lavatory range, with shaped basins (registered), for use in schools, public buildings, &c., in which, as will be seen, the shape of the basins is such

to us to be that each basin is entirely distinct from the others, and should one by chance be broken, it can be replaced without disturbing the other basins in the range. Another very important advantage is that the floor space underneath the basins is left entirely open, so that the lavatory floor can be properly washed, as will be seen in the illustration above. The judges awarded the exhibitors at the recent exhibition in connection with the Sanitary Congress at Newcastle-on-Tyne the bronze medal for this new lavatory.



GREASE TRAP WITH FLUSHING TANK.

that no side jointing is necessary. The basins are built into wall by lugs provided at the back, and are supported underneath by strong cast-iron brackets, also built into the wall. The basins are fitted with brass careless lugs, so that the plugs themselves cannot be lost, and the use of chains is done away with. An adjustable support on the cast-iron bracket is supplied for carrying the horizontal waste-pipe. The basins are made in salt glazed, buff, or enamelled ware. The great advantage of this lavatory seems

Another lavatory shown was in best white glazed ware, and was provided with overlapping joints, so that there need be no line of cement on the face of the basin to mark where joints are made between the slabs. The slabs are supported on cast-iron standards carrying the adjustable rests for horizontal waste-pipe. The basins are fitted with brass taps and brass careless plugs.

The trough-closets in enamelled stoneware for use in schools, which we also illustrate, are of the same pattern as has been supplied to a large

number of the London Board Schools and the various Board Schools throughout the country. An inspection hole and cap are provided on the outlet, so that should any obstruction occur in the trap the same can be removed without breaking the ground. These trough-closets were awarded the Certificate of Merit at the Liverpool Sanitary Congress in 1894. They can be supplied either in enamelled or salt glazed ware, and can be made for any centres required. These latrines are now being replaced in the London School Board work by the "Juventas" closet, which the same firm exhibited, and which is specially made of small size for children. The basin is cane and white, and is thoroughly well flushed with two gallons of water.

Mr. Rogers Field's well-known 1889 patent automatic flushing siphon in cast iron was also shown by the same firm at Newcastle. This siphon is for drain flushing, and is certainly one of the most reliable we have seen. The are no moving parts, valves, or vent-pipes to choke up, and the siphon will work as efficiently with a drop-by-drop supply as with a supply of several gallons per hour. The force and velocity of discharge are very great. The siphons are also made in galvanised wrought iron fitted into wrought-iron cisterns, for flushing latrines, urinals, house-drains, &c.

Another exhibit of this firm, which was also awarded the bronze medal, was their intercepting grease-trap, of which we give an illustration. The trap is used in conjunction with the automatic flushing cistern, and is so constructed that grease entering the trap comes into contact with a body of cold water, solidifies, and floats on the surface of the water in the trap. This solidified grease is broken up by the powerful cold-water flush (from the automatic cistern) and is carried through the drain. By this means all lift-out trays (which so seldom receive proper attention) are done away with. The apparatus is perfectly automatic, and should commend itself readily to architects, medical officers, &c. The makers of all the above are Messrs. Bowes, Scott, and Western, Ltd., of Broadway Chambers, Westminster, S.W.

ADVANCED EVENING CLASSES AT UNIVERSITY COLLEGE AND KING'S COLLEGE, LONDON.

THE Councils of University College and of King's College, London have, in conjunction with the Technical Educational Board of the London County Council, arranged the following courses to be held in the evenings for those students who are engaged in the daytime. The courses are to be of the same standard as the day courses, and admission will be confined to students who have already made some advance in the knowledge of the subjects.

UNIVERSITY COLLEGE, GOWER-STREET, W.C.

Mechanical Engineering Professor Hudson Beare
(Mondays, 7.15-9.30, commencing Oct. 12th.)
Electrical Engineering Professor Fleming
(Tuesdays, 7.15-9.30, commencing Oct. 13th.)
Practical Chemistry Mr. C. F. Cross
(Fridays, 7.15-9.30, commencing Nov. 1st.)

KING'S COLLEGE, STRAND, W.C.

Civil Engineering Professor Robinson
(Mondays, 7-9, commencing Oct. 5th.)
Architecture Professor Banister Fletcher
(Mondays, 6-9, and Wednesdays, 7-9, commencing Oct. 7th.)
Experimental and Practical
Physics Professor Adams
(Mondays, 6-7, and Wednesdays, 7-9, commencing Oct. 5th.)
Pure Mathematics Professor Hudson
(Tuesdays, 7-9, commencing Oct. 6th.)

Application to join any of the above classes should be made as soon as possible to the professors who will conduct the courses. Fee for each course £1 ls., which in the case of students in receipt of weekly wages may be paid in two instalments. Applicants should state their age, occupation, and previous training.

The foundation-stone of the new offices for the West Ham School Board, about to be built from plans by Mr. W. Jaques, will be formally laid on Friday in next week, the 9th inst.

Mr. Arthur Cates, the umpire in the claim for compensation brought by the Duke of Bedford against the Central London Railway Company, recently heard, has published his award at £9,579. The property taken comprised Nos. 133, 134, 135, and 136, High Holborn, the site of which is to form the British Museum Station of the Central London Railway.

OBITUARY.

Mr. J. H. FAIRBARN, surveyor and collector to the Birkdale Urban District Council, an office he had held for over 20 years, died on Sunday at his residence, Town Hall, Birkdale, after a painful illness. His illness took a severe form some five weeks ago, after a visit to Ireland, where he contracted a chill. For the past two years he had been engaged in carrying out a surface-drainage scheme for Birkdale, a complement of the sewerage system on which he was employed about 1873.

The death is announced, at the great age of 86 years, of Mr. WILLIAM RIDLEY CARR, of Corbridge-on-Tyne, formerly of Scotswood. The deceased was a son of the late Mr. Thomas Carr, of Scotswood, who established fire-brick works there in the early part of this century, and who carried on a successful business during his lifetime. His sons, the late Mr. John Carr, formerly of Ebchester, and Mr. Ridley Carr, conducted the business established by their father for many years with great success. Mr. John Carr embarked in the coal and lead trade, and left the management of the brick-works to his brother, Mr. Ridley Carr, now deceased. Mr. W. R. Carr was twice married, his second wife being Miss Fleck, the daughter of a well-known architect. The brick-works of Mr. Carr have for some years past been owned and carried on by Mr. Walter Scott, of Newcastle.

CHIPS.

The Government of Western Australia propose to raise an additional loan of £3,500,000 to be devoted to public works.

Messrs. J. Mowlem and Co., the contractors for the Waterloo and City Railway, now on the eve of completion, have undertaken the contract for the construction of the extension line from the Monument to Islington for the City and South London Railway, and the work will be proceeded with forthwith. It has not yet been decided what course will be adopted with regard to St. Mary Woolnoth, as it is a question for the engineers as to whether it is possible to construct the station under the church.

A new Welsh church is in course of erection, at an estimated cost of £3,500, in St. Mary's-terrace, Paddington Green.

The Merthyr Tydfil Board of Guardians have adopted plans by Mr. E. A. Johnson, M.S.A., of Abergavenny and Merthyr, for a new infirmary containing 120 beds to be added to their workhouse buildings.

A faculty has been granted in the Chester Consistory Court for alterations to be made to St. James's Church, New Brighton, including the decoration of the chancel arch, with figures in illustration of the Te Deum, the painting of other subjects on the north and south chancel walls, and the erection of a baptistry at the west end of the church. The estimated outlay is £700.

The Harrogate Cottage Hospital, which has recently been enlarged and extended, was reopened on Saturday.

Sir William Ingram, Bart., has presented an oil-painting on panel to St. Saviour's Church, Westgate-on-Sea. It represents the Madonna and Child in the cave-stable at Bethlehem, surrounded by a number of peasantry. It is painted on oak, and measures 6ft. by 7ft. It was discovered hidden away in Revesby Abbey, Lincolnshire, and is believed to have been concealed to elude the despoilers of the churches during the Reformation.

A memorial window has been erected in the south aisle of the new church of St. John the Baptist, Kilderminster, in memory of the late Rev. William Allen, formerly curate of the parish. The window has two lights, in which have been placed figures of Elijah and St. John the Baptist.

The Manchester, Sheffield, and Lincolnshire Railway Company are about to contest another big claim for compensation. The claimant is Lord Portman, who seeks compensation for property taken and injuriously affected, which extends practically the whole of the way from the Marylebone-road to the southern confines of the Eyre estate, in respect of which, it will be remembered, Lord Balfour of Burleigh recently, as arbitrator, awarded the trustees about £300,000.

The experiment made by Captain W. de W. Abney, C.B., in the Raphael Cartoon Gallery of the South Kensington Museum of using coloured glass to intercept the rays of light which act injuriously on pigments is said to be considered quite successful. The coloured glass is hardly noticeable, and many people walk through the gallery without being aware of its existence. The system will probably be extended to the skylights of all the picture galleries in which water colours are hung.

BOOKS RECEIVED.

Solid Geometry Questions, arranged by J. W. MARRIOTT, Honours Medalist, Lecturer in Geometry to the Chester School of Science and Art (Blackburn: E. Coward). The collections of geometry questions arranged by Mr. J. W. Marriott include all the questions in solid geometry as set by the Science and Art Department in the elementary stages of Science Subject I. for the last thirteen years. The head-master of the School of Science, Chester (Mr. John A. McMichael, B.A.), has used the questions as set down in this collection in his school, and the results were so satisfactory that he advised Mr. Marriott to publish them. As he points out, one of the great difficulties which a teacher has to contend with is the want of suitably graduated questions. The test-papers usually published are not so graduated, consequently the student must go through the entire course before he can use them. These questions will be found to facilitate the pupil's progress, as they begin with points and lines, and proceed in order through planes, lines and planes, projection of planes, and lastly of solids. The full-size lithographed diagrams are clearly drawn. The "Advanced Solid Geometry Questions" is also on the same plan, and both the Elementary and Advanced courses will be found valuable to teachers in supplementing their lectures. We think if the solutions were also given, they would add to the usefulness of the work to teachers and students.—*The Universal Directory of Railway Officials*, 1896, compiled by S. RICHARDSON BLUNDSTONE, editor of the *Railway Engineer* (London: The Directory Publishing Company, Ltd., Catherine-street, Strand).—Considerable additions have been made to this useful directory, and the whole has been revised and brought up to date. The contents are compiled from official sources. The mileage of each railway, gauge in metres or feet and inches; every railway in the world—the United Kingdom, Europe, Asia, Africa, Australasia, North and South America, &c., are given, with the names of officials connected with each line. To engineers, contractors, manufacturers, and others the directory will be found of great service. There is a good personal index of railway officials at the end of the book.

Alterations are being made to the Royal box and ante-room, Haymarket Theatre, including the ventilation, which is being carried out on the Boyle system.

The new club erected in the Alexandra-road, Penzance, is now open for the use of subscribers. It contains a reading-room and a smoking room on the ground floor, and a handsome billiard-room and card-room on the first floor, besides all necessary or desirable accommodation. The building has been made from the designs of Mr. O. Caldwell, F.R.I.B.A. Contractors: for masonry, Mr. J. Nicholls; carpentry, glazing, and painting, Mr. W. H. Tronson; plumbing and gasfitting, Mr. T. H. Stewart.

The vestry of St. Mary Abbott's, Kensington, recently appointed a surveyor to value the undertakings of the public companies in the parish for the quinquennial valuation on commission, the terms of remuneration being $\frac{1}{2}$ per cent. on rateable value, the commission, however, not to exceed £650, and to include all costs and attendances at committees or sessions. The report of the vestry states that the result has been an increase in the rateable value of these undertakings to the amount of £48,297.

At Whitland, Carmarthenshire, a new intermediate school in Pwllthead-road was opened on Monday in last week. The school, which will accommodate 100 pupils—60 boys and 40 girls—has been erected from the designs and under the supervision of Messrs. Griffiths and Jones, M.M.S.A., Tontypandy and Pontypridd, whose plans were selected by the local managers in an open competition. The contractors were Messrs. Rowlands and Lloyd, Trealaw, Glamorganshire.

The Rhondda Valley Intermediate school, near Porth railway station, was formally opened on Tuesday week. It will accommodate 100 boys and 80 girls, and has cost about £5,000. The building includes an assembly-hall, divided into two parts, one for the boys and the other for the girls; four classrooms, to accommodate about 32 scholars each; a laboratory, which is now being fitted up at a cost of over £300, to accommodate about 20 boys; a cookery-room, and four private rooms for the masters and mistresses. A caretaker's house is also being built, and large dining-rooms for the scholars. The building is warmed by a combined system of hot-water apparatus and open fireplaces. Mr. Jacob Rees was the architect, and Messrs. George Jenkins and Sons, of Porth, were the builders.

OLD MASTERS AT THE NATIONAL GALLERY, AND ON THE CONTINENT.

WE have been asked at various times for a list of the pictures which we have illustrated in our "Old Masters" series of paintings, and therefore, for the convenience of our correspondents, we subjoin the following particulars:—

OLD MASTERS AT THE NATIONAL GALLERY.

1. "The Mystic Marriage of St. Catherine," by Lorenzo da San Severino..	May 26, 1893
2. "Madonna and Child, with St. John," by Il Perugino	June 2 "
3. "The Angel Raphael and Tobias," Florentine, 15th century	" 9 "
4. "A Trinità," Francesco Pesellino	" 16 "
5. "The Virgin Adoring the Infant Christ," Il Perugino	" 23 "
6. "Mars and Venus," Botticelli	" 30 "
7. "The Nativity," Botticelli	July 7 "
8. "Two Bankers," Marinus Van Romerswaal	" 14 "
9. "Madonna and Child, with Saints," Erocole di Giulio, Cesarò Grandi	" 21 "
10. "Porch of a Dutch House," Pieter de Hooch	" 28 "
11. "Uncle Toby and Widow Wadman," Chas. R. Leslie, R.A.	Aug. 4 "
12. "A Canon and Patron Saints," Gheeraert David	" 11 "
13. "Portraits of a Man and his Wife," Flemish, 15th century	" 18 "
14. "The Poulterer's Shop," Gerard Dou	" 25 "
15. "Salvator Mundi and the Virgin Mary," Quinten Matsys	Sept. 1 "
16. "Mrs. Siddons," Thos. Gainsborough, R.A.	" 8 "
17. "Court-yard of a Dutch House," Pieter de Hooch	" 15 "
18. "The Magdalen Reading" (Later School of Van der Weiden)	" 22 "
19. "Portrait of an Old Lady," Rembrandt	" 29 "
20. "The Exhumation of St. Hubert," Flemish, 15th century	Oct. 6 "
21. "Jean Arnolfini and his Wife," Jan Van Eyck	" 20 "
22. "Virgin and Infant Christ Enthroned," Hans Memline	Nov. 3 "
23. Portrait, "Chapeau de Poil," Peter Paul Rubens	" 17 "
24. "Christ at the Column," Velazquez	Dec. 1 "
25. "The Head of a Girl," Jean Baptiste Greuze	" 15 "
26. "James II. at Whitehall," Edward M. Ward, R.A.	Jan. 5, 1894
27. "The Guitar Lesson," Gerard Terborch	" 12 "
28. "Sigismonda," Hogarth	Feb. 2 "
29. "Virgin, Infant Christ, and St. Anne," Francesca Raibolini (Francia)	" 16 "

OLD MASTERS ON THE CONTINENT.

1. "Primavera" (Florence Academy), Botticelli	Mar. 9, 1894
2. "The Three Archangels and Tobias" (Florence), Botticelli	" 23 "
3. "The Adoration of the Magi" (Florence), Gentile da Fabriano	April 13 "
4. "The Vision of St. Bernard" (Florence), Filippino Lippi	" 27 "
5. "The Madonna with Child and Angels" (Rome), Botticelli	May 18 "
6. "La Madonna Della Stella" (Florence), Fra Angelico	June 8 "
7. "The Journey of the Magi" (Florence), Benozzo Gozzoli	July 27 "
8. "The Journey of the Magi" (Florence), Benozzo Gozzoli	Aug. 24 "
9. "The Dance of the Angels" (Florence), Fra Angelico	Sept. 28 "
10. "The Journey of the Magi" (Florence), B. Gozzoli	Nov. 2 "
11. "Sacred and Profane Love" (Rome), Titian	" 16 "
12. "The Entombment" (Rome), Raphael	Dec. 7 "
13. "St. Mauritius and St. Erasmus" (Munich), M. Grünewald	" 28 "
14. "A Lawyer in His Office" (Munich), Romerswaal	Jan. 11, 1895
15. "Charles I." (Dresden), Sir Peter Lely	Feb. 8 "
16. "Bernhard Van Orley" (Dresden), A. Dürer	" 22 "
17. "Madonna" with Burgomaster Meyer (Dresden), Holbein	Mar. 8 "
18. "Young Girl Wearing Straw Hat" (Dresden), Salomon de Bray	" 29 "
19. "Ecce Homo" (Dresden), Guido Reni	April 12 "
20. "The Doge Loredano" (Dresden), Giovanni Bellini	" 26 "
21. "Venus and the Lute Player" (Dresden), Titian	May 31 "
22. "St. Jerome" (Dresden), Peter Paul Rubens	June 28 "
23. "Hubert Morette" (Dresden), Holbein	Aug. 23 "
24. "Christ at the House of Simon" (Brussels), Jan Gossart	Sept. 13 "
25. "Fall of Rebel Angels" (Brussels), Jerome Bosche	Oct. 18 "
26. "Barbara von Vlaenderbergh" (Brussels), Hans Memline	Nov. 1 "
27. "A Duke of Burgundy" (Brussels), Flemish Sch.	" 29 "
28. "The Holy Family" (Brussels), Hans Memline	Dec. 20 "
29. "The Music-Lesson Interrupted" (Dresden), Peter Van Slingelandt	Jan. 17, 1896
30. "The Miser" (Dresden), Giuseppe Nogari	" 31 "
31. "Wilhelm van Heythuysen" (Brussels), Franz Hals	Mar. 20 "
32. "Lament over the Dead Christ" (Brussels), B. Van Orley	April 3 "

33. "Jacqueline Van Caeste" (Brussels), Rubens	May 8 "
34. "The Collation" (Brussels), Gabriel Metsu	June 5 "
35. "The Last Drop" (Brussels), Peter François	July 3 "
36. "Lady with Gold Lace" (Dresden), Rubens	" 31 "
37. "A Gallant Offering" (Brussels), Jan Van Steen	Aug. 23 "
38. "The Holy Family" (Dresden), unknown	Sept. 11 "
39. "Angels from St. Peter's, Rome" (Melozzo Da Forlì)	Oct. 2 "

Most of the above numbers are still in print, and can be ordered through any newsagent at the published price—4d. per copy, or obtained direct from this office, post free, 4½d.; but our stock is not a large one, and early application is desirable. Probably no more comprehensive or complete series of reproductions selected from the cream of British and foreign art has ever appeared.

CHIPS.

The Corporation of Bolton have decided to expend an additional £30,000 on the extension of their electric-lighting works and plant.

For the Church of St. John the Baptist, Little Hutton, there is now in hand, by Mr. George Frampton, A.R.A., a sculptured panel, occupying the spandrel between the arches north of the nave. The subject is St. John the Baptist preaching. This sculpture is provided by two of the daughters of the foundress as a memorial of their father and mother.

The National Provincial Bank of England, whose branch offices at Hull at present are in Lowgate, have bought a corner site in that port abutting on Savile-street and Cross-street, upon which they propose to erect a block of buildings which will, it is stated, rival in beauty of design and commanding appearance the Dock Offices, beside which they will stand.

The fifth exhibition of the Arts and Crafts Exhibition Society will open at the New Gallery, Regent-street, on Monday next, October 5.

A large new clock has just been erected upon the parish church of West Teignmouth, Devon, which shows time on three large dials, strikes the hours, and chimes the "Cambridge" quarters. The work has been carried out by John Smith and Sons, Derby, to the design of Lord Grimthorpe. The same firm made the clock in East Teignmouth Church tower a few years ago.

On Friday, Col. Luard, R.E., an inspector from the Local Government Board, held an inquiry at Toubridge relative to the application of the urban district council for leave to borrow £2,500 for street improvements, and £875 for the purchase of a site for a new free library and technical institute.

Extensive improvements which have been made in the chapel at Aysgarth school, Newton-le-Willows, Yorkshire, were dedicated on Monday by the Bishop of Ripon. The chapel will seat 150 worshippers. Within the last few weeks it has undergone complete redecoration, while several modern improvements have been introduced.

Within the last few days there has been placed in the Church of St. Thomas, Stockport, a stained-glass window in memory of the late organist. The figure is a representation of St. Cecilia. The church being of a severe type of Renaissance architecture, the same style is followed in the window, which is the work of Messrs. Heaton, Butler, and Bayne.

At a meeting at Aberdeen on Monday of the executive committee appointed in connection with the University extension scheme, the Marquis of Huntly, Lord Rector, presiding, plans were approved of the proposed natural philosophy block to form part of the extension of the south wing of Marischal College. The estimated cost of the work is £11,500.

The recent appeal has been so well responded to that the restoration of the Lady-chapel of the Church of St. Bartholomew the Great, West Smithfield, will soon be proceeded with under Mr. Aston Webb, and with that the original scheme of the restoration committee will be completed. It has been decided to throw open, free of charge, the Lady-chapel (in its present unfinished condition), the crypt, and the triforium on Saturday afternoon in next week, the 10th inst., from two to five, when an explanation of the church will be given.

The Bishop of Southwark consecrated, on Tuesday, the new chancel of St. Anne's Church, East-hill, Wandsworth, of which church the foundation stone was laid in June last by the Duchess of Albany. The chancel has been built from the designs of Mr. E. W. Mountford, F.R.I.B.A., at a cost of £2,600, Messrs. W. Johnson and Co., of Belle Vue-road, Wandsworth Common, being the contractors. We illustrated the interior of the new church, from a drawing by Mr. Mountford, in our issue of June 26 last.

ARCHITECTURAL & ARCHÆOLOGICAL SOCIETIES.

BRISTOL AND GLOUCESTER ARCHÆOLOGICAL SOCIETY.—The autumn meeting of this society was held at Cirencester on Friday, when about fifty members assembled. A general meeting was held at the Church Institute, Mr. Wilfrid Cripps, C.B., presiding. The revised code of rules adopted at the Monmouth meeting was confirmed. A paper by Mr. Ernest Whatley, the local secretary, on a recent find of skeletons at the Barton, and two short papers by the Rev. E. A. Fuller on two incidents in Cirencester history, one on Sir Robert Morton's will, and the other on the relations between the abbot and the townsfolk, were read. After some members had visited the Corinium Museum (under the guidance of the curator, Mr. C. Bowly), Mr. Wilfrid Cripps's museum, and the fine parish church, a carriage excursion followed, the Rev. W. Bazeley, the general secretary acting as guide. Daglingworth was the first visited, where the party was met by the rector, the Rev. C. J. Martyn. Here were inspected the remains of a cell of the Nunnery of Godstow, the former owners of the manor and advowson; and close by was a very perfect pigeon-house or culver-house, with the original potence or revolving ladder. The 15th-century cross in the churchyard was noted; and the church of the Holy Cross, which is undoubtedly of Saxon origin, was examined. Some curious rude sculptured tablets of Saxon-Celtic origin were explained by Mrs. Bagnall Oakeley. Pinbury, in the parish of Duntisbourne Rolls, where the Gloucester historian, Sir Robert Atkyns, lived, dying there in 1711, was the next halting-place, and a yew avenue, called the Nun's Walk, the only remains of a nunnery that formerly existed, was viewed. Driving to Sapper-ton, lunch was partaken of, and the Church of St. Kenelm, rebuilt by the Atkyns family in the first decade of the 18th century, was inspected. It contains a monument to Sir Robert Atkyns, whose manor-house stands close by. Much of the Jacobean oak formerly in the manor-house is now in the church. After a peep at Trewherry Roman Camp, Mr. Biddulph, M.P., received the party at Bullasey Wood, supposed to be the site of a Saxon village. Some 30 buildings have been traced in this wood, and by the kindness of Mr. Biddulph, four of them have been excavated. Few remains were found, only two pots, supposed to be of the Romano-British period. No traces of Roman civilisation have been discovered, and it is thought they were dwellings of the British after the Romans left Britain. In any case, it is the site of a considerable village, and further investigations will be awaited with interest.

A faculty has been granted in the Chester Consistory Court for replacing the present pitch-pine stalls and fittings in Wallesey parish church with others of oak, at an estimated cost of £600.

Estate duty has been paid on £157,278 os. 6d. as the value of the personal estate of Mr. Elias Dorning, of Pendlebury Cottage, Pendlebury, and of the firm of Elias Dorning and Sons, Manchester, civil and mining engineer, who died on the 18th July, aged 77 years. The executors are his sons, Herbert Dorning, of Hollyhurst, estate agent and surveyor; and Arthur Harry Dorning, of Pendlebury, estate agent and surveyor; and an accountant.

The Lord Mayor, accompanied by the Sheriffs, will formally open the new Cripplegate Institute, Golden-lane, E.C., on November 4. The Institute, which was illustrated by a double-page perspective and plans in the BUILDING NEWS for July 6, 1894, has been built from designs by Mr. Sidney R. J. Smith, of York-buildings, Adelphi, selected in competition by Mr. J. MacVicar Anderson as assessor. The building is Free Renaissance in character, is faced with red bricks and Portland stone dressings, and consists of public library and ward offices on the ground floor; concert-hall, 76ft. by 40ft., committee rooms, and refreshment room on the floor above; and on the second floor classrooms, stores, and rooms for the staff.

Though masters of the situation, the Hull Corporation have been unable to agree upon a scheme for the future working of the Hull tramways. The metals and stables were purchased for £12,500, the vendors being at liberty to dispose of the rolling stock as they chose. An ambitious scheme was contemplated in the first instance, estimated to cost £200,000, but the expenditure proposed brought about many differences of opinion, and the corporation are now asked by the works committee to lease the lines at £100 per mile of single line to Mr. W. Nettleton, coach proprietor, Hull, for twelve months. During the next year hopes are entertained of producing a scheme which will be less costly.

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ILLUSTRATIONS.

ANGELS FROM ST. PETER'S, ROME.—HOTEL AT HOVE.—
BRAMHALL HALL, CHESHIRE.—UNION BANK, BRIGHTON.
—BRECKENBROUGH HALL.

Our Illustrations.

OLD MASTERS ON THE CONTINENT, NO. XXXIX.—
MELOZZO DA FORLÌ'S ANGELS, FROM SAINT
PETER'S, ROME.

THE considerable power of this great artist, born at Forlì, in Romagna, in June, 1438, was particularly distinguished in the mastery ability with which he managed the foreshortening of his decorative figures, and this remarkable gift of his was manifested in the cupola frescoes at SS. Apostoli, done for Cardinal Riario in 1472. This church was rebuilt in 1711, and its Melozzo frescoes, with the exception of a few fragments, were demolished. In the Palazzo Quirinale the figure of Christ ascending amidst cherubim is still preserved, and in the crypt of St. Peter's at Rome four beautiful figures of angels playing on musical instruments form a small but an inestimable part of the treasures of that great church. Two of these angels we illustrate to-day. There is a remarkable fresco, by Melozzo, in the Vatican, but it has been transferred to canvas, and represents the installation of Platina (Bartolomeo Sacchi), by Pope Sixtus II., as Prefect of the Vatican Library. This work gains additional interest by reason of the portraits which it contains of the Cardinal Pietro Riario Giuliano della Rovere, afterwards Pope Julius II., Girolamo Riario, and Giovanni della Rovere, all nephews of Pope Sixtus. Several of Melozzo's portraits are in the Louvre from the Campana collection. They were possibly executed under the patronage of the Duke of Urbino Federigo di Montefeltro for the Palace of Urbino. The skill of this great painter in his command of perspective was highly spoken of by his friend Giovanni Santi of Urbino, the father of Raphael, and Melozzo is recorded as official painter to the Pope. He died at the age of 56, and the chronicle of the time gives the date of his death as November 8, 1494. In the National Gallery are two of his paintings, executed for his great patron above mentioned. They represent "Rhetoric" and "Music," both being painted on wood, and representing richly-dressed female figures enthroned, and both pictures have inscriptions on them. The fresco figures which we illustrate are among his best-known works.

PROPOSED HOTEL AND FLATS, HOVE, BRIGHTON.

THIS building has been designed for a prominent site near the sea, and comprises an hotel with all modern conveniences, including ladies' and gentlemen's Turkish baths, in the arrangement of which, as well as all ladies' and gentlemen's lavatory accommodation, care has been taken to give exclusive privacy to each. About two-fifths of the block is designed for residential flats, all self-contained, but varied in extent of accommodation, and each having a lift service to admit of catering from the hotel. On plan the block forms a complete square with short wings on the main road side. The whole of the sanitary arrange-

ments are concentrated in the four corners of the quadrangle. Throughout the scheme is contrived to be of a convertible nature, so that with only slight alterations at the points marked A on plans the flats could, from one to the whole, be added to the hotel; while, on the other hand, portions of the hotel can be converted into flats, as it may be found desirable. The work has been designed by Mr. G. M. Jay, architect, Church-road, Hove.

BRAMHALL HALL, CHESHIRE.

WE publish this week a direct reproduction of the general view from the original drawing (now in the possession of Mr. William T. Oldrieve, of H.M. Office of Works), by the late Joseph Nash. The drawing is dated 1841, and was exhibited in 1864. We also give the courtyard view, reproduced from one of the early tinted prints of Nash's drawings. Although bearing generally the character of the Elizabethan timbered style, some parts of the north wing are said to date back to the 13th century, and the south wing to the 14th. Further views, showing the interior, will be given shortly, the interior being quite as interesting as the exterior. A very large amount has been expended upon the hall and grounds by the present owner, Mr. C. H. Nevill, and the house, as now seen from the point to the east from which the general view is taken, stands more clear of the shrubbery shown in Nash's view, terrace walks having been formed on the slope. A full description of this magnificent old hall was given in our issue of Jan. 13, 1888, when we gave a double-page drawing, by Mr. Maurice B. Adams, of the courtyard quadrangle from the rear of the house (nearly identical in view-point with the large plate from Nash now reproduced), together with a bird's-eye sketch and ground plan by the late Mr. Henry Taylor, of Manchester. We have already published some 15 reproductions during the past few years of Nash's architectural drawings, the dates when they appeared being Jan. 5, Feb. 2, Feb. 23, March 30, May 11, Aug. 3, Sept. 14, Sept. 28, and Nov. 23, 1894; Jan. 4, Jan. 25, March 15, April 19, June 21, and Aug. 23, 1895.

BRIGHTON UNION BANK.

THE front of this building had to be arranged on the lines of the old building which preceded it, particularly upon the ground floor, as the whole of the work had to be carried on without interfering with the business of the bank. The brick-work is built of Cranley red bricks, working about six courses to a foot, with white Portland stone for the lower part, and Sussex freestone. The builders were Messrs. G. Lynn and Sons, of Marlboro'-street, Brighton, and the architect Mr. Arthur Keen.

BRECKENBROUGH HALL.

THIS house is situated about three miles from Thirsk, on the Northallerton-road, and replaces a rather unpretentious and inconvenient residence, which was pulled down, and the materials, so far as possible, were reused in the new building. Castleford bricks, with Rainton stone dressings, were used for all the outer walls, local bricks for the internal walls and foundations, and Broomhall tiles on the roofs. The house and stabling are lighted throughout with electricity, and the woodwork to the reception rooms and large hall is for the most part oak and mahogany. Mr. Joseph Howe, of West Hartlepool, was the general contractor, and Mr. Walter E. Mills, of 12, Horse Fair, Banbury, the architect.

A block of new business premises have been erected in the Market-place, Pontefract, from designs of Messrs. Tennant and Bagley, of Pontefract, Goole, and Retford. The style is French Renaissance, the façade of red bricks and terracotta, the latter supplied by the Burmantofts Co. of Leeds, and the electric light is fitted up.

The sudden death, at Nantes, is announced of the painter, Emmanuel Benner. Born in 1836 at Mulhouse, his father, a flower painter of talent, was one of the best pupils of Spaendonck, and he himself began as a painter of flowers in 1867 and 1868 at the Paris Salon. He soon turned, however, to the nude and to portraits, and became popular.

The memorial-stone was laid on Saturday in the large room of the new Masonic hall, now in course of erection in Cook-street, Keighley. The premises, which are to cost about £2,500, give accommodation for a large lodge room and ante-rooms on the top floor; a billiard-room, conversation, news, and smoke rooms on the first floor; a suite of three offices on the ground floor; and here and in the basement apartments for the curator.

COMPETITIONS.

BLACKPOOL.—The directors of the Lane Ends Estate Company, Limited, Blackpool, have had under consideration the design submitted by Mr. C. J. Phipps, Mr. Matcham, and Messrs. Wylson and Long, each of whom were given a handsome fee as honorarium for sending in competition schemes. The directors have unanimously selected the designs of Messrs. Wylson and Long, who have therefore been selected architects for the carrying out of the works.

WREXHAM.—The town council of Wrexham received, on Tuesday, the report from the sub-committee appointed to examine the competitive designs sent in for the proposed public baths. On the recommendation of the committee the first premium of £40 was awarded to No. 19 (Mr. Harold T. Burgess, of 34, Great James-street, Bedford-row, London), and the second premium of £20 to No. 24 (Messrs. Lockwood, Sons, and Barker, 1, High-street, Wrexham). The number of sets of designs sent in was 53.

CHIPS.

New technical schools for Staffordshire in Victoria-square and Earl-street, Stafford, have just been completed. Messrs. Bailey and McConall, of Walsall, were the architects. The stone carving is by Mr. Bridgman, of Lichfield; the lead glazing by Messrs. Camm and Co., of Smethwick; and Mr. H. W. G. Tanner acted as clerk of works.

At the church of the Holy Rood in the Gilbertine Priory, Tenby, last week, a new organ, built by Messrs. Hunter and Son, High-street, Clapham, S.W., was formally opened.

At Tenby, on Wednesday week, the new intermediate school was formally opened. The premises were till lately used as a private school, and have been adapted to their present purposes from plans by, and under the supervision of, Mr. W. Husband, Messrs. Adams and Richards being the contractors. Accommodation is provided for 50 boys and 30 girls.

The foundation-stone of St. Luke's Church, Maidstone, will be laid on Wednesday, the 21st inst., by Mr. F. S. W. Cornwallis.

St. Peter's Roman Catholic school chapel at Woodhall Spa was opened last week. It is carried out in brick and stone, and is Gothic in style. Mr. R. A. Came, A.R.I.B.A., Woodhall Spa and London, was the architect, and Mr. Oliver Cromwell, of Woodhall Spa, the builder.

Newington Parish Church, Elinburgh, was reopened on Sunday, after having been entirely redecorated and fitted up with the electric light.

The ceremony of reopening the Cathedral of St. Brigid's, Kildare, after restoration, took place on Tuesday week.

The new schools, Carlton, near Lowestoft, are being ventilated by means of Shorland's patent exhaust roof ventilators and special inlet tubes, the same being supplied by Messrs. E. H. Shorland and Brother, of Manchester.

A new café in the High-street of Bangor city was formally opened on Monday. It has been built from designs by Mr. Harold Hughes, Messrs. Jones and Roberts being the contractors.

The West Highland Cottage Hospital at Oban was opened last week. It has been built from plans by Mr. Woulfe Brennan, of that town, and cost £2,600. The chief contractors were Messrs. D. and A. Nunn, of Oban.

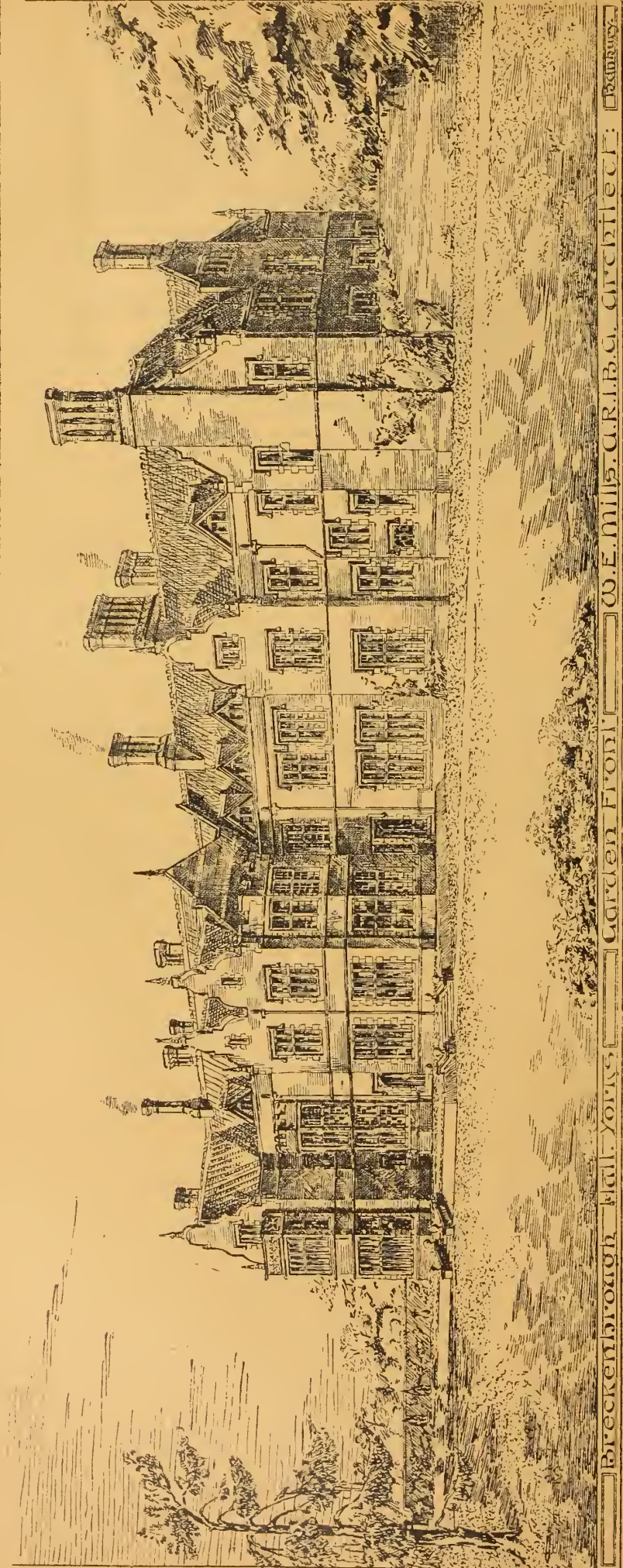
Whittington parish church, which was burnt down in January, 1895, has just been rebuilt on the original lines, from plans by Messrs. Rollinson and Son, of Chesterfield. The contractor was Mr. James Fielder, of Eckington.

A bust of Carlyle has been placed in the house in Ecclefechan in which he was born. The house now belongs to a nephew, and is maintained as a shrine for Carlyle worshippers. The bust has been executed by Mrs. D. O. Hill in white marble.

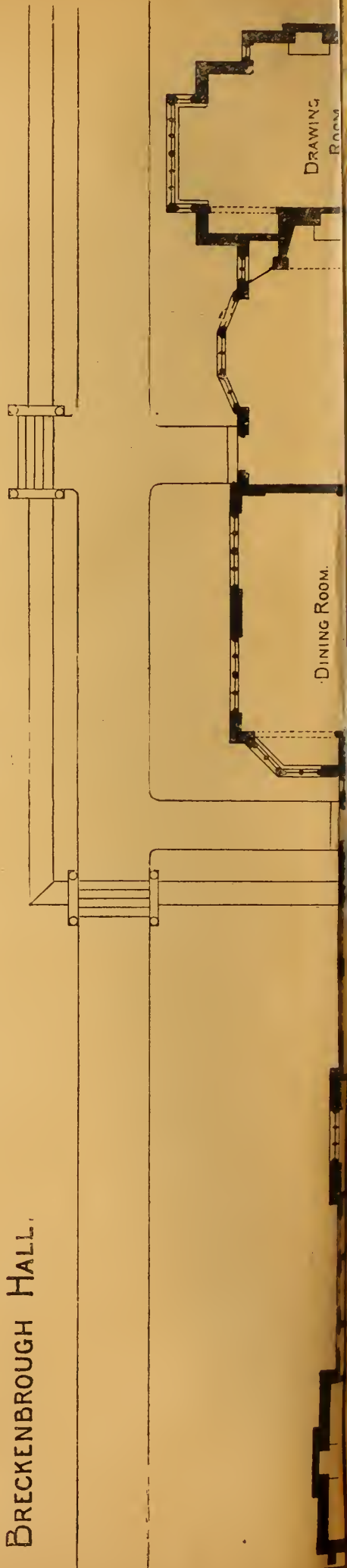
The town commissioners of Larne, Ulster, have decided to considerably extend the present supply of water to the town. The works will comprise the construction of storage reservoir, with accessories; the supplying and laying of about 2,900 yards of cast-iron pipes, varying in diameter from 9in. to 4in., with air-valves, sluice-valves, and all specials, the supplying and laying of about 800 yards of 9in. and 6in. fireclay pipes, &c. The engineer is Mr. J. H. H. Swiney, M.Inst.C.E., Avenue Chambers, Belfast.

The new High Grade Board School at Bradford was opened by Viscount Cross yesterday (Thursday).

The foundation stone of the Metropolitan Hospital Convalescent Home, which is being built at Starvenden Farm, Cranbrook, at the cost of Mr. J. Passmore Edwards, will be laid by Mrs. Cornwallis, on Wednesday, the 14th inst. Mr. F. S. W. Cornwallis has given the site for the home.



BRECKENBROUGH HALL.





BRIGHTON UNION BANK. ARTHUR KEEN ARCHT.





FROM A PHOTO BY SIG BROCI.

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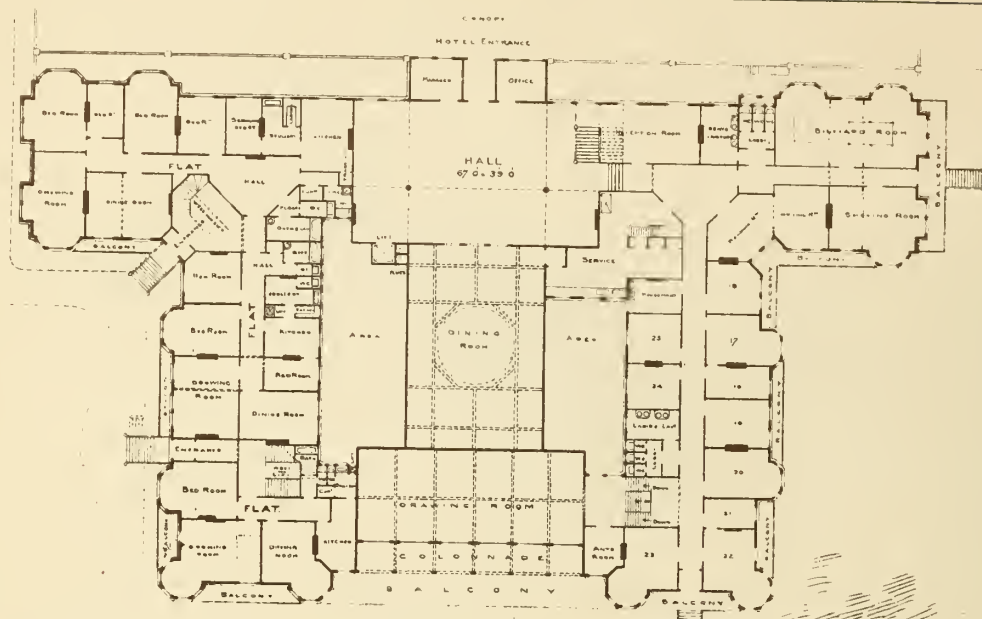
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CONTINENT · N°39.

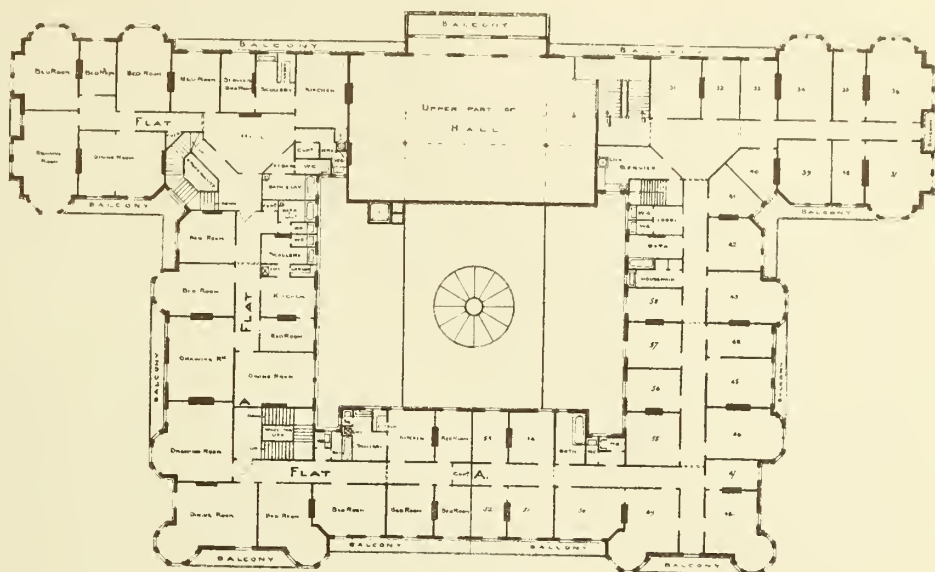
FROM ST PETER'S · ROME

"PHOTO-TINT" by James Akerman, 6, Queen Square, London, W.C.

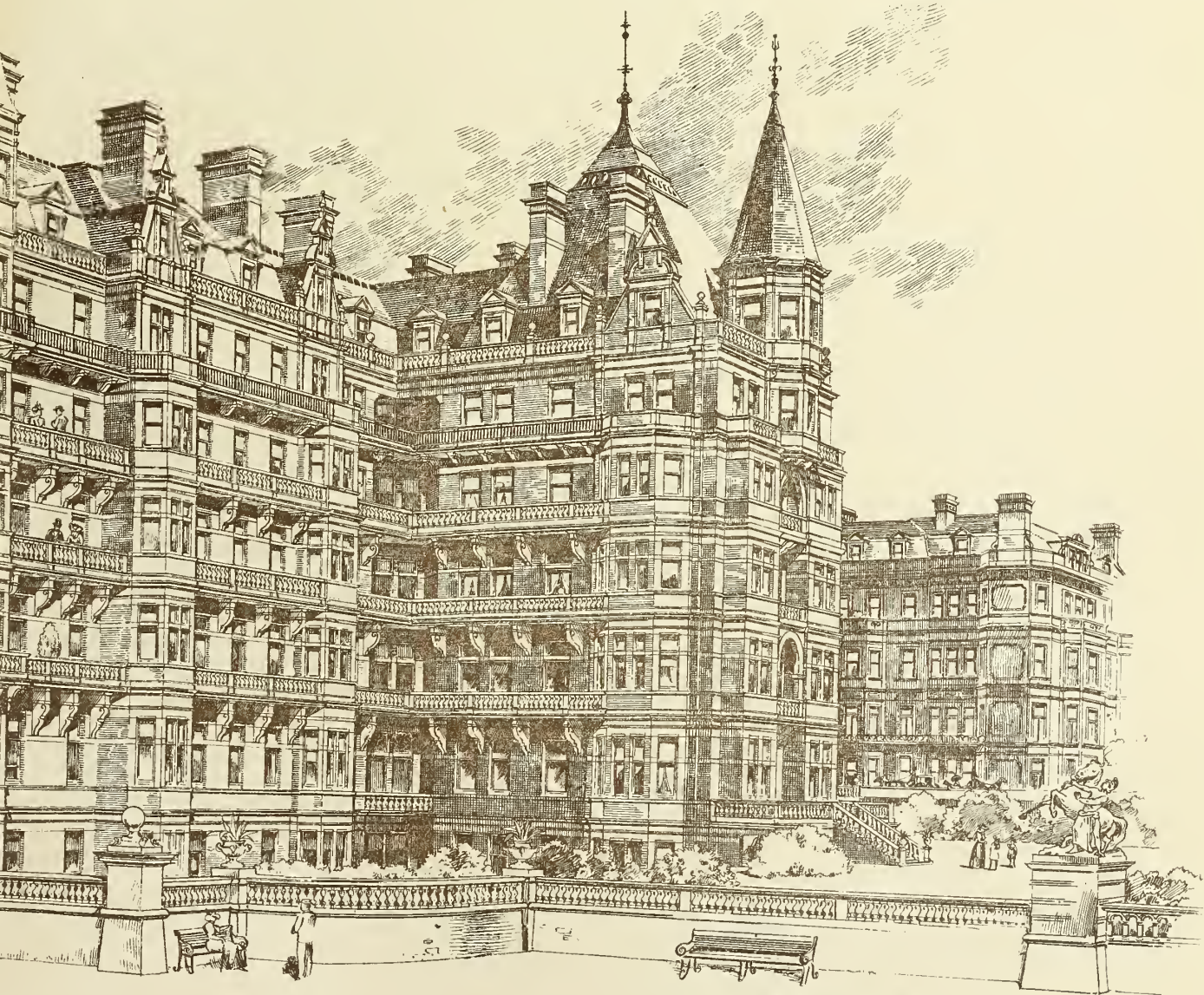


PRINCIPAL FLOOR





— PLAN OF FIRST AND UPPER FLOORS. —



HOTEL & RESIDENTIAL FLATS
KINGS RD. HOVE, BRIGHTON.
G.M. Jay. Architect.



FROM THE COLLECTION OF MR W T OLDRIEVE

BRAMHALL HALL CHESHIRE



THE COURTYARD AFTER J NASH

"PHOTO-TINT" by James Akerman & Queen Square London W.C.

BRAMHALL HALL, CHESHIRE.

GENERAL VIEW FROM A WATER COLOUR DRAWING BY J. NASH.





Building Intelligence.

BALSALL HEATH.—The new Roman Catholic church at Balsall Heath was opened on Monday. The building, which is dedicated to St John the Evangelist, will consist, when complete, of a nave 58ft. long by 22ft. wide, and two aisles 11ft. wide, a sanctuary with apsidal end 22ft. by 22ft., two side chapels, a baptistery, and priest's house and choir sacristies. The whole of this, except the sacristies and a portion of one of the aisles, has been erected. When complete the seating will accommodate 450 persons. The exterior is of red brick and Douling stone, and is of Romanesque character. The interior of the walls, and the nave and sanctuary piers, are finished in plaster, to allow of future coloured decoration, with enriched string and niches for statuary over the piers. A number of these have already been filled with figures of saints. The ceiling is of wood, with pitch-pine panels. The organ gallery is over the front porches. The design was originally intrusted to Mr. Albert Vickers, of London, but, owing to his long illness and ultimate decease, the drawings were prepared and the work carried out under the supervision of Mr. Ernest Avern, of London.

DALRY, EDINBURGH.—A new branch public library, reading-room, and recreation hall are being erected at the corner of Murdoch-terrace and Dundee-terrace. The building represents the first effort of the Nelson trustees to give effect to the testator's scheme for planting in various districts of the city what by his will were described as shelter halls for recreation purposes, combined in this case with a free library. The principal elevation, which is towards Dundee-terrace, shows two stories, with large mullioned and transomed windows, and a wide doorway, with flanking pilasters having carved capitals. The walls are of red and grey stone. On the street level are the entrance corridors and borrowing department, on the upper floor are a small hall and staff and committee-rooms, and in the attics is a caretaker's house. From the corridors backwards the building is but one story high. On the west is the Nelson Hall, measuring about 75ft. by 33ft., and absorbing about one-half of the entire site; while on the east are the reading-room and library. The Nelson Hall is cut off from the rest of the building by a series of arches that are to be filled in with glass. The roof, 35ft. high at the apex, and pierced by numerous lights, is carried on open timbers. The reading-room and library are separated from each other by iron columns, which carry an open timber roof over both at a height of 31ft. Together the reading-room and library measure 55ft. by 36ft. in area; they are lighted from the roof and from mullioned and transomed windows. The library will be in the centre of the site, and will accommodate 12,000 books, of which about 8,000 are now ready and catalogued. The building is at present roofed in, and in the hands of the plasterers, and will be ready for occupation next spring.

FROME, SOMERSET.—New board schools were opened on the 25th inst. at Nunney, three miles from Frome, they having been erected by Mr. Charles Barnes, of Frome, from the plans and under the superintendence of Mr. E. H. Lingen Barker, of London and Hereford. They consist of mixed schoolroom, 43ft. 6in. by 20ft.; classroom, 20ft. by 20ft.; and infants' schoolroom, 32ft. by 20ft., with two porches, cloakrooms, and lavatories, and the usual latrines in playgrounds, and a detached teachers' residence. The school and classroom are divided by doors, part folding and part sliding. The floors are of wood blocks, and there is a pitch-pine varnished dado round all walls. The latrines are supplied from the main in the high road, and are fitted with Adams's patent troughs and automatic flush cistern, and the rooms are ventilated with Boyle's bracket inlets, &c. The walls are built of rock-faced, coursed local oolite, with Monk's Park dressings, and the roofs are covered with Bridgwater dun-coloured angular corrugated tiles, with ventilating spirette over main roof, and projecting bell-pot over front gable. The preparation and walling-in of the playgrounds has cost £280, teachers' residence £275, and school buildings, with their offices, £860, which, for the 212 children accommodated, gives only £4 1s. 1d. per head, showing that a thoroughly up-to-date country board school can be erected as reasonably as any other.

GATESHEAD.—The new Metropole Theatre at the corner of High-street and Jackson-street was opened on Monday night. An hotel has been built at the angle formed by the two streets, and takes the place of an old public-house called the Masons' Arms. Both the hotel and theatre are faced with red pressed bricks, with elaborate stone dressings. The theatre accommodates about 2,500 persons. The pit is 60ft. wide, and 60ft. long from curtain to back wall. The depth of the stage from the curtain line to the back wall is 38ft., and the width 60ft. The pit and gallery entrances are in High-street, and those to the dress circle and stalls are in Jackson-street. The dress entrance leads into a decorated hall, from which the circle is reached by means of a marble staircase with brass hand-rails on each side. The ceiling and walls of the hall are decorated, having a clouded ceiling and frieze. The other entrances and staircases all have concrete steps of easy ascent. The ceiling of the auditorium and the fronts of boxes, circle, and gallery are finished in fibrous plaster, richly coloured. The ceiling is treated with cupids, and festoons, with clouds above. There are two exits to each floor, eight in all—including two from the stage. Each floor has separate suites of lavatories for ladies and gentlemen. Small refreshment rooms are also provided on each floor. A block of dressing-rooms is provided alongside the stage, fitted with hot and cold water. The buildings will be heated by hot-water pipes, and lighted by electricity, all the machinery for the installation being placed in a cellar, cut off from the rest of the building, so that no noise can be heard in the auditorium. Hydrants have been fixed in the building in case of an outbreak of fire. The dress circle and stalls are fitted with tip-up chairs, and the pit with seats with padded backs. Mr. Wm. Hope, of Newcastle-on-Tyne, was the architect, and Mr. S. F. Davidson, of Heaton, the contractor for the whole of the buildings.

LOUGHBOROUGH.—New Sunday-schools and a parochial hall in this town have just been opened. The building has been erected on the central-hall system to accommodate 800 scholars. There is a central hall 61ft. by 30ft., infants' room 54ft. by 19ft., six classrooms, each 13ft. by 12ft., a committee-room, kitchen, cloakrooms, and general out-offices. The central hall and infants' room have pitch-pine principals to the roof of each, ceiled at the collars. The classrooms are divided from the central hall by glazed partitions, and the whole of the walls are lined to the height of 4ft. with a wood dado. The general style is Early English, faced externally with red sand stock bricks and Derbyshire stone dressings. Westmoreland grey slates have been used for roofing. Mr. G. H. Barrowcliff, Loughborough, was the architect, and the builders were Messrs. A. Faulks and Son, Loughborough. The cost has been £2,262. The heating is by steam-pipes on the low-pressure system, with self-regulating tubular boiler, the work having been intrusted to Messrs. Messenger and Co.

MINEHEAD.—The new Roman Catholic Church of the Sacred Heart, at Minehead, has been opened. The church is a small building, and stands on the Dunster-road. The architect was the Very Rev. Canon Scoles, of Yeovil, and its erection was intrusted to Mr. W. Harrison, builder, of Minehead. The style is Early English, and the building is of Alcombe red sandstone, worked to a rock face, with Bath stone dressings and solid Bath stone windows. The outside measurement is 61ft. long, 21ft. 6in. wide, and 33ft. high; the roof is covered with Major's tiles, and is surmounted at the end nearest the road by a cross of Bath stone, and at the other end by one of iron. The principal entrance is by a porch 8ft. 6in. square, and opposite to it, on the other side of the church, and of the same size, is the Lady Chapel, opening into the nave. The dimensions of the interior are: length, 57ft. 6in.; width, 18ft.; and height to wall-plate, 14ft. 6in.; and from wall-plate to ceiling, 7ft. 6in.; the roof of the nave being ceiled, and that of the sanctuary ribbed with pitch-pine, stained and varnished. The nave is 42ft. 6in. in length, and the sanctuary, which is in shape half an octagon, 15ft., and there is a sacristy 12ft. by 13ft. The woodwork throughout the building is of red deal, stained, and varnished, except the entrance door, which is of wainscot oak. Adjoining the church will be built a presbytery, and the work will be put in hand at once, the contractor being Mr. Harrison, the builder of the church. The contract price for the building of the church was £650.

The church is chaired to seat about 150 in the nave.

SOUTH SHIELDS.—St. Stephen's parish church was reopened after restoration on Wednesday week. It was built in 1846, and has lately been in urgent need of repair. The internal arrangements were of a rude and unsatisfactory character, the general appearance being bare and depressing, and the roof much out of repair. The committee appointed to arrange the restoration adopted a scheme embracing the necessary repairs to the roof; the lowering and renewing of the flooring; the removal of the seating in the nave, and the fittings in the chancel. The nave and north aisle have been fitted up with open benches, and a pulpit has been placed at the respond at the north-east of the aisle arcading. The sanctuary floor has been laid with tiles, the walls panelled in woodwork to the height of 6ft. 6in., and a traceried and carved reredos has been added. The chancel now contains new choir and priests' stalls with carved poppy-heads. The decoration of the wall is executed in warm tints, and the wood fittings throughout are stained green and varnished. Specially-designed new wrought-iron pendants supersede the crude and old-fashioned standards; these have the effect of relieving the former bare appearance of the nave. Mr. W. I. Robertson was the contractor for the work, the decoration being in the hands of Mr. Holme, and the reredos and carving executed by Mr. Ralph Hedley, of Newcastle. The whole of the work has been carried out from the designs, and under the supervision of, Mr. J. H. Morton, F.R.I.B.A., of Newcastle-on-Tyne.

CHIPS.

The Privy Council have granted their authority to the building of the county lunatic asylum at Gransha, near Derry.

The bust of Mr. W. T. Best, formerly city organist of Liverpool, will be unveiled by Earl Derby at St. George's Hall in that city on the 19th inst. The bust is of white marble, and has been executed by Mr. Conrad Dressler, and will occupy a black marble pedestal in front of the organ gallery in the hall.

At the Manchester Consistory Court, held on Friday, a faculty was granted for two mural tablets to be put in St. James's Church, Birch-in-Rusholme. Both are figure subjects—one the Call of St. James and John, the other the Appearance of Our Lord to St. Mary after His Resurrection. These panels are to be carried out in opus sectile and mosaic by Messrs. J. Powell and Sons, of Whitefriars, London.

At the Birkenhead Town Council, on Friday, a recommendation of a sub-committee to purchase the Wirral Waterworks Company's undertaking for the sum of £260,000 was rejected by 38 votes to six.

The three-light east window in Culmstock Church, Devon, has been filled with stained glass representing the Ascension. Mr. Frederick Drake, of Exeter, was the artist.

Messrs. Gibson and Mather's extensive oil and paint works at Glasgow were destroyed by fire on Friday morning.

The ceremony of laying the foundation-stone of the baths and washhouses for the parish of St. Paul, Deptford, which are being erected in Lawrie-grove, New Cross, took place on Thursday in last week. Mr. Thomas Dinwiddy, F.S.I., is the architect, Mr. H. L. Holloway the contractor, and Mr. Redman the clerk of works. The contract has been taken at £32,500.

The Earl of Rosebery unveiled, on Saturday, a bronze statue of Burns, which has just been erected in the Public Fountain Gardens at Paisley. The statue, which is the work of Mr. F. W. Pomeroy, London, represents the poet leaning in a musing attitude, with pencil and notebook in hand, on the mould of a wooden plough of the period.

The House Committee of the Sunderland Board of Guardians have decided to recommend the board to instruct their architect to prepare plans whereby the workhouse will be better adapted to meet the requirements of the present. It is estimated that the carrying out of the remodelling scheme will involve an outlay of £37,860.

At St. Cuthbert's Roman Catholic Church, Slateford-road, Edinburgh, four altars, recently erected, were consecrated on Friday by Archbishop Macdonald, of St. Andrew's and Edinburgh, assisted by his brother, Bishop Macdonald, Aberdeen.

Major-General H. D. Crozier, R.E., on Thursday in last week, held an inquiry at Rothwell, Leeds, on the propriety of executing certain sewerage works beyond the limits of the Rothwell district, and into the objections made thereto. Several district authorities were represented.

Engineering Notes.

MANCHESTER SHIP CANAL.—The Manchester Corporation Directors of the Ship Canal have approved of a report, prepared and submitted to them by Mr. G. H. Hill, C.E., the Corporation waterworks engineer, for presentation to the City Council. In the course of the report, Mr. Hill says that if the traffic continues to increase in the same ratio as heretofore, it is anticipated that the revenue in 1897 will be sufficient to pay the interest on the First and Second Mortgage Debentures. Having considered the prospects and the probable volume of the expansion of traffic during the next two or three years, he believes that it would sooner or later be necessary for the company to obtain more capital. With the increase of traffic in view, further wharves, sheds, warehouses, railway sidings, and other works would have to be provided. Additional dock equipment, in the shape of cranes, &c., would also be a necessity, and the question of permanent dock offices and workshops ought to be faced.

THE IRON GATES.—The navigable channel through the dangerous rapids and cataracts on the Danube, known as the Iron Gates, was inaugurated by the Emperor of Austria at Orsova on Sunday. This great project, which has now been brought to a successful conclusion, has occupied the attention of numerous engineers during the greater part of the present century, but the difficulties were so great that even after the Congress of Berlin had empowered the Dual Monarchy to undertake the work, several years elapsed before an actual beginning could be made. It was due to the energy and perseverance of the late M. Baross de Belus, the Hungarian Minister of Communications, that the enterprise finally took a practical shape. Plans were drawn up, but there was great difficulty in finding a contractor. In May, 1890, however, an arrangement was entered into with a German syndicate, and the work began on the 15th of September of the same year, the plan finally adopted being that of M. Wallandt, a Hungarian engineer, who has also supervised its execution. The water, which near Belgrade has a channel of 1,700 yards in breadth, is forced at Orsova into a bed of less than one-twelfth of those dimensions. The river accordingly reaches a depth of nearly thirty fathoms, and its rocky bottom and sides produced a perilous succession of eddies, whirlpools, and cataracts. Two magnificent canals now fill the site of the fierce rapids—the one a mile and the other four miles in length, which have involved the blasting of some 700,000 cubic yards of solid rock. The cost of the undertaking has amounted roughly to £550,000 sterling. The entire stretch of river included in the works is 62½ miles, extending from the island of Moldava to Turn Severin. Between these points were five cataracts and rapids, the greatest and most dangerous being the Iron Gates. Through these a channel has now been pierced. It is 3,300 yards in length, with a breadth of 87ft., and is navigable for vessels up to 2,000 tons.

At the meeting of the Court of the Company of Plumbers held on Tuesday at the Guildhall, Mr. Philip Wilkinson was sworn in to the office of Master, Alderman Hind to the office of Warden, and Mr. Frederick Machin to the office of Renter Warden for the year ensuing.

The Ipswich School Board decided, at their last meeting, to purchase for £4,750 the old residence in Tower-street known as Tower House, with the garden at the rear, for conversion into central offices for the board, a cookery centre, and pupil teachers' centre, at an estimated cost of another £950. The present offices used by the board in the general post-office are required by the postal authorities. The school board contemplate an immediate outlay of about £15,000 on the provision of new offices and the provision of accommodation for pupils in higher and intermediate education.

There are 61 applications for the post of Chief Officer of the Metropolitan Fire Brigade, and these will be dealt with by the Fire Brigade Committee of the London County Council at an early date. As to the agitation which has been in existence for some time among the ranks for ameliorated conditions of service, the delegates appointed by the men generally have held several meetings, and the views of the Brigade are being formulated. When the new Chief Officer is appointed (and it is not anticipated that he will take office until January 1) he will be requested to present the petition to the Council through the usual channels.

TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. All communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondents.]

It is particularly requested that all drawings and all communications respecting illustrations or literary matter should be addressed to the EDITOR of the BUILDING NEWS, 332, Strand, W.C., and not to members of the staff by name. Delay is not unfrequently otherwise caused. All drawings and other communications are sent at contributors' risks, and the Editor will not undertake to pay for, or be liable for, unsought contributions.

Cheques and Post-office Orders to be made payable to THE STRAND NEWSPAPER COMPANY, LIMITED.

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ADVERTISEMENT CHARGES.

The charge for Competition and Contract Advertisements, Public Companies, and all official advertisements is 1s. per line of Eight words, the first line counting as two, the minimum charge being 5s. for four lines.

The charge for Auctions, Land Sales, and Miscellaneous and Trade Advertisements (except Situation advertisements) is 6d. per line of Eight words (the first line counting as two), the minimum charge being 4s. 6d. for 40 words. Special terms for series of more than six insertions can be ascertained on application to the Publisher.

Front-page Advertisements 2s. per line, and Paragraph Advertisements 1s. per line. No Front-page or Paragraph Advertisement inserted for less than 5s.

Advertisements for the current week must reach the office not later than 3 p.m. on Thursday. Front-page Advertisements and alterations in serial advertisements must reach the office by Tuesday morning to secure insertion.

SITUATIONS.

The charge for advertisements for "Situations Vacant" or "Situations Wanted" is ONE SHILLING FOR TWENTY-FOUR WORDS, and SIXPENCE for every eight words after. All Situation Advertisements must be prepaid.

NOTICE.

Bound copies of Vol. LXIX. are now ready, and should be ordered early (price Twelve Shillings each), as only a limited number are done up. A few bound volumes of Vols. XXXIX., XL., XLII., XLIII., XLIV., XLV., XLVI., XLVII., XLVIII., XLIX., L., LI., LIV., LVII., LX., LXI., LXII., LXIII., LXIV., LXV., LXVI., LXVII., LXVIII. may still be had, price Twelve Shillings; all the other bound volumes are out of print. Most of the back numbers of former volumes are, however, to be had singly. Subscribers requiring any back numbers to complete volume just ended should order at once, as many of them soon run out of print.

W. V. of L. SALOP. (Illustrations and descriptions of Haddon Hall will be found in the following issues of the BUILDING NEWS for the past one-and-twenty years:—April 2 and 16, 1875; April 2, 1878; July 6 and Oct. 5, 1883; July 11, 1884; Aug. 17 and 24, 1888; and Aug. 5, 1892.)

RECEIVED.—E. F. Godwin.—Associate.—L. R. and Co.—J. E. G.—County Surveyor.—H. P. (Newark).—E. S.

Correspondence.

RE L.C.C. CONTRACTS.

To the Editor of the BUILDING NEWS.

SIR,—In the interests of the ratepayers, as well as the contractors of London, we venture to raise a protest against the one-sided and objectionable conditions embodied in the form of contract now being issued by the London County Council, the unfairness of which renders it impossible for many of the contractors to tender for the Council's work.

We have recently been invited to tender for the superstructure of the new asylum at Bexley Heath, and have had an opportunity of going carefully through the Form of Contract, and have no hesitation in stating that the terms are of such a character as to preclude any contractor of standing from being a party to it.

In order not to be misled by any exaggerated views or prejudices of our own, we have consulted an eminent firm of solicitors (who have had special experience in dealing with contracts of this kind), who, after carefully perusing the particulars, strongly advise us not to tender upon same.

We think, in the interests of the ratepayers, the Council should give this matter careful consideration, as, until the terms are modified to make them fair and equitable to both parties, the Council is not likely to meet with a satisfactory response to invitations for tenders; consequently the competitions are likely to become limited to a

few firms who, by having high prices, are prepared to take the risks of the unfair conditions.—We are, &c., HOLLOWAY BROTHERS.

Victoria Works, Queen's-road, Battersea, S.W., September 30.

PITCH-PINE.

SIR,—The contributor of "Adaptable Specifications," in your issue of Sept. 4, says, on p. 329, that pitch-pine is the wood of the American *Pinus resinosa*;—as a matter of fact, the wood of this tree is the commercial red-pine of Canada; whilst the pitch-pine your contributor refers to is the wood of the *Pinus Australis*, which grows luxuriantly along the Atlantic littoral from Carolina to Florida. In the Southern States of America our pitch-pine is known as "yellow" or Crown pine. The yellow pine of these States is therefore not the wood of the *Pinus strobus*, or Weymouth pine, which furnishes the yellow pine of our markets, and what is known in Canada as the "white" pine. The *Pinus ponderosa* of California and Oregon furnishes the "Western pitch-pine," or "yellow pine" of that region.—I am, &c., W. E. M.

ADVERTISING ARCHITECTS.

SIR,—The inclosed appears in the current issue of the *Pontefract and District Business Guide*, a copy of which I forward you. It is, I think, worth reproduction in a professional journal, the solicitation of orders being equal to the best efforts of a—COMMERCIAL TRAVELLER.

Sept. 26, 1896.

MR. J. HESELTINE, Architect and Sanitary Engineer, Micklegate (over 14 years borough surveyor), whose success in drawing was registered on the 7th of July, 1870, by order of the Committee of Council of Education, Science and Art Department, having the most extensive and practical knowledge of the borough by-laws and building construction, solicits orders for plans, specifications, estimates of cost, &c., on the most reasonable terms, combined with prompt attention and practical supervision of works.

CHIPS.

Plans are in course of preparation for an opera house proposed to be erected in Holton-road, Barry Docks, near Cardiff.

The parish church of St. Peter, Southborough, is undergoing internal reuovation, the work being carried out by Mr. Gallard, of that town.

The memorial stones of a new Wesleyan school-chapel at Dudley Port were laid last week. Mr. Alfred Long, of West Bromwich, is the architect, and Mr. Cooper, of Blackheath, is the builder. The cost will be £1,300, and accommodation will be provided for 400.

An American exchange suggests as a simple method of measuring heights in the interior of churches and other buildings the attaching a graduated string or tape to a small balloon such as is easily obtainable anywhere.

Sir Arthur W. Blomfield, A.R.A., has been requested by the Restoration Committee of Peterborough Cathedral to make a report on the west front of the cathedral, to ascertain if the extensive works of reconstruction recommended by Mr. J. L. Pearson, R.A., are absolutely necessary.

The proposed railway from Rai Bareilly to Benares will be about 139 miles in length. Of the fourteen rivers and streams which the line will cross, the river Sai is the largest; it is about 350 yards in breadth.

The Plans and Works Committee of Edinburgh Town Council have agreed to recommend that plans should be prepared for the erection of public baths for the Stockbridge district, on the ground recently acquired for the purpose in Glenogle-road.

H.M. Board of Works for Ireland have placed a contract for the erection of a new coastguard station at Portmuck, Islandmagee. It will consist of a residence for the station officer and five houses for the crew, with the usual watchroom and out-offices. The contractors are Messrs. H. M'Manus and Sons, Randalstown, who are at present erecting the new coastguard station at Glenarm.

Faculties have been decreed in the York Consistory Court to insert a stained-glass memorial window on the north side of Carleton Church, and to the vicar and churchwardens of Flamborough to erect a tower at the west end of the church, and to make certain alterations.

The old post-office and four adjoining dwelling-houses, shops, and premises in the Bull Ring, St. Austell, are about to be demolished, and there will be erected upon the site a bank, offices, shops, and buildings, from the designs of Mr. Silvanus Trevail, architect, of Truro. Messrs. W. H. Smith and Son, St. Austell, are the contractors.

Intercommunication.

QUESTIONS.

[11556].—**Architect's Book-Keeping.**—I shall be obliged if any of your correspondents can tell me what system of book-keeping is usually adopted by architects? I have hitherto kept a diary for myself, and one for clerks as a record of their time devoted to each particular work; but the difficulty is to know what, and what not, should be entered into the ledger. Architects, like other men in business, should be able to tell at a glance what such-and-such work has really "cost" them; but how is this to be done?—IGNORAMUS.

[11557].—**Utilisation of Sawdust.**—Would any reader inform me to what profitable account, if any, the sawdust of hardwood timber can be put?—P. F.

[11558].—**Notes on Domestic Drainage.**—Would the author of "Notes on Domestic Drainage" kindly look up the table giving the weights and thicknesses of drawn lead pipes, which appeared in the issue of March 27th last, and say whether it is correct that a 1½ in. strong lead pipe is only .22 in. in thickness, while that of a 1 in. and 2 in. are each .23 in., and if so, please explain.—J. F. SMITH, Salisbury.

[11559].—**Brick and Tile Making.**—Can anyone recommend a practical recent work on brick and tile making, with publisher's name?—W. H. W.

[11560].—**Municipal and County Engineers' Exam.**—What books are necessary to one studying without the aid of a coach to pass the exam. of the Municipal and County Engineers' Association?—DORSET.

[11561].—**Roof for Thatch.**—Would some kind person oblige by giving me some particulars of the best way of fixing and construction of roof for straw thatching on small cottages.—SALEM THRIFF.

[11562].—**Labour.**—If a pair of modern villa residences cost from £250 upwards for wood only, what is a fair fraction to divide for carpenters' labour only to estimate cost of labour?—YOUNG BULDEE.

[11563].—**Inertia.**—What is the meaning of the phrase "moment of inertia," as applied to a beam, and how calculated?—E. P.

[11564].—**Rain-Water Pipes.**—Is there any simple method of calculating the number of down pipes required for a given area of roofing? In a building recently erected, I find the total sectional area of the rain-water pipes, &c., is three times greater than the area of the drain itself.—E. P.

REPLIES.

[11555].—**Parquet.**—A 4 in. or 6 in. bed of concrete, according to solidity of earth, shovel-floated, will form a sufficient foundation. The parquet should be laid in mastic, which is a special preparation, and obtainable from several people. I will be pleased to give "Novice" addresses and any further information, if he will apply to me.—E. W. JENNINGS, 72, Finsbury-pavement, E.C.

A new organ which has recently been built by Messrs. Abbott and Smith, of Leeds, for Waltham-street Wesleyan Methodist Chapel, Hull, was dedicated on Thursday in last week. It supplants an organ which was introduced into the chapel so long ago as 1828, and which of late years has become very dilapidated. The new instrument contains 35 stops and 1,586 pipes, and is placed in a case of pitch-pine, with decorated front pipes.

In connection with our recent illustration of the Trocadero Restaurant, we mentioned that the whole of the electric-light installation has been carried out by the well-known firm of Strode and Co., 48, Osnaburgh-street, Regent's Park, and extensive showrooms at 188, Piccadilly, and 67, St. Paul's Churchyard. It is specially worthy of note that a new system of wiring, known as the New Conduit system, has been used in this building, the whole of the cables and wires being drawn into specially prepared wrought iron tubes, insulated inside, and screwed together, and arranged with inspection boxes in convenient positions so that every one of the cables and wires can be drawn into the tubes after they are fixed, and can be withdrawn at any future time for inspection. The great advantage of this system is that the whole of the tubing of the building can be done during the progress of the building, thus avoiding any unnecessary cutting away. The very handsome arc lamp brackets and columns, and other electric light fittings throughout the building have been supplied and fixed by Strode and Co. The same firm have also fitted up the whole of the steam supply pipes, steam urns, and tank sinks.

On Wednesday week Mr. Victor Cavendish, M.P., formally opened Grinlow Tower near Buxton, the foundation-stone of which was laid by Colonel Sidebottom, M.P. The tower is round and is erected on one of the highest peaks, and from its summit a magnificent view is obtained. It has been subscribed for by Buxtonians, and occupies the site of some masonry of unknown date, known as Solomon's Temple, and of late years a mere crumbling heap of stones.

On Monday week the Bridgend Intermediate Schools were opened with much *celat*. The building has been erected by Messrs. D. C. Jones and Co., of Gloucester, from the plans of Messrs. Lambert and Rees, architects, Bridgend, and accommodation will be afforded for 70 boys and 50 girls.

LEGAL INTELLIGENCE.

IN RE ISAAC CROOKES, OF SHEFFIELD.—A meeting of the creditors of Isaac Crookes, joiner and builder, 119, Petre-street, Sheffield, was held on Friday at the offices of the Official Receiver in that city. According to the statement of the Official Receiver, the debtor filed his own petition. He was indebted to unsecured creditors to the amount of £360 12s. 5d.; to secured creditors £1,590, the value of the securities being estimated at £2,680; to partly secured creditors £1,056; and small preferential creditors' claims brought up the total liabilities to £3,018 4s. 7d. The debtor estimated his assets to produce £342 6s. 5d., and according to the estimate he had formed of his assets, he was only deficient to the amount of £18 6s. In 1888 he had a receiving order made against him, and a dividend was paid of 1s. 11d. in the £ on the unsecured debts, and in June, 1889, he got his discharge subject to a twelve months' suspension. He commenced business almost immediately that period had expired with a capital of £40. Some of the largest creditors had investigated the debtor's affairs, and they expected there would be a considerable deficiency, even if the properties realised to their full value. The debtor had no offer to make, and the estate was left with the Official Receiver.

A brass eagle lectern has very recently been presented to Hinderwell Church, Yorkshire, in memory of the late Rev. Canon James Galbraith Pooler, D.D., by his daughter. It was executed by Messrs. Jones and Willis, of Birmingham, London, and Liverpool.

In the ventilation of the Established Church, Falkirk, now undergoing repairs and decoration, to designs of Mr. William Black, architect, the "Climax" Patent Direct-Acting Invisible Roof Ventilators are being used, and have been fitted up by Messrs. Cousland and Mackay, ventilating engineers, Glasgow.

Lady Dilke visited Burnley on Saturday to open the new Institute which has been erected in that town by the Burnley and District Weavers, Winders, and Beavers' Association at a cost of £7,000. The building is in three stories and covers a ground area of about 500sq. yds. Accommodation is provided for the general offices of the Association, committee and reading rooms, a lecture room to seat 350 persons, and an assembly hall which will hold about 1,000 people.

The reopening of the church of St. Mildred, Bread-street, E.C., which has been closed for cleaning and the installation of the electric light, will be delayed by an unusual structural collapse. The concrete floor, which covers the old burial vaults, has cracked and sunk, owing to the weight of the scaffolding erected for the purpose of cleaning the church. The damage is expected to prove serious, as the vaults honeycomb the site on which the church is built, and there is little likelihood of the church being reopened for the next six months.

There was a considerable improvement in the amount of business transacted at the Auction Mart last week, the total returns amounting to £51,139. No estates of importance figured in the lists, the supply consisting almost entirely of properties for investment, and for the better kinds of these there was an active demand. During the present month a greater number of sales will be held, but at present the announcements of future events fall short of those of last year at this period.

The Hornsey Urban District Council have completed the purchase of a site for municipal dwellings which it is proposed to erect in the district, and they will at once invite tenders for the work. The land acquired is a little over four and a half acres in extent, and adjoins the Alexandra Park Estate, and the price is £600 an acre. About 100 dwellings will be erected, and these will be divided into three classes, the first containing six rooms each, the second five rooms, and the third being double cottages, of which each tenement will have three rooms.

The Institute and Library at Auchterarder was formally opened on Monday by Mr. Andrew Carnegie. The building, till recently known as the Giral Hotel, was originally erected in 1780, and was in the first instance intended as a meal store, and also as a guard-house for soldiers passing through the town. Since the committee entered into possession of the premises the building has been entirely remodelled and extended, from the designs of Mr. G. J. Ewing, Crief.

On Tuesday week the Duke and Duchess of Rutland visited Bakewell for the purpose of opening the new Lady Manners School, which has been erected at a cost of £2,500. The Derbyshire County Council contributed £600 to the cost of building.

The Camberwell Vestry is about to have Camberwell-grove surveyed with a view to lowering the hill and widening the paths. This will relieve the heavy strain upon horses traversing the road, and afford a greater degree of safety to pedestrians.

WATER SUPPLY AND SANITARY MATTERS.

BRIGHTON.—A new fissure, yielding 600,000 gallons of water per day of 24 hours, has just been struck at the waterworks of the Brighton Corporation at Patcham, and it is to be utilised to extend the supply in that part of the town. At the present time the supply there is very insufficient and the pressure inadequate, and the town council has decided to spend a sum of £12,000 in utilising the additional water. At present the reservoirs only contain 9,300,000, or about 1½ days' supply, and the two new ones, to hold respectively 1,000,000 and 500,000 gallons, are to be provided at a cost of £5,500. The large works only recently carried out, and the acquisition of the Shoreham concern just sanctioned by Parliament, will greatly improve the provision of water, and meet the demands created by the rapid growth of the district for some years.

CHIPS.

Whilst excavating for the main sewer on Langton-road, Norton Malton, the men in the employ of Mr. Anthony Lyons came across an old Roman road, and found the perfect skeleton of a man, and other particles of human bones, old coins, and broken urns. The place has evidently at one time been the site of a Roman camp.

Mr. B. T. Batsford will shortly publish a handbook on "The Architecture of the Renaissance in Italy," by Wm. J. Anderson, A.R.I.B.A., Director of Architecture, and Lecturer at the Glasgow School of Art. It will contain numerous colotype plates and smaller illustrations, and is intended to form a general view for the use of students and others.

Mr. Smith-Saville, assistant borough surveyor of Burton-on-Trent, has been appointed borough surveyor and water examiner at Darwen. There were 90 applicants.

New business premises at Exeter were opened on Friday. They occupy the corner of High-street and Queen-street, are faced with Berkshire bricks, and have cost £2,000.

The Liverpool, St. Helen's, and South Lancashire Railway Company were on Saturday fined £5 per day from May 31 this year to September 25 for not completing two railway bridges according to Act of Parliament. The total penalty up to Saturday was £1,190. The proceedings were taken by the Golborne District Council.

On Monday week the newly-formed park in the east end of Stoke-on-Trent was formally opened. It covers 51 acres, and is situated between the Willenhall and Bilston roads. The land has been levelled by the aid of many thousands of tons of blast furnace refuse, and in the centre of the park is a lake, ten acres in extent. There are also a cricket and football ground, a children's playground, and an open swimming-bath 40 yards long by 15 yards broad, with a depth ranging from 2½ ft. to 6½ ft., and inclosed by a neat wooden fence. The work, which has occupied over two years, was carried out under the supervision of Mr. Berrington, the late borough surveyor, and Mr. Bradley, his successor. Messrs. Bradley and Lloyd, of Shifnal, erected the lodges and carried out other masonry work, and Mr. H. Holloway did the road-making and excavations. The total cost of the work has been £15,000.

Mr. James Tilley, an alderman of Widnes, died at his residence, the Norton Arms Hotel, Lugsdale-road, on Monday. The deceased, who was 65 years of age, and leaves a large grown-up family, was a member of the late local board for several years, and on the incorporation of the borough in 1892 he was one of the first members elected to the town council, figuring at the top of the poll for Victoria Ward as the Nationalist candidate, with 428 votes. At the first meeting of the council he was elected an alderman, being appointed for the full term of six years. He was a native of St. Helens, but he had resided in Widnes over 40 years. He was a joiner and builder by trade, but for over 30 years had held the license of the Norton Arms Hotel.

Sir Arthur Blomfield, A.R.A., recently paid a visit to Salisbury Cathedral, and expressed his complete satisfaction with the work of strengthening the foundations of the tower. The work is being paid for as executed, and on Sir Arthur's certificate the sum of £3,500 has been handed to the contractor. The report shows some progress in the matter of funds. One £10,000 has been subscribed, but much more is still required.

Extensive alterations and an enlargement of Bradford Parish Church, at a cost of about £10,000, are proposed as a memorial of the late Archdeacon Bardsley.

The death of Mr. Wm. Morgan, builder, Tony-refail, took place on Monday. Mr. Morgan was 78 years of age, and had always resided at Tony-refail, where he carried on at one time an extensive business as builder. Of late years he had practically retired.

Our Office Table.

A DECISION in a case of interest to builders and occupiers of dwelling-houses in Glasgow has just been given by the Dean of Guild of that city. Some time ago Mr. Whyte, the Master of Works, served a notice upon a firm of builders, requiring them to hinge or construct the window sashes in two tenements being erected by them so as to admit of the outsides of the windows being cleaned from the inside of the apartments, in compliance with one of the by-laws framed by the police commissioners under the Glasgow Building Regulations Act, 1892. Objections were lodged to the requisition contained in the notice, on the following grounds *inter alia*—(1) that the by-law founded on was *ultra vires*; (2) that the window sashes were so constructed as to admit of the windows being cleaned from the inside by unscrewing two nails and removing a batten rod; and (3) that in other tenements erected by the firm in question since the by-law was enacted they had constructed window sashes of the same description without objection by the Master of Works. A complaint having subsequently been brought before the Court at the instance of Mr. Lang to have the questions at issue determined, parties were heard last Court day, and judgment has now been issued, brushing aside all the objections, condemning the respondent in costs, and ordering the work to be done forthwith.

THE T-Square Club, of Philadelphia, has hit upon a novel method of assisting the public to distinguish the good from the bad in architecture. The members of the club have been invited to compete for a medal for the "re-designing" of some of the most objectionable buildings in Philadelphia. Every competitor will be furnished with a photograph of the building and the approximate requirements for which it was intended. It is proposed that the designs submitted in this competition shall be published as an object lesson to the profession and the public; but it is probable that the assessor's award will not be accepted without much discussion.

THE laying out of the City-square at Leeds will prove a rather more costly undertaking than was originally anticipated, and at the next meeting of the city council to be held on Wednesday next, the corporate property committee will request a further grant of money for the purpose. The committee held a special meeting on Tuesday, in order to examine and make recommendations concerning the 40 tenders that had been received for carrying out the work. At the July meeting of the city council a resolution was passed adopting the scheme submitted by Ald. Harding, and authorising the committee to at once make arrangements for the work to be done, with the exception of the central figure and bronze ornaments on the balustrade (the cost of the central figure will be defrayed by Alderman Harding). The resolution also gave power to the committee to expend £5,000 upon this very desirable improvement. The lapse of two months sufficed to convince the committee that £5,000 would not be sufficient, and accordingly they applied to the council a few weeks ago for an extra £1,000, which was readily granted. But still more will be required, for the tenders which the committee have resolved to recommend the council to accept, and which appear in another column, amount to £7,085 17s., or £1,085 more than they have been authorised to spend.

At the Colwyn Bay annual licensing sessions, on Saturday, a resumption was granted of the license of the Rhos Abbey Hotel, situate in the village of Llandrillo, midway between Colwyn Bay and Llandudno. It was stated that the application was the commencement of the development of the Rhos Estate, owned by Mr. Houghton, a Birmingham gentleman, who intended spending a large sum of money with the idea of making a new fashionable seaside resort similar to Llandudno. Mr. Houghton intended to complete the pier which the late Mr. Bostock partly erected, to make a marine drive three miles towards the Little Orme's Head, and plan the estate out to the best advantage for streets and lodging-houses. About £5,000 will be spent on the hotel. By an advertisement in our columns, it will be seen that Mr. Houghton is offering, through Mr. Philip J. Kent, his resident estate agent at Rhos, premiums of £100, £30, and £10 for laying-out the property, some 300 acres in extent, for building purposes.

THE lumber export business from Nova Scotia

and New Brunswick this season has been unusually heavy. One shipper, Mr. Hutchinson, of Douglastown, on the Miramichi river, has forwarded 10,000,000ft. of deals to Europe, and 4,000,000ft. more is on the wharves ready for transportation. Several millions of feet were shipped to South America by J. W. Hunter, of Leamington, Nova Scotia, and 10,000,000ft. of deals were shipped to England in one week in August. The activity in the export business of the maritime provinces is in strong contrast to the stagnation in the United States. The large amount of spruce deals going from New Brunswick and Nova Scotia to Europe has left a lot of random stuff which has been forced on the New England and New York markets, and has thus had the effect of breaking down spruce prices in the States.

"STONE" describes a novel mode of building, the invention of a German. He first put up a frame of water tubing, allowing continuous circulation to a stream of water, and around this frame he built his house in the ordinary way. All floors and ceilings are crossed and recrossed by the water-pipes, which are connected by the vertical tubes. During the summer fresh, cool water is made to circulate under pressure through these tubes, cooling the building, and flows off warmer than when it entered. In like manner during cold weather, the water is heated in basement to 100° and then circulated through the house; the heat is thus imparted to the floors and walls, and runs off at a temperature of about 40°. By this means coolness or warmth can be imparted to the house. We fancy we have seen the germ of this invention in those appliances used by medical men for drawing off the heat of patients during fever or inflammation, which consists of a network of small tubing through which cold or iced water is made to circulate. The network envelops the body of the patient, and the water is supplied under pressure and runs away at a low level.

THE road to the ruins of Tzac Pokama, in Guatemala, runs through an immense pine forest, and they include the foundations of what was once a populous city, with temples, palaces, and other structures. These were described by Mr. J. R. Chandler at the forty-fifth annual meeting of the American Association held at Buffalo, N.Y., the week before last. He said that every temple stood in a plaza, around which had been ranged the dwellings of the priests. Every strategic point on the mountain was once fortified by a castle, fort, or pyramid. The central palace was 190ft. long, with walls 8ft. thick. On the highest point stood a fortress 240ft. long, with a pyramid 40ft. high, the whole built on terraces whence the Tzac Pokama can be seen in its entirety, as well as the hills, volcanoes, valleys, and rivers for hundreds of miles around. This splendid city could have held three times as many persons as now inhabit Guatemala. Few utensils were found, and no statues, sculptures, or hieroglyphics. There is also a conical hill called Mumuz, with a sacrificial pyramid, through which goes a winding passage, said by tradition to lead to a rich subterranean city.

A syndicate has been formed for piercing a tunnel through the Grand St. Bernard, and constructing a railway of ordinary gauge from thence to Turin. This line would put Italy in direct communication via Lausanne and Basle with the North of Europe and the ports of the North and Baltic Seas. The Chamber of Commerce at Turin has reported favourably to the Italian Government on the scheme.

For many years past all the windows save one in the south aisle of St. Peter-le-Belfrey, York, have been filled with stained glass. The remaining window, that next the east end, has now been similarly treated. It consists of four lights, and is filled with figures of the Four Archangels. The artist is Mr. J. W. Knowles, of Stonegate, York, and the window was dedicated by the Archbishop on Michaelmas Day.

At the half-yearly meeting of the North Metropolitan Railway and Canal Company, held on Tuesday, it was reported that the Bill for enabling the company to improve the canal and dock received the Royal assent on August 7 last; and the requisite steps were being taken to carry out the proposed works as soon as possible, under the superintendence of Mr. J. Wolfe Barry, C.B., whose staff were now busy on the drawings and specifications. The chairman explained that they proposed to spend £100,000 on their dock and canal. They had made up their minds to abandon the railway scheme, and the whole of the powers authorising these works obtained by various Acts would be allowed to expire.

MEETINGS FOR THE ENSUING WEEK.

SATURDAY (TO-MORROW).—Sanitary Inspectors' Association. Annual Meeting at Carpenters' Hall, London-wall.

MONDAY.—Society of Engineers. "Discharging and Storing Grain," by William G. Wales. United Service Institution, Whitehall. 7.30 p.m.

FRIDAY.—Architectural Association. Opening Meeting of Session. Address by Beresford Pite, the President. 7.30 p.m.

CHIPS.

The Welcome Mission Hall in Canhall-lane, Leytonstone, was opened last week. It seats 225 adults, and has cost £710.

An arbitration between the Urban District Council of Portishead and Mr. G. H. Wilkins, of Bristol, the contractor for the sewerage work, has been fixed for the 13th inst. and the following days. The arbitrator (Mr. Wanstigh) will sit at Portishead.

Twenty-three operative plumbers were examined for enrolment on the National Registration of Plumbers at the Borough Polytechnic Institute on Saturday. One-third succeeded in passing the full examination.

A receiving order has been made in the case of W. R. C. Waters, architect and surveyor, present address unknown.

The monument erected at Boulogne in commemoration of the first balloon voyage from France to England is the work of M. Thomas. It consists of a globe of bronze supported on a pedestal of stone, and bearing a cupid unfurling a piece of drapery. On the face of the pedestal is a high relief.

Mr. W. H. Wagstaff, builder, of Bartlett's-buildings, Holborn Viaduct, was elected, on Wednesday, as a member of the Common Council for the Ward of Farringdon Without, in succession to the late Mr. George Shaw, the well-known Past Master of the Plumbers' Company.

The historic estate of Read Hall, Sabden, Lancashire, the residence, since the time of Edward III., of the Nowell family, was on Wednesday sold by auction, at Blackburn. The hall and farms surrounding were bought for £38,000, by Mr. Henry Harrison Stuttard, of Whalley Abbey. Three other lots sold for £5,000; but other portions of the property did not fetch the reserve prices.

At Manchester, on Wednesday, the members of the city council were present at the fixing of tablets at the new technical school, at the corner of Whitworth-street and Sackville-street, to commemorate, first, the gift of the site and other donations by the legates of the late Sir Joseph Whitworth and the donation from the council of guarantors of the Royal Jubilee Exhibition of 1887; and, secondly, the date of the erection of the building. The exhibition guarantors give nearly £14,000, and the munificent gift of the Whitworth legates amounts to £60,000. It is expected that the building will be ready for occupation within three years. On the other side of Whitworth-street, the Manchester School Board have begun the erection of a new central school.

The Dover Corporation decided, on Wednesday, to spend £20,000 upon the purchase of over 200 houses in the low-lying district of the town, which suffered so seriously by flooding during the recent gales. The houses are situated in the neighbourhood of the docks, and are the property of the harbour board. In addition to this price, the corporation have agreed to compensate the lessees. The ground is to be raised and new dwellings erected upon it.

New blacklead works are now in course of erection, at a cost of £4,500, at Stoneferry, for Messrs. Reckitt and Sons, Ltd., under the supervision of Messrs. Gelder and Kitchen, architects, of 76, Lowgate, Hull.

A new Post-office is in course of erection at Hay, Breconshire. It is to be built of red moulded and beaded brick, with terracotta ornaments and stonework in relief, and is to be fitted up with all the latest official improvements, supplied by Mr. Henry Bessell, of Bristol. The architect is Mr. Ernest Davies, M.S.A., Hereford, and the contractor Mr. George Meredith, Hay.

Messrs. Fambrini and Daniels, architectural concrete works, Lincoln, have just completed a new balcony to the Borough Hall, Stafford. The above consists of moulded and modelled corbels and friezes, parapet, capping, &c., in grey concrete, with a quantity of small circular pillars of a similar material in red. This firm are also supplying coping for the precipitation tanks for the Borough Council of Stafford.

The death is recorded of Mr. John Sherrin, a member of the Institute of Painters in Water-Colours. He was best known as an extremely prolific still-life painter. Mr. Sherrin had attained his 78th year, and contributed to the London galleries so long ago as 1859.

LIST OF COMPETITIONS OPEN.

Farnham—School Infirmary		E. Kempson, Clerk to Managers, 121, West-street, Farnham	Oct. 13
Peel (Isle of Man)—New School and Masters' House (£1,600)	£20	Alfred N. Laughton, High Bailiff of Peel	" 14
Gorton—Laying Out Cemetery	30gs.	R. T. Holland, Clerk, Town Hall, Gorton	" 24
Belfast—New City Hall (Assessors, A. Waterhouse, R.A., and J. C. Bretland)	£300 divided	S. Black, Clerk to Corporation, Belfast	" 25
Poplar—Coroner's Court, Mortuary	£30, £20	W. H. Farnfield, Clerk, 117, High-street, Poplar	" 26
Malmö, Sweden—New Gasworks	3,000, 2,000, & 1,500 Swedish crowns	Corporation Gas Works Offices, Malmö, Sweden	Nov. 1
Bootle—North Board School for 1,000 children (local architects only)	No premium	F. K. Wilson, Clerk, Balliol-road, Bootle	" 11
Sunderland Corporation—Artisans' Dwellings (for 450 persons)	£50, £30, £20	Fras. M. Bowey, Town Clerk, Sunderland	" 14
Darlington—Laying-out Southern Estate	£35, £15	R. C. Pearce, Estate Agent, Darlington	" 20
Douglas, I.M.—Municipal Buildings (£10,000 limit of cost)	£40, £20, £10	T. H. Nesbitt, Town Clerk, Douglas	" 21
Newport, Mon.—Hospital (£16,000 limit of cost)	£100, £50	J. K. Stone, Secy., 39, High-street, Newport	Dec. 1
Rhos-on-Sea, Colwyn Bay—Laying-out Building Estate	£200, £30, £10	Philip J. Kent, Rhos Abbey, North Wales	" 5
Kieff, Russia—Theatre (£48,000 limit, 1500 seats)	£200, £100, £10	Imperial Society of Architects, 83, Quai de la Moika, St. Petersburg	" 15
St. Gilles, near Brussels—Town Hall (£42,000 limit of cost)	£160 and two lesser premiums	Municipal Authority, St. Gilles, Belgium	Feb. 1
Osgodby, Lincolnshire—Wesleyan Chapel & Schools (cost £600)	No premium	E. H. Davy, Secretary to Trustees, Kirkley, Market Rasen	" —
Kirriemuir, N.B., Parish Church Hall			" —
Keresteven District Lunatic Asylum (C. H. Howell, Assessor)			" —
Eccleshill, Bradford—Sewage Disposal	£20, £10	Jos. Richardson, Clerk, U.C., 4, Town Hall-square, Bradford	" —

LIST OF TENDERS OPEN.

BUILDINGS.

Blaenau—Girls' School	School Board	Grierson and Bellis, Architects, Bangor	Oct. 5
North Devon—Woolacombe Bay Hotel, Additions	Arnold, Perrett, and Co.	A. Halsey, Secretary, Wickwarr Brewery, Glos.	" 5
Berkhamstead—Repairs, Workhouse Infirmary	Guardians	E. H. Adey, 5, Chapel-street, Berkhamstead	" 5
Frome—Allen-valle Cemetery Extension	Cemetery Co.	T. R. Gillies, 131, Union-street, Aberdeen	" 5
Batley—Borough Surveyor's Stores	Board of Guardians	G. W. Bradbury, Public Offices, Frome	" 5
Leyton—Alterations, Town Hall	Corporation	H. Dearden, Borough Surveyor, Market-place, Batley	" 5
Ealing—Additions to Railway Station	Urban District Council	W. Dawson, Town Hall, Leyton	" 6
Mitcheldean-road, Glos.—New Passenger Station	Great Western Railway Co.	G. K. Mills, Secretary, Paddington Station	" 6
Fawley, Herefordshire—New Passenger Station	Great Western Railway Co.	G. K. Mills, Secretary, Paddington Station	" 6
Newport, Mon.—Alterations, High Street Station	Great Western Railway Co.	G. K. Mills, Secretary, Paddington Station	" 6
Chalford, Glos.—Passenger Station	Great Western Railway Co.	G. K. Mills, Secretary, Paddington Station	" 6
Canterbury—Additions, Police Superintendent's House	City Corporation	G. K. Mills, Secretary, Paddington Station	" 6
Bury St. Edmund's—Steam Laundry	Directors of Co.	City Surveyor, 28, St. Margaret's-street, Canterbury	" 6
Reading—Passenger Station	Great Western Railway	Cecil W. Greene, Secretary, 58, Abbeygate-st., Bury St. Edmund's	" 6
Bethnal Green, E.—Workhouse Infirmary	Guardians	G. K. Mills, Secretary, Paddington Station	" 6
Bethnal Green—Infirmary	Guardians	Giles, Gough, and Trollope, Archts., 28, Craven-st., Strand, W.C.	" 6
Manchester—Two Underground Conveniences	Sanitary Committee	Giles, Gough, and Trollope, Architects, 28, Craven-street	" 6
Leeds—Ten Through Houses in Linden-road	Industrial Co-operative Society	W. H. Talbot, Town Clerk, Manchester	" 6
Chryelash, West Cornwall—Board School	Kenwyn School Board	J. W. Fawcett, Secretary, 10, Albion-street, Leeds	" 6
Old Hill—Mortuary	Rowney School Board	R. Dobell, Clerk, Tydar-street, Truro	" 6
Plymouth—Boot Inn, Rebuilding	Hillway Regis U.D.C.	Council's Offices, Old Hill, Staffs	" 7
York—Show Yard	Owners	Rooker, Matthews, and Co., Solicitors, Plymouth	" 7
Caegwrw—Infant School Extension	Worshire Agricultural Society	Marshall Stephenson, Blake-street, York	" 7
Reading—Station Sorting Office	Llanwonno School Board	A. O. Evans, Architect, Post Office Chambers, Pontypridd	" 7
Ilkeston—Wesleyan Chapel	H.M. Office of Works	Hon. R. B. Brett, Secretary, 12, Whitehall-Place, S.W.	" 7
Berwick—Re-erection of Premises	Committee	G. Haslam and Son, Architects, Euclid House, Ilkeston	" 7
Shrewsbury—Gas-engine House, Conduit-head	Caverhill and Co.	J. Stevenson and Son, Architects, Berwick-on-Tweed	" 7
Bromley, Kent—Houses in Glebe-road	Corporation	W. Chapple Eddowes, Borough Surveyor, Shrewsbury	" 8
Mellor—Reflooring St. Mary's Church		F. W. Stocker, Architect, 90-1, Queen-street, E.C.	" 8
Roche's Point, Co. Cork—Lighthouse Buildings	Irish Lights Commissioners	Austin and Paley, Architects, Lancaster	" 8
Chatham—Improvements to Depot	Corporation	Owen Armstrong, Secretary, Dublin	" 8
Cwm, Ebbw Vale—Nine Houses		H. P. Mann, Town Clerk, Chatham	" 8
Forest Gate—Alterations, School		John Morgan, 8, Victoria-road, Ebbw Vale	" 8
Eastville, Boston—Board School	Forest Gate School District	Superintendent, at School, Forest Gate, E.	" 8
Tongrefail, Wells—Master's House	Eastville School Board	T. Ward, Clerk, New Town, Spilsby	" 8
Brighton—Additions to Town Hall	Llantrissant School Board	J. J. Evans, Architect, Sunnyside, Penarth	" 9
Hammersmith—School Superintendent's House	Corporation	F. J. Tillstone, Town Hall, Brighton	" 9
Connestwater—Enlargement of Premises	Kensington School District	J. H. Rutherglen, Clerk, Marlow-road, Kensington	" 9
Highley, Salop—Alterations and New Infants' School	Belfast Ropework Co.	Graeme-Watt and Tulloch, Architects, 77A, Victoria-st., Belfast	" 10
Harrow—Additions, Sudbury-road and Greenhill Schools	Highley School Board	W. M. Roden, Clerk, Kidderminster	" 12
Barnes, W.—Timber Jetty at Small Profit Dock	School Board	A. Fillmore, Clerk, High-street, Harrow	" 13
Dover—Stables, Sheds, and Cottage	Urban District Council	G. Bruce Tones, Surveyor, High-street, Mortlake	" 13
Sutton, Co. Dublin—Three Dwelling-houses	Corporation	E. Wollaston Knockor, Town Clerk, Dover	" 13
Camberwell Workhouse—Fitting Padded Rooms	Board of Guardians	A. Scott and Sons, Architects, 16, William-street, Donegal	" 14
Stockwell—Ambulance Station at Fever Hospital	Metropolitan Asylums Board	The Clerk, Camberwell Workhouse	" 14
Merthyr Tydfil—Workhouse Infirmary (120 beds)	Board of Guardians	T. Duncombe Mann, Clerk, Norfolk-street, W.C.	" 14
Swansea—Additions, Terrace-road School	School Board	Frank T. James, Clerk, Merthyr Tydfil	" 16
Preston—China Clay Show (150ft. by 110ft.)	Corporation	A. W. Halder, Clerk, Dynevor-place, Swansea	" 17
Derby—Pear Tree School	School Board	H. Hamer, Town Clerk, Preston	" 19
Bedlinog—School Extension	Gelliager School Board	Wm. Cooper, Clerk, Becket-street, Derby	" 19
Stroud—Completion, School of Science and Art	Committee	F. T. James, Clerk, 134, High-street, Merthyr Tydfil	" 19
London—West Central District Post-Office	H.M. Office of Works	W. H. C. Fisher, 6, Rowcroft, Stroud	" 20
Stroud—Parliament-street School	School Board	Hon. Reginald B. Brett, Secretary, Whitehall, S.W.	" 20
Hyde—Technical School and Free Library	Corporation	F. Winterbotham, Clerk, 5, Rowcroft, Stroud	" 21
Pare Gwyllt—Asylum Block, 120 patients	Glamorgan County Council	G. Stevens, Town Clerk, Hyde	" 22
Hunslet, Leeds—Public Baths	Corporation	T. T. Lewis, Solicitor, Bridgend	" 27
Stanningley—Four Houses and Shop	Corporation	H. Harrison, Town Clerk, Leeds	" 27
Bradford—House and Shop, Carlisle-road		Rycoft and Firth, Architects, Bank-buildings, Bradford	" —
Stonehaven—Granite Villa		F. Moore, Architect, 40, Sunbridge-road, Bradford	" —
Koswick—Rebuilding Stabling, Duke of Wellington		J. A. Souttar, Architect, 42, Union-street, Aberdeen	" —
Exmouth—Wesleyan Chapel and Schools		A. D. Kaye, Architect, 4, Albion-place, Leeds	" —
Buttershaw, West Riding—Two Houses		W. J. Morley, Architect, 269, Swan-arcade, Bradford	" —
Belfast—Two Houses, University-avenue		Brayshaw and Dixon, Architects, Bowling Old-lane, Bradford	" —
Ovenden, Yorks—Farmhouse		J. G. Lindsay, Architect, 6, Chichester-street, Belfast	" —
Gateshead—Thirty Dwellings in Flats, Saltwell-lane		J. Robert Shaw and Son, Architects, 55, Tyrryl-street, Bradford	" —
Nuneaton—Galley Common National Schools		E. Bowman, 52, Westgate-road, Newcastle	" —
Cardiff—Additions, Halfway House Hotel	Committee	J. R. Veall and Son, Architects, Wolverhampton	" —
Sheerness—Conservative Club	Brain and Co.	Jones, Richards, and Budgen, Architects, Cardiff	" —
Harrogate—Two Houses	Committee	Wm. J. Shearburn, Architect, Dorking	" —
Hull—Repairs 23 Houses	Ryder and Leyland	W. Lupton, North Lodge, New Park, Harrogate	" —
Newland—Alterations Property		75, Charles-street, Hull	" —
Leeds—Pulling down House		N. Swindle, Chemist, Keswick	" —
Harrogate—House		J. W. Watson, 21, New Station-street, Leeds	" —
Towyn—House		J. M. Fawcett and Sons, 26, Albion-street, Leeds	" —
Bury (Lancs)—Stables, Butcher-lane		Hipkiss and Bassett, Architects, Aberdovey	" —
Shorness—Club		F. Cartwright, C.E., Phoenix-yard, Bury	" —
Bristol—Alterations to Fish Market		E. Pover, Architect, Faversham	" —
Leeds—Two Houses and Shops, Dewsbury-road		J. Thomas, City Surveyor, 51, Prince-street, Bristol	" —
Kirkby Overblow—Additions to School		Percy Robinson, Architect, 72, Albion-street, Leeds	" —
Armsley, Leeds—New Works		T. E. Marshall, Architect, Harrogate	" —
Belfast—Business Premises, St. Peter's Hill		W. A. Hobson, Architect, 82, Albion-street, Leeds	" —
Chopwell—Two Houses and Shops		J. Armstrong, 16, Shankhill-road, Belfast	" —
Harrogate—House in Duchy-road		T. Atkinson, 6, South-avenue, Ryton-on-Tyne	" —
		J. M. Fawcett and Son, Architects, 96, Albion-street, Leeds	" —

ENGINEERING.

Elland—Tunnel Outfall	Urban District Council	M. Paterson, C.E., 35, Manor-row, Bradford	Oct. 5
Morecambe—Sea Wall, Carriage Way, &c.	Urban District Council	J. Bond, Surveyor, Council Offices, Morecambe-st., Morecambe	" 5
Bonar Bridge—Works of Water Supply	Sutherland County Council	A. Argo, County Clerk, Golspie, N.B.	" 5
Elland—Sewage Pumping Machinery	Urban District Council	T. England, Clerk, Town Hall Chambers, Halifax	" 5
Dartford—Laundry Fittings, Gore Farm Hospital	Metropolitan Asylums Board	T. Duncombe Mann, Clerk, Norfolk-street, W.C.	" 5
East Retford—Sinking 12in. Bore, 330ft.	Corporation	J. B. Fenwick, Gas and Water Office, E. Retford	" 5
Wantage-road and Grange Court Stations—Footbridges	Great Western Railway Co.	G. K. Mills, Secretary, Paddington Station	" 6

ENGINEERING—continued.

Crossness—Outfall, pipes and valves	L.C.C.	C. J. Steward, Clerk	Oct. 6
Ditto Ditto, Triple Expansion Engines	L.C.C.	Ditto	" 6
Manchester—Underground Conveniences	Corporation	City Surveyor, Town Hall, Manchester	" 6
Havana—Floating Dock	Spanish Government	Commercial Department, Foreign Office, S.W.	" 7
Frith Hill, Godalming	Reservoir Water Co.	H. J. Collier, Secretary, Godalming	" 7
Ballyhack, New Ross, Ireland—Waterworks	Guardians of New Ross Union	Clerk to Guardians, New Ross	" 7
Enfield—Steel Lancashire Boiler	Urban District Council	T. W. Scott, Clerk, Court House, Enfield	" 7
Old Sodbury—Engines and Pumps	West Gloucester Water Co.	J. James, Clerk, 110, Cannon-street, E.C.	" 8
Tréport Harbour, Rouen—Swing Bridge	Official	Prefecture of the Seine Inférieure, Rouen	" 8
Dundee—Electric Lighting Installation	Royal Lunatic Asylum	Engineer	" 9
Dundee—Electric Light Fittings, Lunatic Asylum	Directors	W. H. Tittensor, Electrical Engineer, Crescent-road, Dundee	" 9
Bucharest—Foundation Bridge (about £64,000)	Official	Director, State Railways, Bucharest	" 10
Dorstone—Two Highway Bridges	Bredwardine R.D.C.	C. Griffiths, Clerk, Hay	" 10
Mark—Reconstruction and Rebuilding of Stuckey's Bridge	Somersetshire Drainage Commrs.	Geo. Lovibond, Clerk, Queen-street, Bridgwater	" 10
Marsala, Sicily—Pier (about £10,610)	Italian Government	Italian Ministry of Public Works, Rome	" 12
Leeds—Two Overhead Cranes, Tramways Electricity Station	Corporation	Town Clerk, Leeds	" 13
Morley—Electric Lighting Plant	Corporation	E. B. Hopkins, Town Clerk, Morley	" 14
Leamington—Bore, part steel lined	Corporation	E. de Normanville, Engineer, Town Hall, Leamington	" 14
Hunslet, Leeds—Sewage Works	Rural District Council	S. Shaw, Engineer, Union-street, Dewsbury	" 14
Whitehaven—Intake Works	Water Committee	J. S. Brodie, Engineer, Town Hall, Whitehaven	" 15
New Malden, Surrey—Machinery for Sewage Disposal Works	Urban District Council	W. H. Hope, Eng., Gate House, Portsmouth-rd., Kingston-on-Th.	" 15
Durham—Subway at Penshaw Station	North-Eastern Railway Co.	C. A. Harrison, Central Station, Newcastle-on-Tyne	" 16
Wellington, Salop—Cast-iron Water Mains, Excavating, &c.	Urban District Council	G. J. Monson, Engineer, 45, Walker-street, Wellington, Salop	" 16
Larne, Ireland—Water Works	Larne Town Commissioners	J. H. H. Swiney, C.E., Avenue Chambers, Belfast	" 17
Warrington—Subway	Water Committee	James Deas, Water Engineer, Bank House, Warrington	" 19
Shrewsbury—Main Drainage Engines and Crane	Corporation	H. C. Clarke, Town Clerk, Shrewsbury	" 22
Naj Hamadi, Kinch Line, Upper Egypt—Metallic Bridges	Official	Col. Western, Broadway Chambers, Westminster, S.W.	" 30
Naj Hamadi, Kinch Line, Upper Egypt, Metallic Bridges	Official	Colonel Weston, Broadway Chambers, Westminster, S.W.	" 30
Jassy, Roumania—Baths Installations	Municipal Council	N. A. Bogodan, Secretary, Jassy	Nov. 5
St. Malo—Waterworks	Municipal	Hôtel de Ville, Ile-et-Vilaine, France	Dec. 31
Wellington, Salop—Deepening 4in. Bore from 140ft. in Bunter Beds		Grooms and Sons, Wellington, Salop	—
Chelsham—Driving Headings in Well	Waterworks Co.	Wm. Fox, M.I.C.E., 5, Victoria-street, S.W.	—
North Wales—Pumping out Slate Quarries		R. Parry Jones, Talsarn, North Wales	—

FENCING.

Dartford—Park Pale Fencing	Met. Asylums Board	T. Duncombe Mann, Clerk to the Board	Oct. 5
Joyce Green, Dartford—Park Paling (350 rods)	Metropolitan Asylums Board	T. Duncombe Mann, Clerk, Norfolk House, Strand	" 5

PAINTING.

Birmingham—Interior Parish Offices	Board of Guardians	W. Bowen, Clerk, Edmund-street, Birmingham	Oct. 5
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ROADS AND STREETS.

King's Norton—Kerbing and Metalling	Rural District Council	23, Valentine-road, King's Heath	Oct. 5
Selle Oak—Making-up Weobley Park-road	Rural District Council	E. Docker, Clerk, 83, Colmore-row, Birmingham	" 5
Paddington—Thames Ballast Shingle (400 cubic yards)	Vestry	F. Dethridge, Clerk, Harrow-road, W.	" 5
Nuneaton—Footpath Paving (7,000sq.yd.)	Urban District Council	J. S. Pickering, C.E., Nuneaton	" 5
Salford—Sewering, Paving, and Flagging Streets	Corporation	S. Brown, Town Clerk, Salford	" 5
Southend-on-Sea—Making-up Five Roads	Corporation	Wm. Gregson, Town Clerk, Southend	" 6
Southampton—Tar-paving Footpaths	Corporation	G. B. Nalder, Town Clerk	" 6
Aldershot—Broken Granite (1,500 tons)	Urban District Council	W. E. Foster, Clerk, Victoria-road, Aldershot	" 6
Croydon—Repairs to Roads	Corporation	E. Maudesley, Town Clerk, Croydon	" 6
Mid End—Broken Guernsey Granite (1,500 tons)	Mid End Old Town Vestry	M. Jutsum, Clerk, Vestry Hall, Bancroft-road, E.	" 7
Mid End—Tooled York Paving (10,000ft.)	Mid End Old Town Vestry	M. Jutsum, Clerk, Vestry Hall, Bancroft-road, E.	" 7
Fulham—New Approach to Bishop's-park	Vestry	C. Botterill, Engineer	" 7
Bexley—Materials to Sept. 30, 1897	Urban District Council	T. S. Baynes, Clerk, Bexley Heath, S.E.	" 7
Bedlington—Whinstone Road Metal	Urban District Council	— Cooper, Surveyor, Bedlington	" 7
Bexley—Granite, Flint, and Ragstone	Urban District Council	The Surveyor, Council Offices, Bexhill	" 7
Handsworth—Materials to September 30, 1897	Urban District Council	E. Kenworthy, Public Offices, Handsworth	" 7
Cradley Heath—Street Works	Rowley Regis Urban District Council	Council Offices, Old Hill, Staffordshire	" 7
East Barnet—Materials to September 29, 1897	Urban District Council	H. York, Surveyor, County Offices, Station-road, New Barnet	" 8
East Barnet—Materials to September 29, 1897	Urban District Council	H. York, Surveyor, County Offices, Station-road, New Barnet	" 8
Old Trafford—170 yards of road	Manchester Gas Committee	City Surveyor, Town Hall, Manchester	" 8
Southgate, N.—800 tons Flints	Urban District Council	W. M. Ellinor, Clerk, Palmers-green, N.	" 8
Broadstairs—Granite Kerb and Tram (8,000ft.)	Urban District Council	L. A. Skinner, Clerk, Broadstairs	" 10
Luton—Granite and Slag	Rural District Council	J. Anstree, Surveyor, Dunstable	" 10
Kensington—1,000yd. Crushed Thames Ballast	Vestry	Wm. C. Leete, Vestry Clerk, Kensington	" 13
Halifax—Road Works, Skircoat-green Estate		Jackson and Fox, Architects, 22, George-street, Halifax	" 14
Berkhamstead—Widening Road		Cbas. H. Rew, 87, High-street, Berkhamstead	—
Woodhall Spa, Lincolnshire—Road		— Hucksall, Secretary, Woodhall Spa	—
Withington—Draining and Flagging Passages	Urban District Council	A. Roberts, Clerk, Town Hall, Withington	—

SANITARY.

Saffron Walden—Sewage Disposal	Corporation	W. Adams, Town Clerk, Saffron Walden	Oct. 5
Paignton, Devon—Additional Sewers	Urban District Council	F. W. Puddicombe, Clerk, Paignton	" 5
Aldeburgh—Stone Paving Setts	Corporation	J. G. Gordon, Borough Surveyor, Aldeburgh	" 5
Elland—Tunnelled Sewer 1,476ft.	Urban District Council	T. England, Clerk, Town Hall Chambers, Halifax	" 5
Croydon—Tunnelled Sewer Drain Pipes	Corporation	E. Mawdesley, Town Clerk, Croydon	" 6
Felixstowe—Private Street Drainage	Urban District Council	F. B. Jennings, Clerk, Felixstowe	" 6
Southend-on-Sea—Laying Sewers (1,245ft.)	Corporation	Wm. Gregson, Town Clerk, Southend	" 6
Prestrich, Lancashire—Sewer	Urban District Council	Offices of the Council, Chester Bank, Prestrich	" 6
Uckfield, Sussex—Sewerage Works	Rural District Council	J. Taylor, Henley House, Uckfield	" 9
Uckfield—Sewage Disposal Works	Rural District Council	J. Taylor, Surveyor to the Council	" 9
Whitefield, Lancs.—Sewering Roads	Urban District Council	J. P. Monks, Law Clerk, Whitefield	" 10
Stoke Bishop—Collecting of Ashes	Barton Regis R.D.C.	A. P. I. Cotterell, Lonsdale Chambers, Baldwin-street, Bristol	" 12
Hampton—7 miles Cast-Iron Pipes (Supply and Laying)	District Council	F. A. Kent, Clerk U.D.C., Hampton	" 13
Hunslet—Sewer Works	Rural District Council	S. Shaw, Engineer, Union-street, Dewsbury	" 14
Paddington—Brick Sewers (1,720ft., 3ft. 9in. by 2ft. 6in.)	Vestry	F. Dethridge, Vestry Clerk, Harrow-road, W.	" 19
East Grimstead—Sewerage at Turner's Hill	Rural District Council	W. Alston Head, Clerk, East Grimstead	" 21
Eccles, Lancs.—Brick Culvert (745yds., 3ft. by 2ft.)	Corporation	A. C. Turley, Borough Engineer, Eccles	—
Burnley—Sewage Outfall Plant	Corporation	W. T. Fullalove, Clerk, Burnley	—

STEAMBOAT.

Manchester—Sewage Sludge Steamer (1,000 tons)	Corporation	W. H. Talbot, Town Clerk, Manchester	Oct. 19
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STEEL AND IRON.

India—Steel Axles	Rohilkund & Kumaon Railway Co.	E. L. Marryat, Secretary, 237, Gresham House, E.C.	Oct. 5
Bradford—Roof of Clothing Premises		Milnes and France, Architects, Bradford, Yorks.	" 5
Belfast—Steel Rails (25 tons)	Belfast Harbour Commissioners	G. F. L. Giles, Harbour Engineer	" 5
Steel Bridge (55 tons) Girders	Great Western Railway Co.	Engineer's Office, Paddington Station	" 6
Southend-on-Sea—Lamp Columns	Corporation	Borough Surveyor's Office, Clarence-road, Southend	" 6
India—Stores	Bengal and North Western Railway	E. L. Marryat, Secretary, 237, Gresham House, E.C.	" 6
India—Plate Girder Bridges	Bombay, Barod, & Cent. Ind. Rl. Co.	T. W. Wood, Secretary, 45, Finsbury-circus, E.C.	" 6
India—Steel Rails, Fish Plates, Cranes, &c.	India Office	E. Grant Burls, Director-General of Stores, Whitehall	" 6
India—Carriage and Wagon Turntables	East India Railway Co.	A. P. Dunstan, Secretary, Nicholas-lane, E.C.	" 7
India—Volute and Spiral Springs	Nizam's State Railway	W. G. Hall, Managing Director, 68, Winchester House, E.C.	" 8
Rootle—Cast-Iron Pipes (111 tons)	Rural District Council	P. H. Palmer, C.E., Town Hall, Hastings	" 13
India—Carriages, &c.	India Office	E. Grant Burls, Director-General of Stores, Whitehall	" 13
Alexandria—Bridge Works (Iron)	Administration of Railways	Chief Engineer to Administration, Alexandria	" 20
New South Wales, Australia—Steel Rails (150,000 tons)	Government of New South Wales	Hon. Sir Saul Samuel, 9, Victoria-street, S.W.	Dec. 30
Sweden—Rails (13 miles 1,180 yards) for Christiania-Kolmer	Official	Electric Tram Co., 47, Kirkeveir, Christiania	Jan. 1
Kollen Electric Tram			

TIMBER.

Manchester—5,000 Creosoted Sleepers	Cleansing Com. Manchester Cor.	R. D. Callison, Town Hall, Manchester	" 7
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Trade News.

WAGES MOVEMENTS.

BIRMINGHAM.—The local secretary of the Alliance Cabinetmakers' and Furnishing Trades Association states that all the leading firms have agreed to give the advance asked for by the cabinetmakers.

BLACKBURN.—The cabinet-makers' strike, after lasting a week, was settled at a joint conference of masters and men late on Friday night, and work was resumed on Monday. The men demanded a reduction of hours from 54 to 51 per week, an advance of 3d. per hour in wages, and the restriction of the employment of apprentices. The masters have conceded the three hours' reduction of working time and an advance of 1s. per week in wages, the apprentice question being left over for further discussion.

NORTH WALES SLATE QUARRIES.—Lord Penrhyn has issued to the employes at the Penrhyn quarries his reply to Robert Davies and six others, in which he says he has gone fully into the details set forth by the quarrymen in their further particulars and explanations of August 27, as a rejoinder to his previous reply and remarks to the deputation on August 17 as regards the standard wage. Lord Penrhyn finds no sound reason given for an alteration in the nominal standard of wages, and adds that to set up a calculation of the prices of the best slates as a basis for the adjustment of wages is altogether misleading. He declines to establish a fixed minimum wage of 4s. 6d. a day, and denies that any injustice, as alleged, has arisen under the contract system. He adds that the quarrymen have most signally failed to substantiate the serious charges they made. On receipt of this communication about 3,000 quarrymen at Penrhyn struck work on Monday, and unless the endeavours now being made to effect an amicable settlement are successful a general lock-out and strike are anticipated.

SCARBOROUGH.—The strike of labourers there, which has paralysed the building trade of the town for the past nine weeks, has practically ended, masters and men having consented to refer the dispute to two arbitrators and an umpire, whose decision shall be binding. The labourers, who struck for an advance of wages from 5½ to 6d. per hour, resumed work on Monday, and the employers have agreed to pay the advance for the resumption of operations should the arbitration go in favour of the men. The arbitrators will be nominated by Mr. Moore on behalf of the Master Builders' Association and by Mr. Cockerill as secretary of the Labourers' Union.

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The most extensive Stock of every kind of
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immediate use.

TENDERS.

Correspondents would in all cases oblige by giving
the addresses of the parties tendering—at any rate, of the
accepted tender: it adds to the value of the information.

ABERDEEN.—For macadamising and laying granite kerb
and channel, &c., at Queen-street, King-street, Grandholm-
street, Gaelic-lane, and Marquis-road, Woodside, for the
town council. Mr. William Dyack, burgh surveyor:—
Leith, J., 35A, Union-street, Queen-street £121 3s., King-
street £73 9s. 5d., Grandholm-street £111 6s. 3d.,
Gaelic-lane £110 2s. 6d., Marquis-road £292 11s. 2d.
(accepted).

ACTON, W.—For construction and sewerage of first
portion of Somerset-road, on the Southfield Park estate,
Acton-lane, Chiswick, W. Mr. Edward Monson, F.R.I.B.A.,
Acton Vale, W., architect:—
Mears, J., Earl's-court, S.W. ... £190 0 0
(Accepted).

ACTON, W.—For additions to laundry in Stafford-road,
South Acton, W. Mr. Edward Monson, F.R.I.B.A.,
Acton Vale, W., architect:—
Fanshaw, C., South Acton, W. ... £185 0 0
(Accepted).

ACTON, W.—For the erection of house in Bollo Bridge-
road, South Acton, W. Mr. Edward Monson, F.R.I.B.A.,
Acton Vale, W., architect:—
Hooper, G., Acton, W. (accepted)... £500 0 0

ALFRETON.—For laying-out a small sewage farm at
Greenhill-lane, Riddings, also for the construction of a
9in. sewer along Sleeth-ke-lane, Alfreton, for the urban
district council. Mr. E. Houlton, surveyor:—
Lane, J., & Son, Skegby, Mansfield £691 7 4
Hawley, J., and Son, Ilkeston ... 685 0 0
Barry, H. H., Ratcliffe-on-Trent ... 595 0 0
* Accepted.

BACUP.—For pointing the whole of the schools and the
west end of St. Saviour's Church, Bacup:—
Rushton, J., & Sons, Bacup ... £99 0 0
(Accepted).

BARKING-ROAD, E.—For supplying fittings to the
Frederick-road school, Custom House, for the West Ham
School Board:—
Finegan and Co. (accepted) ... £219 0 0
(Lowest of ten tenders received.)

BARNSELY.—For certain metalling, kerbing, flagging,
and completing works in Rebecca-street and part of
James-street, Barnsley, for the Barnsley Town Council.
Mr. J. Henry Taylor, C.E., borough surveyor:—
Rebecca-street:—
Moore, A., Barnsley ... £242 0 0
Hood, J., Barnsley ... 229 0 0
Burrows, H., and Son, Barnsley ... 210 0 0
James-street:—
Hood, J., ... 367 2 5
Burrows, H., and Son ... 364 18 6
Moore, A.* ... 364 12 6
* Accepted.

BARNSELY.—For three houses and outbuildings, Dobie-
street, Barnsley. Mr. Herbert Crawshaw, 13, Regent-
street, Barnsley, architect:—
Masons:—Dalbie and Squire, Dobie-street.
Joiner:—W. Dyson, Kingstone-place.
Slater:—W. Scholey, Pitt-street.
Plumber:—H. Ashworth, Back Queen-street.
Plasterer:—M. Fleming, Eastgate.
Painter:—C. Bridge, Cemetery-road.

BIRKENHEAD.—For alterations to the steam kitchen and
new cooking apparatus at the workhouse, for the
guardians:—
Clements, Jeakes, and Co. ... £365 0 0
Summerscales, W., & Sons, Keighley ... 250 0 0
Flavell, S., and Co., Leamington ... 215 0 0
Newton, Chambers, & Co., Sheffield ... 20 0 0
Bradford, T., & Co., Salford ... 198 0 0
Manchester Laundry Engineering
Company, Manchester ... 193 12 6
Milan, E., Huddersfield ... 180 0 0
McDowall, Stephen, & Co., Glasgow ... 178 0 0
Barford & Perkins, Peterborough ... 156 0 0
Killick and Cochran, Liverpool ... 143 15 0
* Accepted. + Extra for wood lagging, £13.

BIRMINGHAM.—For the supply and construction of
electric-lighting plant at the new Meat Market, for the
corporation. Messrs. Lea and Thornbury, consulting
electrical engineers:—
Marion and Coulson, Glasgow
(accepted) ... about £8,000 0 0
(Lowest tender received.)

BOW, E.—For paving the carriage-way north and south
of Bow parish church with wood, for the Poplar District
Board of Works:—
Improved Wood Paving Co. (accepted), 6s. 9d. per sq. yd.

BRIGHTON.—For making alterations to the bars, &c.,
building additional rooms, and doing sundry repairs to the
Eight Bells p.h., West-street, for Mr. Ben Parker.
Mr. Robt. W. Pollard, 108, Church-street, Brighton,
architect. Quantities by the architect:—
Lockyer, G. R. ... £716 0 0
Freeman, V. P. ... 692 0 0
Dobell Bros. ... 687 0 0
Barnes, J. ... 663 0 0
Wright, J. J. (accepted) ... 657 0 0
For powerlifting at the above:—
Postlethwaite ... 59 0 0
Brown, W., and Son (accepted) ... 49 12 0
All of Brighton.

BOWES PARK, N.—For the making-up of Moffat and
Livingstone-roads, Bowes Park, for the Southgate Urban
District Council. Mr. C. G. Lawson, surveyor:—
Williamson, W. T., and Son, Green-
lanes ... £1,375 17 2
Nowell and Robson, Kensington ... 1,332 0 0
Adams, T., Wood Green ... 1,279 16 11
Nicholls, W., Wood Green ... 1,256 10 5
Bell, G., Tottenham Hale ... 1,210 19 8
Griffiths, W., Kingsland-road* ... 1,157 7 10
(Accepted.)

BRIGHTON.—For the construction of the new adminis-
trative building, one ward pavilion, the isolation block, the
discharge block, the porter's lodge, and the disinfecting
station at the borough sanatorium, Bevendean-road,
Bear-hill, for the corporation. Mr. Francis J. C. May,
M.I.C.E., Town Hall, Brighton, borough engineer:—
Sattin and Evershed, Brighton ... £21,523 0 0
Treasure and Son, London ... 21,000 0 0
Field and Son, Brighton ... 20,633 0 0
Longley and Co., Crawley ... 19,949 0 0
Peters, P., and Son, Horsham* ... 19,775 0 0
* Accepted.

CINQUEFORD.—For the erection of the third section of
St. Stephen's Church—viz., organ-chamber and vestry.
Mr. E. H. Lingen Barker, architect:—
Coleman, Chasehill ... £198 0 0
Natty, Cinderford ... 160 16 9
Parry, Cinderford (accepted) ... 121 0 0

COLCHESTER.—For erection of school buildings, St.
John's Green, for the school board. Messrs. Goodey and
Cressall, Victoria Chambers, Colchester, architects. Quanti-
ties by the architects:—
Orfeur, C. E. ... £10,600 0 0
Dobson, G. ... 10,389 0 0
Plummer, H. ... 10,250 0 0
Everett, H., and Son ... 9,930 0 0
Chambers, W. ... 9,435 0 0
Dupont, F. ... 9,275 0 0
Kerridge and Shaw ... 8,900 0 0
Grinwood and Sons, Sudbury* ... 8,257 0 0
* Accepted.

CONSETT, DURHAM.—For the construction of the Hise-
hope reservoir at Waskerley, for the Consett Waterworks
Company. Messrs. T. and C. Hawksley, Great George-
street, Westminster, engineers:—
Scott, J., Cotherstone-by-Darlington (accepted).

DARLINGTON.—For painting the outside of the covered
market, the town hall buildings, and the corn exchange,
for the Markets Committee. Mr. T. Smith, borough sur-
veyor:—
Moon, F., Darlington (accepted).
(Two other tenders received.)

DORKING.—For erection of billiard-room, &c., at Hazel-
bourne. Mr. Gerard D. Morrison, Reigate, architect:—
Colls and Son, Dorking ... £1,490 0 0
Carrick, J. J., Redhill ... 1,030 0 0
Debenham, D., Betchworth ... 965 0 0

DOWNPATRICK, IRELAND.—For the following works, for
the guardians: erection of an office for the workhouse
master; painting all outside doors and gates; and repair
of the coping of the yard walls:—
Maguire, J. (accepted) ... £56 0 0

EASTHAMPTON, BERKS.—For the erection of stables
and other buildings on their sewage farm at Longshot-
lane, Easthamptstead, for the rural district council:—
Seward, J. B., Wokingham ... £263 0 0
Stokes, W., Reading ... 243 0 0
Pack, R., Sunningdale ... 237 0 0
May, W. J., Bracknell ... 232 0 0
Green, B., Binfield, Bracknell ... 228 13 6
East, G., Binfield, Bracknell* ... 225 0 0
* Accepted.

ENNISKERRY.—For the construction of a labourer's
cottage at Trenchinch, Enniskerry. Mr. Shirley R. Going,
M.I.C.E. I., 17, Nassau-street, Dublin, architect:—
McHale, R., Dublin (accepted) ... £120 0 0

FOREST GATE, E.—For making-up Whiteville, Palmer-
ston, and Westbury roads, Forest Gate, for the West Ham
Town Council. Mr. Lewis Angell, borough surveyor and
engineer:—
Griffiths (accepted) ... £805 18 0
(Borough surveyor's estimate, £960.)

GAINSBOROUGH.—For completing private streets, for
the Urban District Council. Mr. H. Riley, surveyor:—
McLrose-road:—
Cliffe, Lincoln ... £608 0 0
Vickers, Nottingham ... 604 0 0
Roberts, B., Gainsborough* ... 600 0 0
Hotspur-road:—
Vickers ... 293 0 0
Cliffe ... 269 0 0
Roberts, B.* ... 250 0 0
Mowbray-street:—
Cliffe ... 190 0 0
Vickers ... 183 0 0
Roberts, B.* ... 150 0 0
Noel-street:—
Vickers ... 232 0 0
Cliffe ... 225 0 0
Roberts, B.* ... 150 0 0
* Accepted.

GATESHEAD.—For the erection of school board offices,
Gateshead. Mr. Edwin Bowman, County Chambers, 52,
Westgate-road, Newcastle-on-Tyne, architect. Quanti-
ties by Mr. Geo. Bell:—
Mitchison and Co., Newcastle ... £4,267 0 0
George, E. and T., Newcastle ... 4,200 0 0
Raven and Hitcham, Gateshead ... 4,011 0 0
Lunn, J., Newcastle ... 3,859 0 0
Bewley, J., Dunston ... 3,855 0 0
Tyrie, W. C., Gateshead ... 3,790 0 0
Kirk and Brown, Newcastle ... 3,782 0 0
Hunter, W., Washington ... 3,745 0 0
Davidson, S. E., Newcastle ... 3,740 0 0
Pringle, A., Gateshead ... 3,667 0 0
Elliot, J., North Shields ... 3,605 0 0
Haswell and Waugh, Gateshead ... 3,670 0 0
Woodhall and Wilson, Gateshead ... 3,591 0 0
Lamb, T. and R., Gateshead* ... 3,492 0 0
Turner Bros., Gateshead ... 3,466 0 0
* Accepted.

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SPECIALISATION OF ART.

OUR art and architecture are becoming essentially practical: we are no longer wedded to a lifeless academicism or to the blandishments of "style," but are beginning to look for a new point of departure, and if we cast our eyes round the new art classes and societies and studios, we shall find ample evidence of this. Organised thought and labour are initiating a new movement all the more genuine because it makes slow progress among the great industries which try to impede it, and that class of the public who prefer respectable Philistinism to honest thought and labour. We must not forget to acknowledge the share which those who are foremost in recognising the crafts and the workshop have had on this movement, and no one more so than the late William Morris, whose great aim was that our "workmen should become artists, and our artists workmen." And it is in this spirit that our architects and workmen are achieving the highest results. Let us refer first to the education of the student.

Our architecture, education, and other matters are all now dictated by the practical consideration of how to apply principles to our wants. Practical application is now the order of the day in every profession and educational movement. What are our technical schools but the offspring of a desire to apply our science to the requirements of everyday life and practice, to teach our mechanics and artificers how to use their brains, hands, and tools in accordance with scientific principles, and with precision and economy? Is it not so also with our art and science schools? They are established to bring out art and artistic theories to practical use; to teach our students how their instinctive feeling for art, their skill in drawing and colour and design can be applied to manufactures and industries. Our building and architectural classes, schools of design, and studios are equally directed to teach young architects and builders how to apply their studies in a manner which the old *régime* failed to do. And many of the exhibitions of handicraft, such as those of the "Arts and Crafts," the Artisan Art Scholarship, the art exhibitions of the Technical Education Board, those severally held by the Carpenters', Plasterers', Plumbers', Goldsmiths', and Turners' City Companies, have been the result of the same movement of applying art practically to the several trades. Even such exhibitions of design as those promoted by the Architectural Association attest the same desire. If we were asked what constitutes the difference between these institutions and those of an earlier period of this century, we should say it is their practical character;—the effort to apply and specialise the history and academic teaching of the past to the wants of a utilitarian age; to make our buildings, our furniture, carpets, and wall-papers conform to the standards of art, common sense, and utility, without being mere transcripts of ancient and Mediæval designs. We have not quite yet reached this standard. Still, the love of imitating the Antique and the Natural is strong among our manufacturers of furniture, carpet designers, and wall-paper artists; Classical figures and Renaissance forms abound on our sideboards and overmantels, cabinets, our grates and metal wares; elaborate and florid patterns, based on the naturalistic or on some previous style, are met with in carpets and decorations,

as if the force of the imitative habit had not yet been overcome. The pictorial element is also powerful. These prejudices are the inheritance of an age in which art was cultivated as an exotic—as something too beautiful or ethereal for English tastes, and taught in academies where only Classical traditions were accepted, and nature was copied without limitations. The teaching of our art-schools have not yet been able to eradicate from the minds of the devotees of art these traditional modes of regarding art. Why? Chiefly because they give prominence to methods of teaching which have been in vogue—copying and following rules.

Let us give one or two examples of our meaning. A student copies an old table or a chair; but the drawing, however useful as an exercise, does not give him any definite notion of what such a piece of furniture ought to have to make it really useful. It affords him no *rationale* of the shape or the form of back, or mode of construction. He is not one iota more conversant with the manner in which a chair should be framed or put together than he was before. Another pupil studying ceramic design is set to copy a vessel or a tile, without the slightest regard to their use, the best form for holding or pouring out liquids, or of handling. The architectural student is taught to draw Greek, Roman, or Gothic mouldings as ornament from casts, not knowing their connection, or what relation each had to the whole; he is set to make a scaled drawing of a roof truss or staircase, and he potters over the work without any given object, following other examples as far as he can. He is set to work, not to think it out for himself, but what he ought to think under certain prescribed forms—a prescription or formula is set before him. This is how we fear the architectural student, when he is given a certain subject, is apt to work out his thoughts, if he has any. He copies a little from here, and a little from there, or he varies upon some model. An idea is put in his mind. As long as ideas are put in the head of the student, there is not so much to complain of; but the set formula or prescription is mainly the reason why these art-schools and classes of design have not been successful in developing and calling out the student's own powers and instincts. A better course is for the pupil to be brought into contact with the workshop, to deal with materials like stone, brick, timber, and plaster, lead, iron, and to accustom himself to the technical modes these materials are handled, and then to encourage him to make a design for some simple subject in any of these. If his efforts to produce something of his own are aided by skilled architects and craftsmen, such as they are in the Classes of Design and Handicraft of the Association, where architect visitors direct the students, and give suggestions, so much the better; but the student ought to be under no unnecessary restrictions. He should be left free to use his own discretion and adopt his own style, and encouragement should be given to those men who, throwing aside all "regulation" ideas and forms, strive to think for themselves in a simple vernacular style which honestly expresses the material.

The subjects which are now given to students are not always the best calculated to make them think for themselves. Our schools of art set subjects and themes which are better intended to make "cribs" than artists. Cathedrals, imperial palaces, Parliament houses, and courts of justice are subjects which are bound to make a set of copyists. The student is quite out of his depth in trying to conceive such a subject, much less to grasp all the requirements. He naturally takes a model. Besides, the great subject or theme lends itself more to the ideal and academical—a class of work which has been encouraged in the art schools, the Institute prize competitions, and at the Royal

Academy. Very well in their way for advanced men, but we want art applied specifically to many purposes. It was very much the same when the gospel of artistic simplicity and craftsmanship was broached, set on foot by such champions of pre-Raphaelitism as William Morris. High-flown ideas of decoration and furniture, utterly repugnant to everyday life requirements, had pretty well killed art in the households of the great middle class. The themes and subjects were copied from antique models—the art galleries of Europe, and the manufacturers supplied those goods which found the best sale. How great is the reaction may be seen in any of our art exhibitions.

Let us take construction. The way the science has been taught is to cram the pupil with theorems of statics and dynamics, which he had to apply to his arches and roof trusses and domes as best he could. The mathematical principles were only considered necessary at this time; but now the student of our technical school or classes is taught specifically to apply these principles to the particular trade or branch of construction he is going in for. Any of the questions set in the examination papers of the classes of these schools will show the extent of this specialisation of the subject. If it is the thrust of a vault or the stability of a wall, the student is only asked to show how the "principle of moments" or the "resolution of forces" is applied to the work; the pupil is assumed to have mastered the subject in a previous course, though whether he has done so or not is questionable. Anyhow, so much of the mathematics as is involved in the particular problem is taught. This spirit of specialisation affects the building trades or crafts. Every architectural student is expected to be trained in the nature of materials and the methods of manipulating them. Workshops equipped with all appliances and tools are now open to him, at which he may study brickwork, masonry, carpentry, ironwork, leadwork, and be taught how to handle the tools and materials. But it is needless to show how comprehensive the movement has been. What we have said as regards design may be said to hold good of craftsmanship. As everyone knows quite well, "a class must run in grooves." It does not promote creative work. Technique and style can only be taught up to a certain point in the classroom; beyond this they can only be learned by individual effort, working in the materials, and expressing the student's own character in his own way. The design classes established on Government grants have not done what might have been expected of them, and the "class epidemic" of our technical schools may fail from like reasons. To sum up these remarks. To bring down the Classic and academical to the level of building, furniture design, and decoration, was the problem of a past school: it is now rather how to specialise and apply art to various objects and materials, and it is well if designers and teachers keep this distinction clearly in view. At one time we had all theory, now we study application to practical wants. The old example or precedent was taken bodily and copied; but now we take it to pieces, and select so much of it as suits our purpose. It would be better to see first whether any part of it can be used before we accept it. The rule in the class of design is not what the student thinks, but what he *ought* to think according to some prescribed form, which is almost as fatal to honest work as the old one of copying. This is the class-teaching error. It has very truly been said we cannot teach design as a thing in itself; it must have reference to something—a building, a table, a lamp, &c. It is of little use in trying to make a student an architect by telling him there are



PAIR OF WROUGHT-IRON GATES EXECUTED BY MR. THOMAS ELSLEY.

DESIGNED BY MR. REGINALD BLOMFIELD.

certain proportions and cautions that have to be observed in all cases, that good architecture depends on ratios, geometrical or harmonic, or to teach him those abstract qualities in which it is supposed to reside. Of what use is such teaching to a man who has to design a building for municipal offices, for baths and washhouses, for a technical school, or even a country house? None whatever. We must instruct him in the practical requirements of these buildings, and leave it to him to apply those proportions which he thinks desirable. And it is the same with the designer of furniture or metalwork. He must do the best with his material to make the design "hang together" constructively, and to apply to it just that amount of ornament, and no more, which it seems to require.

ARTS AND CRAFTS EXHIBITION.

THE fifth exhibition of this society, now open at the New Gallery, Regent-street, is come after a long interval; but its opening has been saddened by the death of its president, Mr. William Morris, who was emphatically one of the leaders of the movement of which this society is an offshoot. The exhibition is touchingly commemorative of Mr. Morris's labours in the cause of the arts and crafts. We have ample evidence of his mission to art in many of the fabrics and articles of furniture and metalwork throughout the three galleries, no less than in the loan collection of the works of Ford Madox Brown, which occupy the South Gallery. Both these pioneers of art were leaders in the Medieval-aesthetic movement which so powerfully influenced the art of the day, and the results of which may be seen in the works here brought together. In the West Gallery we come upon some cartoons for stained glass, by Walter Crane, such as "Death and Disease," which for invention and colour may be noted as we pass through, also on some of his wall-paper designs. A mirror in a walnut frame with panels of

coloured gesso, designed by Charles M. Gere, and executed by Hallet and Gere, is worth a glance for its quiet treatment and mouldings. A "Sideboard in Stained Oak," designed by George Jack, and exhibited by Morris and Co., shows the characteristic simplicity and unaffected plainness which the new school of workers aim at. The framing is flush throughout. The "wrought brass candlesticks," "hot-water jug," and "coffee pot," designed and exhibited by R. Ll. B. Rathbone, are equally simple in outline, and expressive of their uses; so, too, are A. S. Dixon's "Hammered Copper Pot Pourri Jar" and other wrought-copper vessels exhibited by the Birmingham Guild of Handicraft, must be mentioned.

To the popular eye many of these designs will appear ludicrously quaint and simple, and entirely contradict the preconceived ideas of people habituated to the furniture and decoration of the ordinary shop or Currier-road styles. To such people, the chimney-piece, grate, and fender designed by George Jack, and executed by Longden and Co. (70); the "Oak Side-Table," by A. S. Dixon (111); the "Chimney-Piece in Marble and Onyx," designed by W. R. Lethaby, and executed by Farmer and Brindley (149); the large "Mantel-Piece in American Walnut," designed by C. Harrison Townsend, in the North Gallery, and other pieces of furniture, will be thought strangely crude, and out of accord with modern ideas. It is, perhaps, true that in some of these, as the last named, and Mr. Lethaby's "Chimney-Piece in Marble and Onyx," the designer has rather too rudely shocked our preconceived tastes; but at the same time we are bound to admit the utility and sincerity of the design, and to contrast it with the fidgety shape and ornament of the ordinary furniture manufacturer's and dealer's goods. Thus, in Mr. Lethaby's "Chimney-Piece," the jambs and frieze of which are of marble and onyx in panels, the plain, polished surfaces can be kept scrupulously clean, and the natural veining and colour of the green marble and onyx panels

in the mantel are pleasing and restful to the eye. The mantel is recessed 2in. or 3in, to make a ledge or shelf. Nothing like a deep shelf is seen—so often a cause of mishap to the head; there are no crevices or receptacles for soot or dirt. The large American walnut mantelpiece by C. Harrison Townsend, with carving by G. Frampton, A.R.A., and woodwork by W. S. Walker, which we intend to illustrate, despite a want of character in the corner pillars and their capitals, the corner seats and the exceedingly heavy top, is more useful and comfortable than the modern flimsy arrangement. Although it looks archaic and old-fashioned, it has the merit of quietness and comfort. Or, again, if we take the "Table with Cipollino Marble Top," designed by W. R. Lethaby, exhibited by Farmer and Brindley at the end of West Gallery (181). We may find fault with the design of the supports, however strong and rigid, by the introduction of the double cross brace; but the details of the top, which is a plain slab of Cipollino marble on a slab of oak, and the corners, which are slightly curved off in one direction, are well treated. We may also compare the designs of music cabinets on the West Gallery, designed and exhibited by G. Ll. Morris, executed by E. S. Ratcliffe and J. Verney (129), with the one in the North Gallery designed by C. R. Ashbee, and exhibited by "Guild and School of Handicraft." In the first the cabinet forms an upright oak cupboard with hollowed corners carried down as feet, which are admirably treated, the mouldings dying away on the angle feet and the doors in front panelled with bolection mouldings. In the latter there are no panel mouldings, the framing is quite flush, and the doors mitre-clamped; the only relief is the simple cavetto cornice and surbase dividing the cabinet into two portions. For a music cabinet we take exception to this bare treatment. There is an affectation of plainness hardly consistent. We may notice also a "Folding Tea Table," by Sidney H. Barnsley (41), in oak, exceedingly neat and simply treated; a "Chimney-piece, Grate, and Fender," de-

signed by Geo. Jack, exhibited by Longden and Co., in tilework, oak, and, plaster (70); "An Oak Bureau," by R. S. Lorimer (91), with inlaid frieze; a simply-designed oak "Stole Table," by A. S. Dixon. In the North Gallery Edgar Wood designs a "Bedstead," head and foot of oak, inlaid, in which circular panels of metal, by B. Schwabe, are introduced along the head-piece, a design in which the repose of flat surfaces, relieved only by inlay border, is effectively obtained. C. F. A. Voysey's "Mantel and Fireplace" (223) is simple almost to a fault: tiles in light grey surround the grate, the whole painted ivory-white. The side pillars supporting the upper shelf or mantel give an air of piquancy to the design. In the woodwork exhibits, few objects surpass the "Chancel Stalls" designed and exhibited by H. Wilson, executed by Chas. Lask and Co. The outline of the stall-ends is good; there is an avoidance of any crocketing work or finials we used to see in the older class of work; the carving is confined to the bench-ends and book-rests, rails, and muntins, and is in low relief and flatly treated. "A Folding Screen," by Reginald Blomfield (260), an "Oak Sideboard," by Edward P. Warren (271), a "Bookcase Cabinet" in brown oak, by George Jack (308), a broadly conceived "Oak Chest" with landscape panel inlaid, by R. P. Lorimer, may be mentioned as departures from ordinary furniture. Lewis F. Day's "Panels in Walnut" (340) and a few other pieces are worth notice in this part of the exhibition. One of the most remarkable designs in the North Gallery is a "Lectern with Books" (355), designed and exhibited by W. Bainbridge Reynolds. The design is of Italian character, the wide-spreading metal branches for candles on each side of the desk and the stand are bold in outline, and are executed in steel and copper in a spirited style. Frederick W. Pomeroy has another cleverly treated lectern in the central hall in bronze, with kneeling figures, and a figure of the Virgin and Child in a niche in the pedestal. There are also branches for lights. Amongst the notable works in the Central Hall we notice a very handsome pair of wrought-iron gates, designed by Reginald Blomfield, and executed by Thomas Elsley, the design of which we illustrate. Only the central portion of the gates is exhibited. In both the design and execution the wrought-iron character is well maintained. A "Hall Settle" (509), by Chas. E. Mackintosh, and some nice designs for metalwork, by W. A. S. Benson, and a "Lamp-post," by C. F. A. Voysey (529) are also seen.

In decorative work, one of the most important exhibits is the large sketch cartoon design for the apse of Lady-chapel for St. Agatha's, by J. Henry Ball, the decoration by Heywood Sumner. The Virgin and Child are made the centre subject on the semi-dome, and over the arch the Nativity is represented. The decoration will be in sgraffito. The decorative mosaic panels, by W. B. Richmond, R.A., executed by Powell and Sons, are of interest. L. F. Day has a display of tiles, some embossed in green glaze (478), and H. S. Rathbone "Panels of Glazed Pottery," the figure subjects after Ford Madox Brown. "The Douglas Castle Chapel Decoration," by Christopher Whall in the West Gallery (68), represents cartoons for mural decoration and ceiling. The "Te Deum" is the subject for the former. There are cartoons for stained glass by Walter Crane, Christopher Whall (133, 142), and Henry Holiday (136). Sir E. Burne-Jones' decorative subjects or drawings (95), the figures of "Ministering Angels" and "Praising Angels" in Arras tapestry (252, 254), exhibited by Morris and Co. in the North Gallery, and his beautiful figure of "Love" in the West Gallery in needlework, executed by Mrs. Frances Horner; the "Illustrations of Chaucer," pencil drawings (100-104) by the same painter, are

charming works of decorative design and colour. As a piece of decorative furniture we must not forget A. Dolmetsch's "Harpsichord," the ornament by Helen Coombe. The case of metalwork (179), comprising altar cross for St. Martin's Church, Marple, designed by H. Wilson, and the silver and bronze chalices, wafer-box, is full of delightful work, feelingly executed. Embroidery, of course, is largely represented. The beautiful work designed by Morris and Co., Mrs. Sparling, Lewis F. Day, Selwyn Image, and others in both galleries, it is impossible to do justice to in this notice. The South Gallery is filled with a delightful loan collection of cartoons and pictures by Ford Madox Brown, including a series of drawings of great men, sent by the council of Owens College, Manchester—emblematic designs in red and black chalk;—some of them for the mural paintings in the Manchester Town Hall, and many oil paintings, in all of which the wide sympathies and Chaucerian bent of his mind are seen. Particularly interesting are the examples in cases of printed books and bindings, which represent the beautiful works of printing done in Mr. Morris's famous Kelmscott Press, also the books exhibited by the Ballantyne Press, the Chiswick Press, &c., including the magnificent type borders and ornaments designed by Sir E. Burne Jones and Walter Crane, by Morris, in the works of Chaucer, "Le Morte d'Arthur," "The Earthly Paradise," Spenser's "Faerie Queen," &c., the finely-designed book covers by various designers of repute. It is a pity these and the other works of furniture and decoration are so far beyond the means of the ordinary purchaser. When will these typographical and other beautiful productions be obtainable at a moderate price, and be accessible to the middle classes? This drawback is one of the greatest hindrances to the dissemination of works of this kind.

There is, indeed, an irony in this result. Morris and his coadjutors struggled hard to bring down true art within the reach of the people, and although these works attest the success which has followed their labour in all that relates to common-sense design, they still remain beyond the reach of the classes for whom they are specially intended. We can understand, indeed, the reason why works of this sort, so much above the average taste and demand, should be expensive; but a good deal might be done by the co-operation of the manufacturer and the artist to remove this obstacle.

ADAPTABLE SPECIFICATIONS.—XII.*

SPECIFICATION, PART VIII.: PLASTERER'S WORK.

VIII. 1. **GENERAL DIRECTIONS.**—All done with great care, and with the best materials. No road scrapings [or burnt ballast] will be allowed in it, and should these be employed in spite of this direction, the work which contains them will have to be removed and made good with the materials herein specified. This removing and making good is to be done by the contractor, or at his expense.

The sand, except for cement work and any other work intended to be left white, is to be sharp, clean, pit sand, approved by the architect. Cement and other white work, where requiring sand, is to have clean crystalline river or other sand, not too coarse, and quite free from loam, dirt, salt, and other impurities. The lime is to be [best chalk lime], free from "core," and from particles of coal, coke, and cinder. When used in the plastering work, it must especially be free from unslaked particles. The lime used for "coarse stuff" should be slaked at least two months before it is required for use by sprinkling water on it, and should henceforth be kept under cover. The lime for "fine stuff" may be "run" as usual, but long enough before it is used to insure the perfect slaking of every particle of it.

VIII. 2. "COARSE STUFF."—The coarse stuff, for the first coat of plastering, must consist of one

part of lime, treated as above described, mixed dry with 1½ parts of sand, and afterwards sifted, and made up with water to the proper consistency. It must contain, uniformly incorporated with it, 1lb. of sound, long oxhair, or goat's hair, free from grease, to every 3c.ft. of the mortar. The coarse stuff is not to be put on in needlessly thick layers; but any considerable irregularities on the underside of the joists or rafters must be trimmed off or fired up, as the case may require, before the lathing is begun. Timbers more than 3in. wide on the soffit, when they occur in ceilings and have to be plastered over, must be filleted or counter-lathed on the underside, so as to provide a proper key for the plastering. Each coat before the setting one is to be properly scored, or roughened, to receive the next; and each coat is to be dry before the subsequent one is added.

VIII. 3. **FLOATING AND SETTING COATS.**—The floating must be accurately done, to form the true surfaces required, and the floating coat, as well as that beneath it, must be perfectly dry before the setting coat is applied. The setting coat, where not otherwise specified, is to be of "fine stuff." In all three-coat ceilings it is to contain a small quantity of white oxhair. Where the plastering is specified to be finished as "trowelled stucco," the finishing coat is to be composed of two parts of fine stuff to one part of very fine clean sand of a colour approved by the architect, alternately floated and sprinkled with water until it is brought to a hard, smooth surface.

VIII. 4. **COARSE STUFF (alternative).**—Soft red brickbats, ground dry to fine powder, and approved by the architect, may be used in the coarse stuff if uniformly mixed with sand in the proportion of 2 parts of this powder to 3 of sand and 4 of lime.

VIII. 5. **BRACKETING AND DUBBING OUT.**—The plasterer is to do, or provide for the doing of, all necessary bracketing, cradling, coring, and dubbing-out, whether in woodwork or tiles in cement, which may be required to any part of the plasterer's work, and this is to be executed in a permanent and substantial way, to the approval of the architect.

VIII. 6. **LATHING.**—This is to be done with sound Baltic fir laths, free from knots and defects. On walls and ceilings they are to be of the thickness known as "lath and half," and on ceilings and elsewhere they are to be what are known as "double lath." In ceilings of all kinds the laths are to be "matched"—that is, they are to break joint about every 4ft., one portion running across the joist or rafter, at which the adjacent portion ended. Each lath is to have one nail at each end, and one at each intermediate joist, rafter, or filler. Unless it is absolutely unavoidable, the ends of one set of laths are not to be nailed over the ends of another set. A space of about ¾in., to form a key for plaster, must everywhere be left between the laths, and the first coat of plaster must be well forced through this space.

VIII. 7. **CORNICES AND MOULDINGS.**—The cornices are to be very cleanly and accurately run, the internal ones being finished, where not otherwise specified, in stuff gauged with plaster of Paris; and the external ones, where not otherwise specified, in Portland cement, with an equal quantity of fine white crystalline sand. Form proper grounds, either of Portland cement, where suitable, and elsewhere of the coarser qualities of Keene's, Parian, and Martin's cement, for all work to be executed in those cements, or in plaster of Paris. All plaster and cement must be finished clean, so as not to require whitening or colouring.

VIII. 8. **PORTLAND CEMENT.**—The Portland cement for plastering need not be of the weight or slow-setting character required in the bricklayer's work; but it is to be of the best quality, and of light colour approved by the architect. Before being used, it is to be spread out and exposed to the air in a dry place for at least 48 hours. It is to be used mixed dry with the sand or gravel which is to be used with it, then wetted with a proper (and not an excessive) quantity of water, and used immediately. It must on no account be mixed up again and used after having begun to set. Where it is to be applied in more than one coat, a previous coat must not be allowed to dry before the next one is put on. The walling or other material which is to be cemented over must be uniformly wetted before the first layer of cement is applied, and the cement work must be screened from sunshine till it is dry if the sun is powerful.

VIII. 9. **KEENE'S, PARIAN, AND MARTIN'S CEMENTS.**—These and all other patent or manu-

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factured cements are to be used in conformity with the instructions issued by the makers, which the contractor can obtain on application to them.

VIII. 10. EXTERNAL PLASTERING.—The following portions of the work, namely [the cheeks of dormers, the plastering between external timbers and projecting brick patterns....] are to be executed with mortar of [Dorking stone lime] [Barrow hydraulic lime] [Greaves's blue lias lime] mixed with an equal quantity of clean sharp sand and a sufficient proportion of long, sound goat's hair, and gauged with Portland cement. The work is to be [trowelled smooth on the face] [finished like rough bastard stucco, by means of a hand-float faced with felt] [finished as rough-cast by dashing on it before it has set a mixture of well-washed fine gravel or finely-broken shells, and equal parts of Portland cement and of the lime above specified.] Stout oak laths are to be used for the external plasterings.

VIII. 11. EXTERNAL CEMENT-WORK.—Cover the following walls [and partitions]—viz.,..... with a good coat of Portland cement, uniformly mixed with clean, fine gravel in the proportion of one part of cement to two of gravel, and a finishing coat [of equal parts of cement and gravel] [of equal parts of cement and clean sharp sand], the first coat to be well wetted before the second is put on. The last coat is not to be wetted after it is applied.

VIII. 12. TWO-COAT WORK.—The following walls are to be rendered and set—viz.,..... The following partitions are to be lathed, laid, and set—viz.,..... The following ceilings are to be lathed, laid, and set white—viz.,.....

VIII. 13. THREE-COAT WORK.—The following walls, and all others not otherwise described, are to be rendered, floated, and set—namely,.... The following partitions, and all others not otherwise described, are to be lathed, laid, floated and set—namely,..... The following ceilings, and all others not otherwise described nor shown to be boarded, are to be lathed, laid, floated and set [white] [grey].

VIII. 14. TROWELLED STUCCO.—The following walls and partitions are to be finished as three-coated trowelled stucco—namely,..... The sand to be approved by the architect before this stucco is begun.

VIII. 15. ROUGH BASTARD STUCCO.—The following walls and partitions are to be finished as three-coat rough bastard stucco—namely,.....

VIII. 16. COLOURED PLASTER.—The following walls and partitions in three-coat trowelled stucco—namely,..... are to be finished [cream colour, by mixing yellow ochre with the sand of the setting coat], [grey, by mixing blue-black with the sand of the setting coat], [red, by mixing (red ochre) (Venetian) red with the sand of the setting coat], so that the colour when the plastering is thoroughly dry may match the pattern exhibited for the purpose in the architect's office. The colouring material must be uniformly mixed with the whole bulk of fine stuff, before the sand is added.

VIII. 17. PORTLAND CEMENT SKIRTINGS.—Put to the following places, namely,..... a square skirting of Portland cement, 6in. deep, and projecting ½in. from the general surface of the plaster, and put to..... a skirting of Portland cement, 9in. deep, and projecting ¾in. from the general surface of the plaster; the top of the skirting having run on it a moulding to detail, 2in. in girth.

VIII. 18. SKIRTINGS IN KEENE'S AND OTHER CEMENTS.—Put to the following places, namely,..... a bracket [7in.] deep, projecting [¾in.] from the general wall of plaster, and having a moulding to detail [2½in.] in girth, of [Keene's cement, of the best quality, on a proper ground of Portland] [of Martin's cement on a ground of the coarse quality of Martin's]. The skirting adjoining the bottom of a staircase is, except where otherwise shown or described, to be continued up on the staircase-wall as a string, in such a way that the width of this string, measured at right angles to its rake, shall at the narrowest point be at least [4in.]

VIII. 19. DADO IN KEENE'S CEMENT.—Form a dado in the best quality of Keene's cement trowelled, on a ground of Portland to the following places, namely,..... This dado is to project [¾in.] from the wall face above it; it is to be [3ft. 6in.] high from the floor to the bottom of the moulding to be further described [and it is to be coloured grey to the architect's approval with uniformly mixing with it blue-black or other common colours]. Run above this dado, and in the same material [but tinted dif-

ferently in common colours as will be directed], a moulded capping projecting [1½in.] from the general wall surface, and [9in.] in girth; the capping to extend the whole length of the dado.

VIII. 20. RETURNING HORIZONTAL MOULDINGS DOWN.—Except in the [scullery and attics], the horizontal or raking mouldings on the tops of dados and skirtings are to be returned vertically down to the floor wherever the dado or skirting is stopped by the doorway or its architrave.

VIII. 21. ANGLE STAFFS, SPLAYS, &c., IN KEENE'S.—Put to the following places—namely,..... proper square angle staffs, 1½in. wide, on each side of the angle, in the [best] [second] quality of Keene's cement. Put to the following places—namely,..... chamfers [2in.] wide in the [best] [second] quality of Keene's cement, in all cases on a ground of Portland.

VIII. 22. WINDOW JAMBS AND HEADS IN KEENE'S, &c.—The following windows—namely,..... are to have [splayed] jambs with [moulding, 2½in. in girth] [chamfer, 1½in. wide] on each angle in [the best quality of Keene's cement on a ground of Portland] [the best quality of Martin's cement on a ground of the coarse quality], the mouldings or chamfers being properly mitred.

VIII. 23. CHAMFERS IN ORDINARY WALL-PLASTER.—All plastered reveals and heads of window and other openings which are not described to have mouldings or other finishings in any description of cement, are to have each arris taken off, so as to form a chamfer 1½in. wide.

VIII. 24. SPLAYS AND CHAMFERS NOT TO BE "STOPPED."—Splays and chamfers in plaster, or in any kind of cement, when they occur on the arrises of chimney-breasts, or on other projections which run from floor to ceiling, are not to be stopped off into the square either at top or bottom, unless so shown on the details, or specially directed by the architect. On the contrary, the skirtings and dados are to mitre round these splays at bottom, and the cornices are to mitre round them at top.

VIII. 25. PLASTER CORNICES.—Put round..... plaster cornices to detail [9in.] in girth, put round, &c. plaster cornices [15in.] in girth, and round..... plaster cornices [24in.] in girth, all to detail.

VIII. 26. PROVIDE for modelling, making patterns, and supplying enrichments the prime cost sum of £...., and fix [one] enrichment in the cornices [15in.] in girth, and [two] in those which are [24in.] in girth. The enrichments are to be modelled, cast, and supplied by anyone whom the architect may appoint.

VIII. 27. SOFFITS OF WOODEN STAIRCASES, where not otherwise shown or described, are to be lathed, laid, floated, and set [grey] [white].

VIII. 28. CURVED CEILINGS.—Form these ceilings accurately according to the detail drawings, including [rough fir groin ribs, each of No. 6 thicknesses of inch deal, the thicknesses breaking joint and screwed together, and cut to curve on the under side and] all cradlings, bracketings, blockings, and other preparations needed. These ceilings are to have "double" laths, and the first coat is to be of coarse stuff, as before specified, but gauged with Portland cement. These ceilings are to be floated and set [white] [grey] [cream-colour], but are not to be distempered or whitened.

VIII. 29. DISTEMPERING.—Twice distemper the following walls and partitions—namely,..... with common colours, as will be directed by the architect.

VIII. 30. WHITENING CEILINGS.—Twice whiten the following ceilings—namely,.....

VIII. 31. TWICE LIMEWHITE the following walls [and ceilings]—namely,.....

VIII. 32. PUGGING TO FLOORS.—The following floors—namely,..... are to have between the joists pugging 3in. thick of coarse stuff mixed with chopped hay, and laid on ¾in. rough boarding nailed between the joists and 1½in. above their underside.

VIII. 33. "DURESCO."—Distemper the following walls [and partitions] with the washable silicate distemper sold by the Silicate Paint Co. under the name of "Duresco," the tints to be as directed by the architect.

VIII. 34. REPAIRS TO OLD PLASTER.—The plastering of the following walls, partitions, and ceilings—namely,..... is to be repaired as follows. Remove old wallpaper and distemper, and well wash, stop, and scrape the walls. Wash, stop, clearcole, and twice [whiten] [distemper with common colours as directed] the ceilings.

VIII. 35. HACK the face of old brick walls which are now to be plastered for the first time, so that the plaster may properly adhere to them.

VIII. 36. COLOURING OLD PORTLAND CEMENT.—Well clean the dirt and vegetation from the existing cement faces, cornices, reveals, soffits, and other details of..... and twice colour the whole with Portland cement wash.

VIII. 37. KEENE'S CEMENT, POLISHED.—The following details, namely,..... are to be in the finest quality of Keene's marble cement, laid on a ground of Portland, and highly polished of a [pure white] [warm cream colour] tint, matching a sample to be agreed on between the architect and the contractor.

VIII. 38. PARIAN CEMENT.—The following surfaces, namely,..... are to be in the fine quality of Parian cement, on a ground of the coarse quality, and trowelled so as to be fit for painting on.

NOTES.—The specially detailed character of this specification seems to be called for by the increasing carelessness with which ordinary plastering has come to be executed. A return to better modes of work is very desirable, even if it adds a little to the cost of what is not generally a very expensive "trade."

WROUGHT IRON AND STEEL IN CONSTRUCTIONAL WORK.—III.

By JOSEPH HORNBER.

IN the last article we traced very rapidly the methods of treatment of ore for the direct extraction of iron therefrom, and also those for the indirect production of malleable iron from the crude pig of the blast-furnaces. We observed that while cast iron contains from about 94 to 95 parts of metallic iron in 100, the remainder consisting of carbon, silicon, sulphur, phosphorus, and manganese, with occasional slight traces of titanium; wrought iron contains over 99 parts of pure iron in the 100, the purification being effected by oxidation of the objectionable elements.

When white or grey pig is purified in the reverberatory furnace, the complete expulsion of those elements is immediately perceptible in the loss of fluidity of the iron, and in the assumption of a pasty condition—a condition termed by the puddlers, "coming to nature." The iron henceforth is incapable of ever being melted at ordinary temperatures, and if melted at high temperatures, it loses some of its distinctive characteristics. At this particular stage of the production, which corresponds with definite chemical composition, the temperature of the furnace is reduced, and the puddler works up the pasty iron into balls of about 70lb. weight. These are transferred to the steam-hammer, where the cinder is squeezed out, and the mass consolidated by a number of very rapid blows, increasing in force as the mass grows cooler. The mass of iron is then termed a slab, or bloom, or shingled bloom, the operation of hammering being termed shingling. The term is derived from the Anglo-Saxon *bloma*, meaning "metal, mass, lump," and the term is still retained in the iron and steel works to-day. From it the term "bloomery," applied to the ancient smelting furnaces, was derived. Formerly the shingling was performed under helve-and-tilt hammers, and squeezers; but those have now been superseded by the quicker and more powerful steam-hammers.

The lump or bloom of malleable iron obtained directly in the primitive furnaces is ready to be hammered into bars or other forms, and used at once. Not so that of the puddling furnaces. The shingled bloom contains a quantity of spongy metal and metallic oxide, cohering only loosely together, hence termed a "sponge." To remove impurities, and consolidate the iron, the blooms are passed on to the forge train, which consists of a series of grooves set in two pairs of rolls, the first having grooves triangular in form, the second grooves of rectangular shape. The bloom is drawn through the grooves of these rolls in succession, commencing at the largest, and gradually passing down to the smallest, so that at the end of the series the result is a long bar of rectangular section. The bars pass through in one direction, and come back again in the other, to effect which powerful reversing engines are employed. Sometimes, however, the engines run continuously in one direction, and then three rolls, one above another, are employed. When the bars leave the rolls they are classed as No. 1 puddled bars, having parted with a quantity of oxide, which, as

hammer slag or mill scale, is utilised in the puddling furnaces.

Still, these are not sufficiently homogeneous for good work, and to supply iron of superior quality, these No. 1 puddled bars are cut up into lengths, and piled or "fagoted" in bundles, one bar being left longer than the rest to serve as a porter handle. They are then put into a reheating furnace, made on the reverberatory principle, and strewn with sand, to flux off any oxide which has formed upon the surfaces. The pile or fagot is then passed between finishing-rolls, in which it is made to assume any form required by engineers, as bars, rods, angles, tees, and other sections. Some of the best irons are thus passed through the reheating furnace two or three times.

The following is the result of these various processes:—The iron as it left the smelting furnaces was crystalline and very brittle, so that it could be easily broken with a sledge-hammer, and was readily melted, so that it could be run in a liquid condition into a mould. But the iron, after it has left the forge train, puddled, and rolled, is no longer crystalline, but fibrous, possessing a well developed grain, so that it is considerably stronger in the direction of the fibre than in the other way, in the proportion of about 22 to 18. Neither is it easily melted, requiring a much higher temperature to render it fluid; but it readily assumes the pasty or spongy condition, so favourable to welding, a property which is of invaluable service.

The question naturally occurs, What constitutes the great differences in the qualities of malleable iron? for these differences are not always wholly due to chemical composition, and are but slightly due to the qualities of the original ore or pig used. Of course malleable iron must contain more than 99 parts of iron in the hundred, and must be practically free from phosphorus, and silicon, and sulphur. But an iron may be nearly chemically pure, and yet sections rolled from it be unsound. It may be, as Dr. Siemens once called it, "a sandwich of iron and dirt." To a large extent, the purity of a bar or plate of wrought iron depends upon the amount of work done upon it. Since to expel the scale, cinder dirt, and slag, which cling to the iron in the puddling furnace, it becomes necessary to ball it up in small portions, to squeeze or hammer them in order to expel a portion of the impurities, to break it up into smaller fragments, to reheat, pile, weld, hammer, and roll again, it follows that in proportion to the degree of purity required must be the quantity of work of this kind done. And the high price of the best wrought iron is mainly due to the increased cost incurred for fuel and for reheating, and the increased accompanying cost for labour. Thus, a bar or plate of wrought iron can be bought for £5 or £6 per ton, or £20 per ton can be given. To a large extent, of course, the difference in quality is due to the extraordinary care exercised in the preparatory refining of the iron itself in the furnace. Hence, for the best irons, the older methods are still preferred to the new, so that in Sweden, from which the iron for the best crucible steel is obtained, the pig is refined in the Lancashire fire, as it is in Yorkshire, and the puddling furnace is not used. In Russia the finery process is adopted. The Yorkshire iron has so long maintained an exceptionally high reputation, that the following account of the care taken in its manufacture may be of interest. It was given by Mr. Windsor Richards, the head of the Lowmoor works, at one of the meetings of the Iron and Steel Institute: "The foreman every day chooses from each man's work any heat he desires to test, and has one or more pieces broken through. The fractures of these lumps are carefully examined, and numbered according to the degree of perfection attained. These numbers are added up at the week-end; the workmen having such numbers as represent the worst samples in evenness of quality have to stand out or, in other words, are not allowed to work on the following week, whilst the men who have numbers which represent the best samples of work during the week are rewarded by money prizes. This system necessitates the keeping of surplus men, who are waiting to be taken on when others are turned out. The decision of the foreman in judging the samples is never disputed; the samples are exhibited, therefore the men have every opportunity of examining for themselves the work they produce. The figures showing each man's work are posted up daily, so that the men are satisfied that no partiality is shown, no errors of judgment made. This system has been strictly carried out day by

day and every day over many years, and creates a very desirable competition, keeping the men's attention concentrated on their work.

"The workmen, having inherited their fathers' positions, have done no other work all their lives, but manipulate the same class of materials to produce the same results; only one quality of iron being made, the same methods of working have been pursued over very many years. Each workman is especially skilful at his respective task. The result of all this care, and skill, and good materials is a soft, ductile, and reliable iron."

We are able now to form a sound estimate of the distinguishing characteristics and adaptations of wrought iron. Unlike other common metals, it cannot be melted and cast. At the moment that it comes to nature, or becomes wrought iron in the puddling furnace by the oxidation of the foreign elements present in the pig, it stiffens into a paste or sponge, and as a paste only can it ever be manipulated afterwards. Hence the metal must be worked by methods wholly different from those which are employed in the case of cast metals. Further, it can only be produced in blooms of moderate dimensions and weight. The more pure it is required, the smaller must be the quantity puddled in a single mass. If massive solid pieces are wanted there is only one way to get them—namely, by means of welding. Where welding is not practicable, fastenings, such as rivets, bolts, and pins, offer the only alternative. Further, since the rolling develops a very pronounced fibre, the designer-craftsman is careful to arrange these layers so that they shall lie in certain directions. If this is not done, the punching of holes and the shearing of edges will open out the fibres. Or the bending of plates will produce cracks, neither of which evils will be likely to occur if the metal is arranged according to the direction of greatest ductility—that, namely, of the longitudinal course of the fibres. In all test pieces pulled slowly asunder or bent double, the fibrous character of the material is most unmistakably apparent. This direction of fibre is one of the essential conditions noted in specifications and in tests. The fibrous and laminated condition of wrought iron is especially apparent in the case of worn rails and of much-rusted bars. In these the laminae are often partially separated, so that the appearance is that of stratification. In a lesser degree the same appearance is often found in bars of very inferior quality when being worked at the forge, especially during upsetting, layers becoming partially separated and the black lines of scale becoming clearly visible. Yet if this same fibrous material is nicked and broken suddenly the fractured surface will reveal as much crystallisation as cast metal and there will be no indication of fibre at all.

Further, since large masses are obtainable only at prohibitive prices, and welding is not always practicable or reliable, a large number of joints and fastenings are necessary to the building up of large structures. These add to labour and increase the number of vulnerable sections. The possible presence of lamination and the comparative lightness of the masses which can be rolled in wrought iron are the most effective and distinctive barriers to its employment for the most massive work, and in these respects it yields place to mild steel, which we will consider next.

Mild steel is the most recent of the materials used for structural purposes on a large scale, having been in use about forty years only. Yet there is no question that temper steel and steely iron were made in a rude fashion and in small quantities at least 2,000 or 3,000 years ago, by methods almost or quite identical with some which are pursued to-day in Africa, India, and Catalonia, and which were alluded to in the last article. Temper steel was probably used by the fighting Greeks as well as bronze weapons, and abundant evidences of the use of temper or high-carbon steel antedate the Christian era. But though temper steel, and steely iron, and wrought or malleable iron have probably been so long in common use, the mild steel, destitute of the qualities which render tempering practicable, yet possessing strength and ductility exceeding that of the best wrought iron, are the inventions of Bessemer and of Siemens. And the growth of this industry has been almost infinitely more rapid during the last 30 years than was the use of temper steel during the previous 2,000 years, and it is still impossible to forecast the future. The production also of malleable iron diminishes as that of steel increases. This, however, is largely

due to the substitution of steel rails for those of iron, the latter formerly absorbing a large proportion of the iron made. But in constructional work the same influence is operating. Hence practical interest in the puddling processes is not so keen as it once was—it centres more in steel-making. Most of the ironworks have had to take up steel-making to save themselves from bankruptcy, and the production of the two products is thus carried on in the same works. Rotary furnaces of the Danks type, and regenerative gas puddling furnaces arouse little interest, and are probably scarcely used now, since the demand for steel so greatly eclipses that for iron.

SUSPENSION BRIDGES—A STUDY.*

By GEO. S. MORISON, Past-President Am.Soc.C.E.

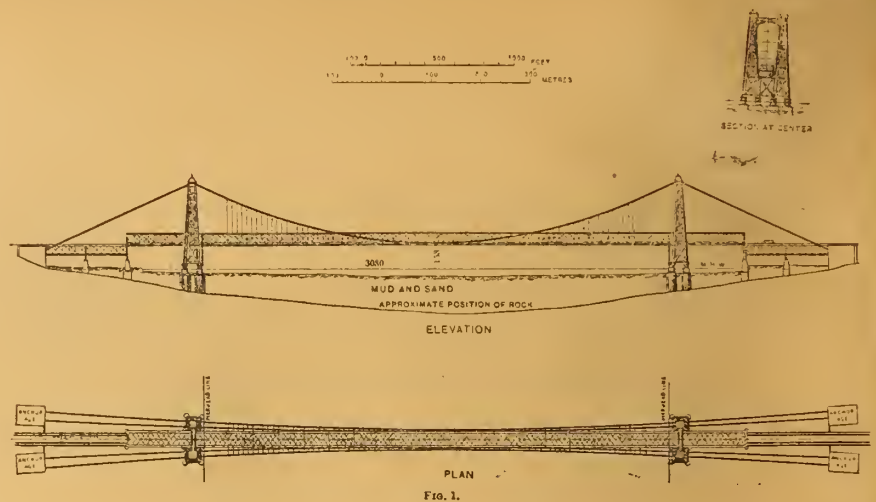
FIFTY years ago the suspension bridge was regarded as the one class of structure adapted to spans of unusual length. Highway suspension bridges were built in almost all parts of the world. Several railroad suspension bridges were proposed, and the one actually built across the Niagara River has done service for nearly forty years. Fifty years ago metallic bridge construction was in its infancy, and anything beyond the limit which could well be built of wood was considered an exceptional span. Although there were a few striking exceptions, 200ft. was practically the limit of wooden truss bridge spans. The introduction of iron bridges changed these conditions, and a 400ft. iron span was as readily built as a 200ft. Howe truss. The first 400ft. span in America was constructed by Albert Fink, past-president Am.Soc.C.E., in the bridge across the Ohio River at Louisville, Ky., where it is still in use. The cheapening of the price of iron, the increased capacity of rolling-mills, and the new methods of making steel have rendered it an easier task to build a truss of 600ft. span now than it was to build a 400ft. span then. The result of this development has been that trusses have superseded suspension bridges, and where a suspension bridge would have been built forty years ago a steel truss is built now. Furthermore, the old suspension bridges were highway bridges, and highway traffic does not enter upon a bridge as a concentrated load, while it is generally light in proportion to the dead weight of the bridge. Important modern bridges are generally railroad bridges, and the suspension bridge has not been considered stiff enough to serve this purpose, this want of stiffness being largely due to the fact that on a single-track railroad bridge the whole moving load comes on as a concentrated load, and that on railroad bridges of moderate span the moving load is large in proportion to the dead load. No important suspension bridge has been built since the East River Bridge, the design of which was shaped by the elder Roebling before his death in 1869. During this time great advances have been made in all other forms of bridge construction. While it is admitted that there is no field for suspension bridges of the dimensions of which they were formerly built, a new field is opening in structures of enormous size, bridges that would bear the same relation to a 600ft. steel truss that the 1,000ft. suspension span at Cincinnati bore to the 200ft. truss spans built about the same time in the same neighbourhood across the Great Miami. If, at the present day, an 800ft. span is to be built, a truss on the beam or cantilever principle would be used; but a 2,000ft. or 3,000ft. span would be a case for a suspension bridge. Two things must be remembered. In a suspension bridge of any such enormous size the dead weight would be large in proportion to the live load, and the distortion due to the passage of trains would be comparatively small. Such a bridge would be built for two or more railroad tracks; its length would be much greater than that of a single train, and the condition under which a concentrated maximum load would advance as a whole upon the bridge would be rare. In the manner of the passage of loads such a bridge would resemble a highway bridge more than a short-span railroad bridge. Before, however, a suspension bridge is built which will bear the same relation to the modern steel truss that the old suspension bridge did to the wooden truss, the same advance in details must be made in suspension bridges that has been made in truss bridges. If such a bridge is to be built now, the

* A paper read before the American Society of Civil Engineers, Oct. 21, 1896.

designer must concentrate in the work of a single design all the improvements corresponding to those which truss bridge builders have spent many years in developing. This paper is submitted with a view to opening the way for improvement, and to show that a great suspension bridge, which would be well adapted to railroad service, would involve no insurmountable difficulties of construction. The method of demonstration and illustration which has been adopted is the explanation of the design of a suspension bridge of unusual dimensions and capacity. The size selected for this design would give a clear opening of about 3,000ft., this corresponding to the dimensions proposed for the North River at New York. The plan discussed is simply a general plan, but as such a discussion to be valuable must be accompanied by estimates, the depth to rock at the sites of the towers has been assumed to be 140ft. below mean high water; this corresponds to the depths which borings have found opposite the foot of Seventieth-street. It has been assumed also that the anchorages would be built on rock, and elevations have been assumed for these anchorages. These elevations correspond with reasonable accuracy to the position of the bluffs on the west side of the river opposite Seventieth-street, and are probably not very different from the position of the rock on the east side at the same location, but it is not likely that a structure located there would be of the symmetrical character which is now described. The design gives a clear headroom of 150ft. at all stages of water. While these conditions correspond more closely to the location at the foot of Seventieth-street than to any other place, this paper is intended as a study of suspension bridges, and not as an approval of any particular location. The location at Seventieth-street undoubtedly has great advantages, especially in the matter of anchorages. A location below Thirty-fourth-street has also very great advantages, particularly in the matter of convenience to existing business centres. It must be observed that the distinctive feature of a suspension bridge lies in the fact that it has no compression member. The weight is carried by cables stretched from tower to tower, which are secured by heavy anchorages at each end. The strains in the cables tend to overturn the anchorages, and any motion of the anchorages disturbs the entire structure; a slight settlement in the towers might not do much harm; any motion in the anchorages is felt through the entire bridge. In this respect the conditions of a suspension bridge are the opposite of those of a cantilever bridge. Any settlement in the towers of a cantilever bridge is exaggerated at the ends of the cantilevers, while the anchorages are usually of such a character that they can easily be adjusted. It is therefore of the utmost importance that the anchorages of a suspension bridge should have foundations which will not yield, and which can be put in at reasonable cost. These conditions are assumed in the estimates in this paper. A study of the paper, however, will show that the form of anchorage proposed admits of great latitude in use, as the inclination of the backstays becomes independent of the inclination of the main cables, and the anchorage for one pair of cables may be placed much farther back from the tower than the other pair. This might present great advantages if it became necessary to locate anchorages in a portion of the city already built up. The capacity of the bridge designed has been reached in a backhanded manner. The bridge has been designed to carry a total load of 25 tons, or 50,000lb., per lineal foot. The design has then been developed and the dead weight calculated, and the result is a balance for the live load of 11,000lb. per foot over the entire structure. As the width of the structure is 92ft. between the stiffening trusses, this corresponds to about 120lb. per square foot of floor. If this space were to be occupied by eight railroad tracks it would amount to 1,375lb. per lineal foot per track, which exceeds the weight of any passenger train. It would amount in the aggregate on a length of 3,100ft. to 34,110,000lb., equivalent to eight freight trains 1,400ft. long, each weighing 3,000lb. per lineal foot. It is probable that the requirements of any location where a bridge of this magnitude would be considered would be satisfied by four railroad tracks adapted to a heavy class of traffic, and four rapid transit tracks to be operated by electric cars or short trains of a character which would require only a floor-stiffener to secure the necessary rigidity. Therefore, in proportioning the stiffening truss the variable load has

been taken on the basis of 12,000lb. per lineal foot, corresponding to a load 3,000lb. per foot on each of the railroad tracks, with no provision for unequal weight on the rapid transit tracks, or to 1,500lb. per lineal foot on all eight of the tracks. These provisions correspond to four maximum freight trains, or eight maximum passenger trains. In one respect the design departs radically from suspension bridges hitherto built. The cables, instead of being made of straight wires, are made of ropes, and these ropes, instead of being passed over the towers and around pins in the anchorages, are socketed, both at the top of the towers and in the anchorages, all connections being made through the sockets. This modification is really the essential feature of the whole design. The objections which will be raised to it are—first, that a straight wire is both stronger and less extensible than a twisted rope made of the same wire, and second, that no socket can be made which will develop the full strength of the rope. Both of these objections are true; but a rope can be laid in such a way that the modulus of elasticity is only about 1,000,000lb. less than that of a straight wire, and a rope can be socketed in a way which can be absolutely depended upon to a fixed amount of strain, and the strength of the structure will then be determined, not by the strength of the wire, but the strength of the connection at the end of each rope. Furthermore, experiments have shown that ropes constructed in the manner proposed have an extremely uniform modulus of elasticity, which is the most important thing. The advantages of this system of construction are principally two: the ropes can be made in the shop, adjusted to length there, carried to the bridge site, and put up in the least possible time; the wires are practically straight from one end to the other, the decided turns required over saddles and the short turns required around pins being entirely avoided. With this arrangement the objections to a strong stiff wire are removed. Another feature which is believed to be novel is the method of holding down the ends of the stiffening truss. When one-half the span is loaded, the upward reaction at the unloaded end is equal to the downward reaction at the loaded end, so that the stiffening truss must not only be supported, but anchored down. The stiffening truss of this design is made 1,000ft. longer than the span, thus extending 500ft. back toward the shore from each tower, while the suspenders in the 150ft. next to each tower are omitted. The result is that the duties of the stiffening truss proper are confined to a length of 2,800ft.; back of each tower is a span of 500ft., from which a cantilever 150ft. long projects to each end of the stiffening truss proper. The reactions of the stiffening truss are taken by the ends of the cantilevers, and the cantilevers are themselves anchored by the weight of the shore spans. This arrangement has the further advantage of leaving 150ft. between the towers and end suspenders, within which the cables will adapt themselves to any changes of length and height due to temperature, loads, or otherwise. The description of the design follows the order of computation, the cables being first proportioned to carry the selected weight (59,000lb. per foot), the towers being proportioned to carry the cables, the foundations being proportioned to carry the towers, the anchorages

designed to resist the pull of the cables, and the suspended superstructure to distribute the moving load. *General Design.*—The general design is that of a stiffened suspension bridge, the cables to be of wire, the towers of steel on masonry foundations, the structure being stiffened by steel trusses suspended from the cables. The cables are four in number—two on each side—the length of span between the theoretical intersection points on the top of the towers being 3,200ft., and the versed sine 400ft. To secure lateral stability, the two stiffening-trusses are placed 100ft. between centres horizontally, this affording an opening 92ft. wide in the centre. At the middle of the span the two cables on each side are brought as close together as possible, or 4ft. between centres, the width at the centre of the span between points midway between the two cable centres being 115ft. At the tops of the towers the cables are spread apart to a distance of 28ft., the width between the centres of the towers being 200ft. Each inside cable has, therefore, a cradling of 30.5ft., and each outer cable a cradling of 54.5ft., the average cradling between 42.5ft. The backstays are carried from the towers to the anchorages in planes which are tangent to the horizontal projection of the cradled cables, thus splaying the backstays apart between towers and anchorage. By this arrangement the towers are relieved of all transverse strain, and become, as it were, simply gin poles to sustain the cables. The lateral stability produced by this arrangement is evident from the plan, Fig. 1. The towers are of steel, each really consisting of two independent towers formed of four posts, 94ft. square at the base, and battered together so as to be 28ft. square on the top, the two square towers being connected by a cross truss at the top, and resting on masonry cylinders at the bottom. The exact shape and location of the half-towers are determined by the direction of the cables, the sides of the two half-towers not being parallel, and the squares being only approximate. It has been considered important to reduce the number of cables to four, two on each side. If the cables of the main span and the backstays are counted as separate cables, which the detail hereafter described shows them to be, there are four cables, two leading in each direction, terminating at the top of each tower, the number of cables corresponding to the number of posts, so that the weight from each cable is transferred directly to one of the four posts. This requires cables of much larger dimensions than have ever been used; but there is nothing impracticable in making cables of the required size. The stiffening truss is 4,100ft. long over all, divided into panels of 33ft. 4in. each, supported for the central 2,800ft. by suspenders leading from the cables, while the ends are supported on piers 4,100ft. apart, and intermediate supports are taken on rocking bents 3,100ft. apart. The truss is continuous for its whole length of 4,100ft., fastened to the gables at the centre and free to move longitudinally at each end. It is considered of great importance to use a continuous truss, thus avoiding the difficulties and lost motion of a central hinge. The difficulties of fastening down a stiffening truss are overcome by the end supports, the end of each truss being a 500ft. span resting on two supports, from which a 150ft. cantilever projects



towards the point where the suspenders begin. The suspended stiffening truss is only 2,800ft. long, and exerts an upward or downward reaction at the end of the 150ft. cantilever, according to the position of the moving load; the cantilevers are anchored by the weights of the end spans. The stiffening truss is 66ft. sin. deep between the centres of gravity of the chords, this depth being adopted for reasons given hereafter; it at once secures the necessary rigidity, and permits sufficient flexibility to allow a considerable portion of the irregular moving load to be taken care of by the change of shape in the cables. The general elevation, Fig. 1, shows a clearance of 158ft. above mean high water at the centre of the span at a mean temperature of 60° Fahr., when the bridge is unloaded. The extreme effects of temperature are to lower or raise the centre 3.15ft., so that the maximum clearance of the unloaded bridge at a temperature of 0° Fahr. would be 161.15ft., and the minimum clearance at a temperature of 120° Fahr. would be 154.85ft. A moving load of 11,000lb. per lineal foot over the whole span, being the amount hereafter calculated on, and using a modulus of elasticity of 27,000,000 in the cables, will cause a deflection of 3.96ft. at the centre, thus reducing the minimum possible clearance to 150.89ft. This load is, however, excessive, and the maximum load which should be estimated in calculating clearances is 9,000lb. per lineal foot, which will cause a deflection of 3.24ft., making the minimum clearance 151.61ft. The bridge is designed with a camber of 6ft. in the centre of the span when unloaded at mean temperature. This corresponds to a camber of 9.15ft. when unloaded at the lowest temperature and to a camber of -0.39ft. when fully loaded at the highest temperature. The maximum camber curve corresponds to a grade of 1.18 per cent. at the ends; but this is so short that it will not affect the passage of trains. In this design the essential difference between a great suspension bridge and a truss bridge of ordinary dimensions has been borne in mind. The truss bridge of ordinary dimensions is so nearly a rigid structure that the changes which take place in its form under passing loads have little influence on the strains in the several members, and such a bridge can be proportioned on the basis of a rigid geometrical skeleton. A long-span suspension bridge necessarily changes its shape with every change of load, and changes, too, in such manner as to relieve local strains, every unstiffened suspension bridge having some shape of perfect equilibrium for every possible loading. These changes of shape play an important part in proportioning a suspension bridge, and so long as they are kept within limits which do not disturb convenience of operation, they are a source of strength instead of weakness. A suspension bridge must be permitted to change its shape within proper elastic limits, and this change of shape must be made the basis of calculations in proportioning the structure.

(To be continued.)

SECRET COMMISSIONS.

THE correspondence on this subject is being continued in the *Times*. Mr. Tilson Lee, formerly employed by, and in after years a partner, in Henry Lee and Sons, of Belvedere-road, Lambeth, and Westminster Chambers, a firm of contractors for public works, writes denying that the bribery alleged by "Civil Engineer" to be frequently offered by contractors to engineers is usual. Mr. Lee says he either assisted in settling, or settled, the amount of a very large number of tenders, and in no single instance did his firm ever dream of inserting any sum as commission for "Mr. Engineer." The firm carried on works under the late Messrs. James Walker and Burges, the late Mr. J. R. McClean, the late Mr. Bateman, the late Sir John Hawkshaw and his surviving partners, Messrs. Clarke, Hawkshaw, and Hayter, the late Sir John Coode and his surviving partners, and many able provincial civil engineers, and, although it would be absurd to suppose that any of these gentlemen could have been approached with the view of offering them any commission, Mr. Lee goes further and states that not one of their assistants, the resident engineers on the works, were ever offered or expected any secret commission. He challenges "Civil Engineer" to give his own name, and then state the works on which he was offered the commission.

On the other hand, "N. Y.," a member of

the Institution of Civil Engineers, writes:—"About 1863 I was appointed resident engineer of a branch about to be constructed on one of the leading railways in the north. I was no sooner introduced to my contractors—two partners—than one of them informed me that 'a knife and fork would be daily laid' for me 'at the Wheat-sheaf,' at any hour I chose to name, and unlimited wine and cigars for one supplied. The other told me, very secretly, that any hunter in the market, at a reasonable price, that might suit my fancy was at my disposition, and that I need not trouble myself about stabling or fodder. The astonishment of both at my politely declining was evidently unbounded, and they made it quite clear that they were convinced that my only reason was that they had not offered enough. Of course I reported everything to my head, the engineer-in-chief of the company, officially. That contract ran for nearly six years, and was an unbroken series of attempts at 'scampering' and fraud, each of which I reported to my chief, who always said that they would be gone into when the contract was finished. They never were gone into. I subsequently learned that it was notorious that the resident engineer of another branch of the same railway, which was being constructed by the same contractors, lived entirely on them, and that they found and kept a horse for him. I also learned, beyond a doubt, that the engineer-in-chief was in the habit of accepting presents from contractors; and I often saw him accept their hospitality."

Mr. J. Wolfe Barry, C.B., the president of the Institution of Civil Engineers, denies that any such commissions as those to which "Civil Engineer" refers as being secretly paid by contractors to engineers are either received by any respectable civil engineer, or offered by any respectable contractor. In his thirty years' experience Mr. Barry has never known an instance of a contractor making even the suggestion of a secret commission to any of his assistants, much less to himself, and he feels certain that no such practice exists. He adds: "If any instance of such a secret commission were brought before the council of the Institution of Civil Engineers (not anonymously, but properly substantiated), we should know very well how to deal with the recipient if he were connected with the Institution. The courts of law, also, would make short work both of briber and bribed, for every judge on the bench would welcome an opportunity of putting his foot on such a flagrant breach of trust as is involved in a secret payment made by a contractor to an engineer employed to overlook him."

THE ASSOCIATION SCHOOL OF DESIGN.

THE designs submitted by the A.A. students in the "Elementary" and "Advanced" classes of design have been on view at the studio of the association in Great Marlborough-street. The designs and drawings mainly represent the principal building trades—viz., brickwork, stonework, woodwork, leadwork, plasterwork, &c., and except in one case, a stone oriel window, "are portions of a two-storied country house of moderate size on the southern slope of a Surrey hill," to quote the conditions. A bronze medal is awarded to W. H. Ward for his designs in the elementary stage class of design. The oriel window (the visitor in this case being Mr. T. G. Jackson, A.R.A.) is well conceived, and we have no doubt the student has complied with the conditions laid down. G. C. Carter is the recipient of another award. In one case the subject is a sash window, one of three, with linings and architraves in the long side of a dining-room. The windows were to be fixed flush with the external wall. This subject is not so simple as it appears, and some skill was necessary in treating it. Mr. Halsey Ricardo is the visitor in this branch. Other subjects are shown by drawings, many evincing artistic skill in dealing with the material. We notice, for example, some good designs for a lead rain-water head, taking a swan-neck from eaves. The head and pipe are shown by the candidates. Mr. C. R. Ashbee, M.A., is the judge. Iron entrance-gates, plaster cornices—the former work visited by Mr. Frank T. Baggallay, and the latter by Mr. T. E. Colclutt—may be mentioned. A chimney-stack with angle fireplaces is the subject of several essays, the visitor being Mr. Reginald T. Blomfield, M.A. The subjects in the Advanced section were "A Pair of Labourers' Cottages," visitor Mr. Ernest George; "An Entrance Gate," visitor Mr. J. Belcher; "A

Street Fountain," Mr. Basil Champneys, M.A.; "A Small Warehouse," visitor Mr. Beresford Pite; "Convalescent Home," Mr. E. W. Mountford; "A County Technical School," Mr. Aston Webb; "A Wooden Pulpit," Mr. Leonard Stokes; "A Screen in Metalwork," Mr. C. F. A. Voysey. The silver medal has been awarded to W. J. Devlin for a Late Gothic treatment of a small warehouse; the bronze medal to T. H. Lyon for a technical school of plain Georgian brick elevation; and hon. mention is awarded to E. Nicholson. Students in both classes are expected to visit the workshops once or twice a week, and the advanced class students are advised to take up one of the crafts studied in the elementary class, and to endeavour to master it at the workshops. These are visited by Mr. W. R. Lethaby and Mr. Geo. Frampton, A.R.A., as inspectors of the Technical Education Board. We hear that arrangements are now being made between that board and the polytechnics for the admission of architectural students to the workshop classes.

THE CENTRAL SCHOOL OF ARTS AND CRAFTS.

THE Central School of Arts and Crafts has been started by the Technical Education Board of the London County Council at Morley Hall, Regent-street, opposite the Polytechnic, under the direction of Mr. George Frampton, A.R.A., and Mr. W. R. Lethaby, the art advisers of the board.

It provides for apprentices, pupils, and workmen engaged in, or connected with, artistic handicraft the best instruction in art and design as applied to their particular industries. No attempt is made to meet the requirements of the amateur, or to do the work of the teacher of figure and landscape drawing and painting; nor is the instruction given directed in any way towards the preparation of pupils for examination. The special business of the school is the industrial application of decorative design, and students are expected to concentrate their studies on the several branches of the industries in which they are engaged. The work of the school during the session 1896-7 will be specially adapted to those employed in the different departments of the building trades, architects, designers (especially in textiles, wall-papers, furniture, and metal-work), workers in glass, bronze, and lead, enamellers, and the various branches of the gold and silver trades. Other departments will be added according to the demand.

Facilities will be given for the student of architecture to study modelling, ornament, stained glass, lead-work, and other work in its application to building. The lectures in architecture will be given by Mr. Halsey Ricardo, and those in sculpture by Mr. E. Roscoe Mullins, while the other departments will be in the charge of specially-chosen experts. The ordinary fee will be 2s. 6d. a month, a reduction being made for artisans in receipt of weekly wages. Apprentices will be admitted free.

THE LATE WILLIAM MORRIS.

THE world is distinctly the poorer by the death of the gifted and versatile William Morris, Socialist, poet, and decorative artist. For some months past he had been suffering from diabetes, and returned from a voyage to Norway a few weeks back in worse health than before; he rallied, however, for a time, but a relapse set in. Severe hæmorrhage resulted on Tuesday in last week from the effort to walk upstairs, and the end so widely regretted came on Saturday morning at his London home, Kelmscott House, Upper Mall, Hammersmith, the headquarters of Socialism in the west of London. Mr. Morris was in his 63rd year, having been born at Walthamstow on March 24, 1834. His father, a wealthy merchant, sent him in succession to Marlborough and Exeter College, Oxford, intending him for the Church. The youth showed, however, such marked artistic as well as literary powers, that in 1856, on taking his degree, he was articled to the late George Edmund Street, R.A., but he only remained in that office about nine months. Indeed, to those who knew the autocrat who afterwards planned the Law Courts, and the antipathy to restraint and convention ever evinced by Morris, the wonder is the association lasted so long. At college and afterwards, Morris's

personal friends were the members of the Pre-Raphaelite School, and in 1861, in conjunction with Dante Gabriel Rossetti, Ford Madox Brown, Henry Holiday, Philip Webb, P. P. Marshall, C. Falkner, and Edward Burne Jones, he started an establishment in Queen's-square for the designing and manufacture of wall-paper, stained glass, fabrics, tapestries, carpets, and furniture, Morris himself acting as director and manager of the firm's operations. It is impossible to estimate the influence for good which William Morris has since done in changing for the better the motifs, patterns, and colours of all household fittings. Speaking of his early struggles, Morris has written: "I tried to think what would happen to me if I were forbidden my ordinary daily work, and I knew that I should die of despair and weariness, unless I could straightway take to something else which I could make my daily work; and it was clear to me that I worked not in the least in the world for the sake of earning leisure by it, but partly driven by the fear of starvation or disgrace, and partly, and even a very great deal, because I love the work itself." The business originated on a very humble scale, being started with but five pounds; but Morris's belief that it would soon provide its own capital was amply and speedily justified; the ridicule and derision with which his new ideas were received only served to give them more bold advertisement, and before long they had gained a world-wide reputation. With Morris as the designer-in-chief, and eventually as sole director, the works grew, and were eventually removed to a factory in a garden of an old mansion at Merton, premises being secured in Oxford-street as show and sale-rooms. Even the work of designing and superintending the production of all kinds of furniture and decoration did not suffice to employ Mr. Morris's active brain, and of late years he had given much time and means to the production at the Kelmscott Press, Hammersmith, of splendid specimens of typography, sumptuously bound, in reproduction of the works of the 15th-century master-printers, all the processes being as far as possible hand work. He designed his own founts of type from Early Venetian examples, and cast it himself; he had his paper and ink specially made, and pieced out his lines in the old fashion, every detail being a revival of the original free-hand printing.

Morris wrote much in prose and verse that will long be remembered. His "Defence of Guinevere and Other Poems," appeared in 1858, when he was in his 24th year; other noteworthy works are his "Life and Death of Jason," 1867, "The Earthly Paradise," his masterpiece—a collection of Mediæval tales of adventure brought together from Greek, Oriental, and Scandinavian myth lore, and told in easy verse in the manner of Chaucer and Boccaccio, 1868-70; a book on the Decorative Arts, 1878; "Hopes and Fears for Art," 1882, and translations of Virgil and the *Odyssey* in 1875 and 1887 respectively. On the death of Tennyson, just four years ago, he was offered, and indignantly refused, the Poet Laureate-ship. He early imbibed Socialist views from Ruskin, whose desire to see a happier England imbued with a love for the beautiful he ardently shared. He soon went further than his old master, and by lecture, address, and pamphlet sought to raise the individual worker and to abolish capitalism and class distinctions. Some fifteen years ago he became an active member of the Social Democratic Federation, and, as Mr. John Kenworthy has succinctly put it, "took his stand with the people for the people." In 1885 he seceded from the Federation, and founded the Socialist League and its journal, the now defunct *Commonweal*; but in 1891 he resigned membership, owing to the growing Anarchistic tendencies of the League, and had since been in sympathy with the Federation. His charming prose idyll, "The Dream of John Ball," appeared in 1888, and was followed three years later by his Utopian romance of the twenty-first century, "News from Nowhere," and by his "Chants for Socialists." On the very day of his death, Morris's latest romance, "The Well at the World's End," was published. He carried out his Socialistic and Co-operative theories in practice, and all the workers in the Merton factory shared in some degree in the profits of "Morris and Co."

William Morris was one of the most active workers in the Arts and Crafts Society, of which he was president at the time of his death. His warm sympathies with Mediæval life, works, and

buildings led him to heartily espouse the cause of the Society for the Protection of Ancient Buildings, which he had served as president; and he delivered many lectures under the auspices of the Sunday Society, and was keenly interested in the work of the Society of Friends of Russian Freedom.

No notice of Morris would be complete without a reference to his charming personality.* His short, thick-set, alert figure, invariably attired in a suit of blue serge, with no visible linen, his resolute, well-cut features, surrounded with a profusion of wiry, iron-grey hair and beard, his florid complexion, and high and broad forehead, were familiar on the lecture platform in all our great cities, and, like his addresses, were typically English. His lectures were read from manuscript, the style being plain and easy, the choice of words good but little varied, while the reasoning was never profound, nor the illustrations far-fetched, and the delivery was apt to become monotonous from continued vehemence. His restless and exuberant energy, frankness, heartiness, and utter absence of affectation and of regard for conventionalities were as marked as his kindness and simplicity of manner, and many stories are current of his private acts of unostentatious generosity to the poor and unfortunate. He has said that he lived one of the fullest and happiest of lives. He is survived by Mrs. Morris (whose portrait, under the title of "Astarte Syriaca," was painted in 1877 by Dante Gabriel Rossetti; this beautiful picture, which, since 1891, has been one of the treasured possessions of the Manchester Art Gallery, was reproduced in our issue of Jan. 4, 1875) and by two daughters, one of whom, May, now the wife of Mr. H. Halliday Sparling, is an occasional contributor on art subjects to our columns.

The funeral took place on Tuesday, at Kelmscott Churchyard, just below Lechlade, on the Upper Thames, where the poet-craftsman had had his country home in the manor house for the past quarter of a century, and after which he had named his Hammersmith residence and press. The ceremony was largely attended by his friends, and there were laid on the grave a very large number of wreaths and bouquets from, among others, Mr. and Mrs. Alma Tadema, the Countess Charleville, Mr. and Mrs. Alexander Ionides, Messrs. R. and F. Smith, the Chiswick School of Arts and Crafts, Mr. J. H. Dearle, the Art-Workers' Guild, Comrades of Hammersmith, the Socialist Club, Mr. Detmar J. Blow, Mr. Mackail, Mr. and Mrs. Fisher Unwin, Professor York Powell, Herr Jessner, Miss Caruthers, the employees at Merton Abbey and at Oxford-street, and at the Arts and Crafts Exhibition Society.

The manor house is idealised in "News from Nowhere," and of the church he wrote: "It is small, but interesting; the rear of it, a nave with tiny aisle, transept, and chancel, being Early English of date, though the arches of the aisle are round-headed. There are remains of painting all over the church, the north transept having been painted with figure subjects of the Life of Christ in trefoil-head panels. The east window has a painted glass image of St. George (in whose honour the church is dedicated) of the time of Edward IV. Most of the windows (which are insertions of the early 14th century) have their inner arches elegantly cusped. A very beautiful bell-cot formed by two trefoil arches crowns the eastern gable of the nave, and composes pleasantly with the low-pitched roof over a clerestory which, in the 15th century, took the place of the once high-pitched ones. The church is plastered almost all over the walls, as no doubt it was in the earliest days; it is fortunate in having escaped the process of stripping and pointing which so many of our village churches have undergone at the hands of the restoring wise-acres."

PROVINCIAL ARCHITECTURAL SOCIETIES AND THE R.I.B.A.

THE forty-ninth session of the Liverpool Architectural Society was inaugurated on Wednesday evening by an address delivered by the president, Mr. George Bradbury, diocesan surveyor. The meeting was held at the Law Library, Union-court, Liverpool, and was largely attended. Mr. Bradbury remarked that the society had seen fit to elect one of their members as their president for this session who was not a member of the R.I.B.A. Had he been present

and had a voice in this election, he should have pointed out that this was breaking through a precedent which had always been followed ever since 1889, when the society was allied with the Institute. He continued: On the receipt of the letter from your last worthy president, Mr. Alfred Culshaw, notifying me of the honour put upon me, I wrote, declining the position on the grounds mentioned; but on reconsideration I thought there might be a special object in electing the president, the vice-president, the secretary, and treasurer from among those who are not members of the Institute. I find that the proceedings, the charter, and the management of the body has been a subject of great interest throughout the kingdom, and therefore I think you will excuse me if, instead of addressing you upon art and architecture, we come down to a subject of very grave importance and practical utility, and consider for a short time what may be said for and against the Institute. Your society has seen fit to enter into alliance with the Institute under which it becomes "the accredited centre of the district and agent of that district, in this relation with the heart of this system in London." These are the words used by the Institute's president in his address at the opening of the session 1893-4. Further, you have agreed that "the constitutional rules or by-laws of allied societies shall be subject to the approval of the Council, and that no addition thereto, or variation thereof, shall be made without previous notice to and approval by the Council." If your president happens to be a member of the Institute, he may then attend the meetings of the Council. Now this appears to me a very advisable and proper alliance for your society to have adopted. I think everyone will admit that in these days of great competition it is exceedingly advisable that there should be a central authority in London, that should look after and guide the education of those who intend to follow our profession; that should collect and purchase books and establish a library for the attainments of knowledge; that should call meetings and arrange to have papers read on subjects of interest to their members; that should publish their proceedings in a journal and take note of everything relating to legal decisions and other matters useful to the architectural profession generally. Now, all this the R.I.B.A. has done in the past and is doing in the present. Its system of education through the Architectural Association is probably as fine a one as can be devised for London. In Liverpool there are many members of our profession who think the mode of examination capable of very great improvements. Mere cramming the mind with a large number of facts, dates, and names of celebrated architects of past ages will never produce an architect, but it may make a good historical architectural writer or archaeologist; but this knowledge, although of a certain amount of benefit, will never teach him to design plans suitable for modern requirements. The whole system of education at the present time throughout the kingdom, even in our board schools, colleges, and universities, is undergoing a change. The professors and teachers, instead of cramming their pupils with a vast store of book-knowledge, which is probably forgotten as soon as the examination is over—they are now endeavouring to find the strong points and the individual abilities of their pupils, and to encourage them to work and think out for themselves problems in life which may be presented to them. With all these manifest advantages, is it not strange that, out of about 78 members of your Society, only 24 are subscribing members of the Institute? To obtain further enlightenment, I attended with Mr. Culshaw the Manchester conference held on May 20, when an address was read by Mr. Edward Salomons touching the "mutual relations between the local affiliated societies and the apparent body in London." The great point of that address was the "most important benefits resulting from the relationship of more frequent personal intercourse between non-Metropolitan societies and the Royal Institute, whereby provincials got their views enlarged by the experience of those at the head of the profession, and thus improved the standard of our work." A great deal is to be obtained by social intercourse, and such a gathering as that at which we are now assisting. It was to myself a very great pleasure to meet the great Dons of the profession, Mr. Alfred Waterhouse and many others too numerous to mention; but I cannot see where the benefit is derived by your society as a body

* An excellent portrait of Mr. Morris, reproduced from a photograph, was given in the BUILDING NEWS for April 25, 1890.

in sending your president—whoever he may be—to Manchester or London to eat a dinner. You may say that the president attending the meeting of the Council in London, and meeting those from allied societies, would bring back information which would be of value to the whole of his professional brethren; but this is not so, for I read in the address delivered by Mr. William Henman, the president of the Birmingham Architectural Association, that he attended three meetings of the council of the R.I.B.A., yet “on none of these occasions,” he said, “have I met any of the representatives of a provincial society, although there are eight who are members of the council, and there are fifteen societies in alliance with the Institute.” It was remarked at Manchester that people asked what benefit they would derive by becoming Fellows of the Institute, although there were many highly interesting addresses delivered as to why all the architects in the province should become members; I am sorry to say they only appear to me to be Fellows to a great extent on sentimental grounds. The president of the Manchester Society said that “it seemed to him that architects must follow all other professions or businesses in one thing.” There must be co-operation or “trade-unionism,” as Mr. Golthart has called it. Now, with these words, gentlemen, I must cordially agree—that is to make the R.I.B.A. in profession and in practice a “trade-union.” You may not like the words, but alter them to any other you prefer; but let the union of self-protection, advancement in knowledge, and in brotherly feeling be the watchwords. All the great and learned professions have some system of union. Medical men have to obtain certain degrees and pass certain examinations before they are allowed to administer even the simplest form of medicine to a patient. The solicitors have to pay a high premium and serve five years and pass an examination before they are allowed to practise. Even the accountants have had to amalgamate, and now use the word “chartered.” There is not a single artisan that is employed to carry out our works that does not belong to one trade-union or another, even down to the lowest-paid labourer. To bring this about there will have to be great changes in the Institute. For the admission of a student an exceedingly moderate fee per annum should be demanded, and he should be supplied with all the printed matter issued from the Institute, even if it cause a slight loss. He should, in my opinion, be registered as an Associate when he has completed a certain number of years of study, either at a recognised art school or college, and after passing an examination of a not too severe character, and more of a practical nature than of mere historical knowledge. An Associate’s subscription should not be, for the provinces, more than £1 ls. It should, in my opinion, be the aim of the Institute to enrol the whole of the architectural draughtsmen. The election of Fellows should be entirely in the hands of the Council, and all fellows of provincial societies should be elected as Fellows of the Institute on making the ordinary and requisite declarations. Their subscription should not be more than £2 2s., and I think, if you wished the trade-union idea to be carried out, the entrance fees should be done away with. This question of election was in the minds of the Congress in Manchester, and it was remarked that there are many outside the Institute who ought to belong to it. Mr. Holden said that “he could quite understand that a gentleman who had been in practice twenty or thirty years would say, ‘I would sooner remain as I am than place myself in a position of being voted upon by gentlemen who have passed through my office, and some of whom may be in my office now’—no doubt referring to the Associates, who now have considerable power in the election. Mr. Slater said that “he felt very strongly on the subject, and if there was a possibility of a repetition of what had occurred a year or two ago, when some very eligible men were blackballed for no fault of their own, by people who, he believed, knew nothing about them, then the council,” he said, “ought to take steps to alter the by-laws, and limit the election of Fellows to Fellows themselves.” If these are the views of the Fellows in the Institute, what must be the views of those outside? On the financial view of the question, I should like to give you a few facts. The contributions by the members of the allied societies of the Institute in 1895 was, I believe, about £800. The Institute returned to the allied societies one-fourth of the subscriptions—say, £200. What

benefit, I should like to ask, have the allied societies gained by giving the £600 to the Institute? Or, taking our Liverpool Society, fifteen Fellows at £4 4s. each, and ten Associates at £2 2s. each, gives a total of £84, of which one-fourth (£21) was returned to the Society. What benefit does the Liverpool Society, or the architectural profession, reap from this expenditure of £61? In London, it may be said, you can obtain the advantages of the Institute examinations; but I am not sure, gentlemen, if we cannot boast of having in Liverpool a school of architecture established at the University, that gives to our students a superior system of education than that given by the Association of the Institute in London. I think and hope in years to come that the certificate granted by the college will count as high as any that has ever been given in London. The total number of students attending all the various classes in architectural drawing, modelling handicraft is very large, and I have no doubt you will be pleased to know that I have the authority of Professor Simpson to say that the school is now in a very flourishing and satisfactory condition. The college has a small architectural library, and a very considerable sum of money is now being expended upon architectural casts. We have in the Public Library one of the very finest collections of architectural books in the kingdom; so extensive is the number of the books that a special catalogue has been issued which contains the names of 1,070 volumes devoted to architecture alone. There is a similar catalogue issued on building construction, making a total of about 1,453 volumes appertaining to our profession alone. The *Journal* of the Institute we can read in the Free Public Library. My view therefore is, that until the Institute have amended their Charter and by-laws so as to make it possible for every practising architect and those associated with him to become members, it is useless for us to look to London for guidance in our profession; but rather that our efforts, energies, and, what is not of so much importance, our money should be devoted to helping forward and encouraging all our local efforts, which I feel you will all agree with me, are now, and will be in the future, second to none in the kingdom. If this idea of professional unionism is brought about in the ten or fifteen years, an absolute and visible effect will be seen. I feel we shall have done very much towards doing away with that great incubus of our profession—I mean the competitive system. What, gentlemen, can be more lowering to our profession—to the dignity of our profession, whose members have to construct homes in which the lives of its citizens must be passed, and in the schools at which the young are taught—than to find an advertisement like that of the Bootle School Board, inviting competitive plans from the architectural profession without offering any premium whatever for any of the designs sent in? But, on the other hand, the committee who have charge of the education of the district demand from every architect who even wishes to know what the conditions will be a fee of £2 2s. A charge of 1s. would have been ample for such particulars, and would have more than paid for the cost of printing. They desire not only to pick your brains, but your pockets as well. Are there no architects in this neighbourhood fit to design and honestly capable of erecting a board school without entering upon this wretched competitive system, which is neither satisfactory to the architect nor the proprietor, as it nearly always leads to misunderstandings on such matters as cost. Another growing evil, and a great danger to our profession, is that large firms and limited liability companies now undertake the erection and the furnishing, including the whole of the plans, of houses, mansions, and public buildings. There are instances known in our profession where furniture removers have offered to supply designs for additions and stables and other out-buildings free of cost, and even where there was an architect already employed upon the work. I need not enlarge to you by further illustration what a great benefit the Institute could become if worked on the lines I have suggested. The total number of members in all classes in 1885 belonging to the Institute was 2,504. This is probably a mere fraction of those calling themselves architects—probably not more than one-tenth. If the Professional Union could enroll one-half of those calling themselves architects throughout the United Kingdom, I feel sure they would have

a body of at least 10,000 members. They then could pass a by-law that all competitions shall be carried out under the rules of the Institute, or the members of the Institute decline to compete. They could pass the resolution that the members of the Institute would decline to receive contracts from building contractors, decorators, furniture removers, who supply plans and carry out architectural works on their own account. There are many other similar regulations which they could enforce, of vast benefit, in my opinion, to the profession. I must apologise for having detained you so long on this subject; but it is a legacy left over to me by your former president. I had no idea when accepting this position of the mass of correspondence and the literature I would have to peruse on this subject, and I have felt compelled to ask you to take the matter into your serious consideration, and that all the members of the council of the Liverpool Architectural Association or Fellows and Associates in Liverpool of the R.I.B.A. will do their utmost to attend a meeting called for to-morrow at two o’clock to take into consideration letters and correspondence with the Institute on the question of the election of Fellows. The reply from your society is required to be received by the Institute before the 12th inst. The Birmingham Society has very kindly, and with the utmost courtesy, sent us their views on the interim report on the subject. For the present I particularly desire you to consider the views I have expressed this evening as entirely my own. I cannot hope or think they will all be approved, or even adopted, by your own members as a society; but with your permission I will read to you a few words addressed by Mr. Alfred Waterhouse, LL.D., R.A., F.R.I.B.A., Gold Medalist and President 1888-1891, who said at Manchester that “He believed that members of the Institute might very safely agree not to take part in competitions except among themselves. He thought the Institute must make a great change in the mode of electing Fellows, and concluded by giving the reasons which should induce architects to become members of the Institute. It was not merely a question of whether they were to derive individually certain advantages by becoming members of the Institute, but whether, by joining the Institute, they could advance their art and the profession to which it was an honour to belong.” In conclusion, the President referred to the three excursions held during the vacation—one to a specimen of half-timber Cheshire architecture, Mr. Hudson’s home at Oxtou, carried out in the true spirit of the old work, and designed by Messrs. Grayson and Ould; another to the large new model works and model village at Port Sunlight, also by local architects, Messrs. Grayson and Ould, Mr. Kirby, Mr. Owen, of Warrington, and others; and the third to Stockport to visit a church by Messrs. Paley and Austin. He also dealt with alterations that it is proposed to make in the Liverpool by-laws, and the revival of the scheme for a High-Level Bridge over the Old Haymarket.

THE WHITWORTH INSTITUTE GALLERIES, MANCHESTER.

THE private view of the exhibition of works of art, as now rearranged in the new galleries of the Institute in Whitworth Park, Manchester, took place on Tuesday. The recently-erected galleries occupy a portion of the site of Grove House, at the corner of Oxford-road and Denmark-road. The two galleries now completed form the first instalment of a larger scheme. They consist of a north gallery facing towards Denmark-road, and a central gallery at right angles to it, facing west, and they are so arranged that the scheme may, at some future time, be completed by the addition of a south gallery facing towards the park, and a front façade facing towards Oxford-road, forming a connection between the north and south galleries. In the meantime a portion of Grove House has been left standing, and forms the principal approach to the galleries, which are connected to it by a temporary wooden and glazed corridor. The rooms on the ground floor of the old portion of Grove House are arranged as retiring-rooms for ladies and gentlemen, and offices for the curator; the rooms on the upper floor are arranged for library and museum, council-room, and for the exhibition of textile fabrics. On the ground floor, by the removal of internal walls, a corridor 100ft. long and 17½ft. wide has been temporarily arranged, in which are groups of statuary, and some large tapestries

made by the late Mr. William Morris, after designs by Sir E. Burne-Jones. From this corridor the north gallery is entered through wide folding-doors. This gallery measures 78ft. by 32ft., and is 37ft. in height from the floor to the highest point of the ceiling light. This hall opens into the central gallery, measuring 78ft. 6in. in length, by 39ft. in width, and 30ft. in height. Both the galleries are top-lighted, and are practically of the same construction. The roof is constructed with an outer skylight and an inner ceiling light. The ceiling light is segmental in form, and is constructed with steel ribs incased in wood mouldings, and framed so as to divide the light into squares; it is glazed with strong glass with a cut pattern in it, which diffuses the light well, but prevents the constructional parts of the roof above being seen. The whole of the roofs and coves are constructed with steel and wrought iron, and the plastering of the coves is carried on strong metal lathing. The walls, 16ft. in height, provide for a dado 3ft. high, of polished mahogany framing with panels and raised mouldings, clear space for hanging paintings, &c. (on boarded screens) 9ft. high, and above this the frieze. The frieze spaces have been utilised for the exhibition of carefully-selected specimens from well-known friezes in the British Museum. Round the central gallery the whole of the space is filled with portions of the Parthenon frieze, plain spaces being left where continuity is broken. On the north side of the north gallery are examples from the frieze of the mausoleum at Halicarnassus, on the south side examples from the broad frieze of the Nereid Monument, and on the west end are examples from the Phigaleian frieze. The floors of the galleries are of fireproof construction, of concrete and steel joists carried on steel girders, and are finished with oak wood blocks 1½in. thick, varnished. Under both galleries there are cellars, which are used for storage purposes, workshops, receiving-rooms for exhibits, and heating apparatus; from the cellar to the gallery floors there is provided a hydraulic lift, with a cage area of 9ft. by 5ft. The warming of the galleries is on the low-pressure system, with hot water carried in pipes round the galleries at the floor level; a ledge is fixed in the dado above these pipes in order to throw the heat off the walls where the pictures are hung; from this ledge down to the floor a bright copper cove is fixed behind the pipes. For the ventilation of the galleries large inlets for fresh air are provided in each corner behind the angle screens; the cold air passes through radiators before entering the galleries, and provision is made for regulating the supply of fresh air; four large extraction flues are built in the corners of the galleries, and at the foot of each, in the cellar, a hot-water radiator is fixed; zinc tubes are taken from openings in the coves of the galleries and connected to the extraction flues; in addition to this several ventilating sunlights are fixed in each gallery, connected to extractors fixed on the roofs, and for summer ventilation the whole length of the centre part of the ceiling lights can be opened by means of gearing worked from the floors of the galleries. The buildings and all arrangements have been carried out from the designs and under the superintendence of Mr. J. W. Beaumont, F.R.I.B.A., architect, Manchester.

THE "TROCADERO" SANTARY FITTINGS.

THE design of this sumptuously fitted-up restaurant in Great Windmill-street, Piccadilly-circus, which has been opened to the public, is worth a more special notice on account of the very perfect scheme of sanitary fittings which it contains. Indeed, for a building of this character, sanitary excellence is one of the first considerations, and our inspection of the building has satisfied us that on this point little can be desired. These fittings have been supplied by the well-known firm of sanitary engineers, Messrs. B. Finch and Co., of Belvedere-road, Lambeth. It would be impossible in a short notice to give our readers a complete account of the sanitary fitting-up of this building; but we may observe that every precaution has been taken which sanitary engineering can suggest to prevent stoppage in any of the pipes, to disconnect and ventilate every part of the system, and to enable any sink or lavatory waste to be removed in case of stoppage, plumbers' unions being inserted for this purpose. For cleaning and inspection screw-caps are put on

all bends. Each soil-pipe, sink, or lavatory waste has separate ventilating pipes, and we notice that all the kitchen-sinks at the top of building discharge into two separate waste-pipes, which go down to the basement without any other connections being made to them, so that they can be inspected at once and separately dealt with in case of need. Every soil-pipe and sink or lavatory waste has a ventilating pipe. The vertical pipes which take the sink-wastes are 3in. heavy cast iron galvanised pipes, with caulked joints, and junctions to receive branches, and in every case there is a cleansing access-plug. All the service-room wastes discharge into grease-traps in the basement, and to insure ventilation and a free current of air through them a fresh-air inlet and outlet above them are provided. We notice, also, that every sink and lavatory-trap is fitted with an inspection-cap (a very desirable precaution), and that every trap is ventilated. The provisions guarantee immunity from many of the troubles incident upon a large and complicated system of sanitation.

Some idea of the extent of the fittings may be gathered from a casual inspection of the various floors. On the upper floors there are the staff needlewomen's porcelain wash-down closet, slate lavatory; the lavatories and urinals for staff men. The ladies' conveniences are well arranged, and fitted with new marble lavatories, marble fascia and shelf, hot, cold, and waste fittings; Finch's siphonic pedestal closets and cistern on brackets, and lifting seats. The gentlemen's ranges are similarly provided with the "siphonic" w.e.'s. The lavatories are fitted with Lord Kelvin's valves, and stop-cocks are put to every fitting. On the second floor is also a range of staff lavatories, with conveniences for gentlemen of the same description, new marble urinals, blue and gold hand-basins, St. Ann's marble half-hexagonal flush tank with plate-glass sides, gunmetal interior, and copper service pipes. Ladies' lavatories, &c., are also provided on this floor. The mezzanine floor has ranges for both sexes. In the basement we notice the grill-room is provided with ample ranges of white porcelain circular-back urinals, with marble sides and divisions, a special waste gutter and outlet being a feature in the drainage of these urinals; stop ends and outlets, with gratings; siphonic closets. The billiard-room is similarly provided. The closets are all of the wash-down type, and the walls of lavatories are lined with enamelled zinc wall tiles. There are three cisterns. The main one in roof supplies all fittings down to the ground floor. Two separate services of 2½in. lead pipe are carried down to mezzanine floor, one for closets and lavatories, and the other to the sinks, and full-way stopcocks are fixed on each branch to sinks and each fitting. For the wine-bars a separate waste, and the sinks in same have three services, hot and cold from store-tanks, and the drinking water direct from meter. The lengths of pipes supplied of all sizes, we are informed, make a total of 6,160ft., and the total weight of pipes 12 tons 15 cwt. All the work has been done by B. Finch and Co. in a first-rate manner, under the general supervision of the architect.

Arrangements have been made for the members and associates of the Society of Engineers, and their friends, to visit the Westinghouse Brake Co.'s Works, King's Cross, and the Midland Railway Co.'s Somers Town Goods Depot, on Tuesday next.

The foundation stone of the Roman Catholic church at King's Lynn, which is being entirely rebuilt, was recently laid by the Bishop of Northampton. The special feature of the new church will be the Lady chapel, which will be a replica of the Holy House of Loreto, a restoration, or to speak more correctly, a re-erection of the once famous shrine of Our Lady of Walsingham, which is situated within the limits of the King's Lynn Mission.

The city council of Bristol have decided to promote a Bill next session to enable the corporation to provide, construct, and maintain a railway to connect the Harbour Railway with the Portishead Railway by means of a swing-bridge across the river Avon; a towpath between the said railway and river, and a widening of Cumberland-road; a railway to connect the cattle pens at Cumberland Basin with such first-named railway; coal tips at Ashton Fields; a wharf and stacking yard for timber at the Floating Harbour, and a railway to connect the same with the Harbour Railway; and a footbridge across the river Avon near Vauxhall Ferry. A feature of the scheme is the timber wharf, which will be 1,700ft. in length, and will afford deep-water accommodation to the extent of 22ft.

OBITUARY.

The death is announced, in his 80th year, of the Rev. R. POTTER, M.A., the Vicar of Corley, near Coventry. Besides taking a great part in the opening of schools at Clehonger, the erection of the schools and a vicarage, and the restoration of the church at Bulkington, he restored and enlarged Corley church and schools. He was a member of the Warwickshire Field Club, and was regarded as an authority upon church architecture, and a skilled wood-carver. He also worked in stone, and was a painter of ability. Specimens of his carvings in wood are to be found in Hereford Cathedral, Bulkington Church, and Corley Church. He designed and carved the pulpit and reading-desk at Corley Church, the reading-desk being dedicated last November by the Bishop of Coventry.

CHIPS.

The new Technical College at Colchester will be opened by Earl Rosebery on Tuesday, the 20th inst.

A mission church just built at South Featherstone was opened last week. Lord Masham gave the site in Green-lane. The contractor was Mr. Dowson, and the architect Mr. H. W. Fearnley. There is accommodation for about 180 persons. The seats are mainly of polished pitch-pine, and have reversible backs. The entire cost, including furniture, is about £475.

As a reply to the charges made against Mr. Constable, the New York superintendent of buildings, a petition, signed by 116 of the most distinguished architects and firms of architects in the city has been presented to Mayor Strong, commending the manner in which the business of the Department has been conducted under Mr. Constable's care, and asking that the appropriation for its expenses may be increased, in order that its efficiency may be still further promoted.

The West Ham Corporation have received the sanction of the Local Government Board to the borrowing of £53,000 for additional sewerage works.

The Raleigh Estate at Dartmouth, on which it is suggested the College for Cadets, to replace the *Britannia*, should be built, has been surveyed by Mr. Fox, of Messrs. Fox and Bousfield, London, on behalf of the Admiralty, to whom he will report. It is stated that if the site is adopted, about 150 acres will be required, including the old Mill Creek and the present cricket-ground.

At Desborough new Sunday-schools, built adjoining the Wesleyan chapel in Victoria-road, were opened last week. The building comprises an assembly-hall, 44ft. by 30ft., and accommodating 170 children, two classrooms, and infants' room, and has cost £650. Mr. W. J. Smith was the architect, and Mr. J. Buckley, of Rothwell, Northamptonshire, was the contractor.

The urban district council of Morecambe have resolved to borrow £26,000 to cover the cost of purchasing the plant and machinery of the Morecambe Electric Light and Power Company.

The new recreation ground at Eastleigh, Hants, will be publicly opened to-morrow (Saturday). The land cost £5,000, towards which the South-Western Railway Company gave £2,000.

Part of the ancient home of Wilberforce, known as Wilberforce House, High-street, Hull, has been purchased by the Hull Corporation for preservation. The other half is still in private hands.

Mr. Frank Cartwright, eldest son of Mr. Joshua Cartwright, borough engineer for the corporation of Bury, Lancs, has been appointed chief of the public works department at Cyprus by the Colonial Office. The appointment carries with it a commencing salary of £600 per annum.

Three stained-glass windows were unveiled on Friday in Swinton parish church to perpetuate the memory of the late Rev. Canon H. R. Heywood, who was for 26 years the vicar, and many years rural dean of the ancient rural deanery of Eccles.

The Episcopal church of St. Cyprian at Leuzie, N.B., was consecrated on Saturday by the Bishop of Glasgow and Galloway.

It has been decided to continue the triangulation system of the Indian Survey Department from Burma to Singapore and the Malay Peninsula, thus joining up the work of India and of the Straits Settlements.

The Hanley Town Council decided at their last meeting that the salaries of Mr. C. A. Cowell and Mr. C. J. Sutherland, the electrical engineers, be increased from £150 to £175 per annum, and at the end of 12 months to £200.

The Liverpool Art Committee have decided to purchase Sir E. Burne-Jones's picture, "Sponsa di Libano," for £750, for addition to the permanent collection at the Walker Art Gallery, the cost to be met by the profits of the autumn exhibition.

COMPETITIONS.

CROYDON BOROUGH ASYLUM, WARLINGHAM.—The competition for a lunatic asylum for the borough of Croydon has just been decided. The asylum is to be built at Warlingham, south of Croydon, is to accommodate 600 patients, and the cost was limited to £120,000. The first premium of £200 has been awarded to Messrs. Crisp, Oatley, and Skinner, 27, Clare-street, Bristol; the second of £100 to Messrs. Hine and Pritchett, 35, Parliament-street, Westminster; and the third of £50 to Mr. G. H. Stanger, F.R.I.B.A., North-street, Wolverhampton. Eighteen designs were sent in.

LIVERPOOL MUSEUM EXTENSION.—The penultimate step was taken on Friday last in settlement of this competition by the Liverpool Library and Museum Committee, who resolved to recommend the council to authorise Mr. Edward W. Mountford, F.R.I.B.A., of London, to prepare working plans and specifications to carry out his accepted design for the extension of the museum building and the erection of a new school of science and technology, at an estimated cost of not exceeding £92,000. We illustrated Mr. Mountford's design, which was selected in competition by Mr. Aston Webb, the assessor, and awarded the premium of £150, in our issue of August 14 last.

LONGTON.—In a competition for a block of business premises, situate in Stafford-street, Longton, for Messrs. Herbert and Harry Aynsley, the designs by Messrs. Taylor and Burgess, A.R.I.B.A., architects, of Longton, have been selected.

MILL HILL.—For the proposed cottage homes for aged members to be built at Mill Hill by the Linen and Woollen Drapers' Association, the plans of Mr. George Hornblower, A.R.I.B.A., of Fitzroy-road, W., have been selected in competition. Of the fifty cottages contemplated promises have been received sufficient to build 34 forthwith, the building fund now standing at £10,200.

A new Primitive Methodist chapel at Deeping St. James was opened on the 1st inst. It has cost nearly £900, and seats 200 persons. The front is of rock-faced stones and the fittings of pitch-pine. Behind the chapel are schoolroom, two classrooms, and kitchen. The contractors were Messrs. Hinson Brothers, of Stamford.

Glasgow Harbour and Docks, including the new Cessnock Dock, which is one of the largest and most important in the kingdom, were inspected on Friday by the members of the Clyde Navigation Trust. Some dredging has still to be done at the new dock, and one of the graving docks is not yet completed; but the 11,212 lineal feet of quay wall embraced in the dock is now finished, and the undertaking was officially completed during Friday's proceedings by the laying of the keystone by Sir James Bell, Bart., Lord Provost of Glasgow. The works at Cessnock were carried out from plans by and under the supervision of Mr. James Deas, engineer to the Trust. The works of excavation and of quay construction have been carried out by the Trustees' own workmen.

A new Cambridge quarter-chime clock, with three external illuminated dials and all the latest improvements inserted, has just been erected in the tower of Christ Church, Heaton Norris, Stockport, by Messrs. Wm. Potts and Sons, clock manufacturers, of Leeds and Newcastle-on-Tyne. Messrs. W. Potts and Sons are also erecting a new illuminated clock at the Congregational Church, Heaton Chapel, for Mr. B. Marsden, J.P., of the Hawthorns, Heaton Chapel.

A number of important alterations have been carried out at the theatre at Aston, by which the seating accommodation has been doubled. A new wing has been added, providing a suite of dressing-rooms and two refreshment bars, one for the pit and one for the stalls. A vestibule, 6ft. wide and 60ft. long, gives access to the stalls, and will also provide an additional means of exit. It is intended to erect a glass-covered verandah, 60ft. long, and extending over the footpath, for the entire length of the building. The total cost of the improvements will be about £4,000.

Lord Dean of Guild Brown, in retiring from office at the Glasgow Dean of Guild Court, on the 1st inst., made an interesting statement as to the year's building operations in the city. With the exception of public buildings for which livings had been obtained the previous year, the amount in the value of buildings was the greatest in any year since 1876-77—viz., £1,290,000. The total number of dwelling-houses up to and including four-room-and-kitchen houses for which livings were granted was 3,398, against 3,197 in the previous year.

ARCHITECTURAL & ARCHÆOLOGICAL SOCIETIES.

GLASGOW ARCHITECTURAL ASSOCIATION.—A meeting of this association took place in the rooms, 187, Pitt-street, on Tuesday, the 6th inst., Mr. Wm. Tait Conner in the chair. Mr. Wm. Vickers read a paper on "Architectural Sculpture." He confined his paper entirely to stone carving, and made some introductory remarks showing the training necessary to make a successful stone-carver. The indiscriminate mixing-up of the different styles of Gothic was much condemned. The essayist thought that a judicious mixture of Gothic and Classic in sculpture work was a good thing. This was done in many parts of England, and drawings were hung round the wall showing where this has been successfully carried out at Sheffield Municipal Buildings. At the conclusion a hearty vote of thanks was accorded to the essayist.

CHIPS.

Lieut.-Colonel A. G. Durnford, R.E., a Local Government Board inspector, held an inquiry at Dudley on the 1st inst. respecting an application by the town council to borrow £1,110 for purposes of street improvement, £750 for works of sewerage, £180 for the purchase of obstructive buildings in Guest Fold, Birmingham-street, £150 for works at the public baths, and £110 for sanitary improvements in the market-place. Mr. J. Gammage, the borough surveyor, explained the plans.

Viscount Cross visited Bradford on Thursday in last week, and opened a new department for boys of the Belle Vue Higher Grade School, in Manningham-lane, which provides accommodation for 711 boys, and cost £11,000, exclusive of the site.

By direction of the Local Government Board, an inquiry was held at Llandudno, on Friday, touching an application to sanction a loan of £1,400 for the erection of a market hall.

The Wesleyan church, Clapham-road, London, has been entirely redecorated. A new organ-chamber has been built off the chancel, in which a large new organ has been erected by Hunter and Son, of Clapham. The church has been relighted on the Stott-Thorp system by James Stott and Co., of 174, Fleet-street, London.

The foundation-stone of a new Roman Catholic church was laid at Kirby-Moorside on Tuesday week. The architect is Mr. A. L. Smith, of London, and the contractor Mr. Lyons, of Malton.

Owing to the great demand for Asiatic wood, which is exported from Rostoff and Petrovsk, via the Baltic ports, the question of reducing the railway freight rates to Revel, Riga, and Libau will be considered at the forthcoming conference of the representatives of Russian railways.

Mr. Glynn Evans, of Chester and London, has just completed the internal decoration of St. Ethelwold's School Chapel, Hawarden.

New schools built by the School Board at Lavenham have been opened by Mr. W. Cuthbert Quilter, M.P. Mr. J. S. Corder, Ipswich, was the architect, and Messrs. G. Grimwood and Sons, of Sudbury and Ipswich, were the builders. The cost was £4,500, and the accommodation is for 450 children.

The committee appointed by the promoters of the proposed Dingwall and Cromarty Railway, at a meeting held in Inverness, have resolved to appoint Mr. Forman, of Messrs. Forman and McCall, C.E., Glasgow, as engineer, and that he should be asked to proceed at once with the survey of the route in order that a Bill may be presented in the next session of Parliament.

All Saints' parish church, Syerston, Notts, has been reopened after restoration, at a cost of £750, from plans by Messrs. Smith, Brodrick, and Lowther, of Hull, acting in conjunction with Mr. H. Bailey. The builders were Messrs. Thrale Brothers, of Newark.

Operations have just been commenced by Messrs. George Lawson and Sons, Rutherglen, the contractors, on the large new graving dock which the Duke of Portland is having constructed at Troon, on the Ayrshire coast.

The Hon. Mrs. Portman laid the foundation-stone of a new girls' school at St. Andrew's, Rowbarton, near Taunton, on Friday. The building, which will consist of two stories and accommodate about 400 children, will adjoin the present schools. The architect is Mr. C. H. Samson, and the builder Mr. H. J. Spiller. The cost will be £1,200.

Works covering about half an acre of ground are to be erected in Baker-street, Greenock, for the British Aluminium Company. The total cost of the buildings that have been resolved on will be upwards of £5,000. All the contracts have been let.

Engineering Notes.

BLACKWALL TUNNEL.—The Bridges Committee of the London County Council report that considerable progress has been made during the past two months with the construction of the Blackwall Tunnel under the Thames. From July 21 last 179 iron rings, forming the lining of the tunnel and representing a length of 447ft., have been erected. The cutting edge of the shield is now within 11ft. of the "cut and cover" work on the north shore. The shield has passed under Leicester-street and close to the high chimney of the Midland Railway Company without causing any damage. It has also passed beneath the railway lines of the Midland and Great Eastern Railway Companies, and the movement of the surface has been very slight, and there has been no interruption to the traffic. Two "blow-outs" have taken place, but in neither case was any damage done. The cast-iron lined portion of the tunnel is on the point of being completed. The subway arch and concrete backing in that portion of the tunnel which runs under the river are completed; the centres for concrete and tile lining above the level of the road are being set. The brick lining to No. 4 shaft is about half completed; the granite sett road and the stone foot-paths have been commenced in the "cut and cover" on the north side of the river, and the work is progressing satisfactorily. The building of the entrance houses on either side of the river has not advanced so rapidly as could be desired. About one-third of the stonework is, however, erected on the north shore, but on the south side the work is only brought up to a level of 5ft. above the surface of the ground. The approximate value of the work executed, including the approach roads comprised in the contract, is £693,069, the total amount of the contract being £871,000. The work has been carried out for the London County Council, under Mr. A. R. Binnie, their chief engineer, who has been represented upon the works by Messrs. D. Hay and M. Fitzmaurice, acting as resident engineers. The contractors are Messrs. J. S. Pearson and Son, Mr. E. W. Moir being the contractors' engineer. —Since this report was published the actual completion of the sub-aqueous tunnelling has been announced.

THE CITY AND WATERLOO ELECTRIC RAILWAY.—This new undertaking is making steady progress, and the up line on the Waterloo side of the river is within a few feet of its terminus. Excavation is now going on under the approach to the Windsor line, and will soon reach the station, which has for some time past been in process of construction under the South-Western Company's station at Waterloo. From this station steps and inclines will lead directly up to all the platforms overhead. The down line is not so far advanced. It has reached a point about 650ft. from the terminus, and there has come to a temporary stop. Between this point and Waterloo the South-Eastern Company have required the underpinning of the viaduct at Cross-street, and in order to effect this the engineers of the new line (Messrs. W. R. Galbraith and J. H. Greathead) have sunk a temporary shaft there, and will work from this shaft backwards to meet the completed portion of the down line. At the City end the work is so far advanced that it is expected that in February the up line will be complete from Waterloo to the City station, which will be under the road between Queen-street and Bucklersbury, and in communication with the subways of the Central London station now in course of construction in front of the Royal Exchange. The contractors are Messrs. Mowlem, Burt, and Co.

The studios of the Home Arts and Industries Association at the Royal Albert Hall, S.W., are now open for the autumn session of classes for bookbinding, basket-making, woodcarving and carpentry, metal repoussé, cut and embossed leather work, inlay, and marquetry. Particulars to be had from the secretary.

On Saturday a service was held in Kewloe parish church, on the occasion of the unveiling of a stained-glass window, which has been executed by Messrs. Hardman and Co., of Birmingham. The subject of the design is Christ appearing to Mary after the Resurrection. In the side lights are a representation of Mary Magdalene and Mary the Mother of James and Salome bringing sweet spices to anoint him, and of the visit to the place of sepulture. In the centre light is designed the appearance.

Building Intelligence.

BIRMINGHAM.—About twelve months since, says the *Birmingham Post*, the City Council acquired a site of about 4,030 square yards in Milk-street by an improvement scheme under the provisions of the Act for the Better Housing of the Working Classes. The ground was promptly cleared of the insanitary buildings that formerly occupied it, and it was offered to private builders for the erection of improved dwellings. The Committee have so far failed to secure a purchaser or lessee, and now recommend to the Council the erection of 68 dwellings, at an estimated cost of £6,500. Designs for the proposed dwellings have been prepared by Mr. Addie, the manager of the Improvement Scheme, somewhat similar, although improved in some details, to buildings of the class that have been erected in Liverpool. The suggested dwellings are in two stories, the upper floor consisting of distinct dwellings to those on the ground floor. The latter are entered from the level of the street or terrace, while the doors of the former open on to an external balcony at the back. Each dwelling consists of a living-room and two bedrooms, a scullery and closet being provided in a detached building at the rear. These tenements Mr. Addie describes as "labourers' dwellings" rather than artisans' dwellings, and estimates that they may be let at rentals as low as 3s. 9d. to 4s. 3d. per week. They cannot correctly be described as "flats," as each dwelling has its separate entrance and is self-contained; but the plan to a certain extent would embody the advantage of the flat system of being able to place more than one dwelling upon land that otherwise would be monopolised by a single house and so reducing the cost. The acquisition of the Milk-street area cost in round figures £6,000.

BRAMHOPE.—A new Wesleyan church was opened at Bramhope, near Leeds, on Tuesday the 29th ult. The church is in the Decorated Gothic style, and consists of nave, transepts, and chancel. The interior has an open timber roof and seating of pitch-pine. The choir stalls are of polished oak with carved ends and traceried fronts. The pulpit and font are of Caen stone and marble. The chancel window is a figured design representing Christ's Sermon on the Mount. In the rear of the church is a large schoolroom and a detached caretaker's house. The architect is Mr. W. J. Morby, F.R.I.B.A., of Bradford and Harrogate.

GRANGE-OVER-SANDS.—A new convalescent home is now being built at Grange-over-Sands of the local limestone, with red sandstone dressings, and covered with blue Welsh slates. It is in the pavilion style, having the administrative block in the centre for a tower, and the dormitory and dining-room as wings on each side in the form of the letter L. The entrance is placed on the west side in the administrative block through a glazed porch into the entrance hall. Immediately to the right is the door leading into the dining-hall. Out of the dining-room is the day-room, 27ft. long by 22ft. wide. From the day-room the smoke-room is gained, a cosy room facing south. There is also lavatory accommodation in connection with the day-room. From the entrance-hall through a glazed screen is the passage leading to the kitchen and stewards' quarters. From the entrance-hall we have the main staircase leading immediately to the first and second floors, well lighted by windows on each landing. The cost of the home will be about £3,000. The plans and specifications have been made by Mr. John Hutton, M.S.A., architect, Kendal, under whose superintendence the work is being carried out.

NUNEATON.—New National schools have just been completed for the Committee of Managers at Abbey Green, Nuneaton, for 416 children. This accommodation is provided in a mixed school for 180 and four classrooms for 236 boys and girls. Spacious cloakrooms with lavatories are annexed to each department. Additional class and cloak rooms for 40 infants have also been erected. The whole of the works have been carried out by Mr. Joshua Wilson, of Nuneaton, the contractor, at a cost of £1,620 17s. 6d. for the mixed schools, including latrines, drainage, boundaries, and formation of playground, &c., and £245 for the infants' school, making a total outlay of £1,865 17s. 6d., from plans and under the personal superintendence of Messrs. J. R. Vcall and Son, of Wolverhampton, architects.

PARTICK, N.B.—The foundation-stone of

St. Bride's Church was laid at Partick, Glasgow, the other day by Mr. J. Parker Smith, M.P. The new church, which is situated at the south end of Rosevale-street, Partick, is being built of dressed stone of a red colour, with roof of open timber, and it will accommodate 800 persons. In addition to the church proper, there will be a hall capable of accommodating 300 persons. Eventually a manse will be attached to the church. The interior of the building will be made up of a large open nave, free from galleries, a single side aisle separated from the nave by an arcade of four arches, and with a gallery, a deep chancel for the choir and the Communion table, a side chapel, an organ chamber, and a font recess. The church and hall together are estimated to cost £1,000.

CHIPS.

A new board school at Dunfermlie, built from designs by Mr. Scorie, of that burgh, was formally opened on Wednesday week.

Colonel A. G. Durnford, R.E., held a Local Government Board inquiry at Handsworth, on Friday, into an application made by the Urban District Council, for sanction to borrow £6,300, for the extension of the Victoria Park.

The Prince of Wales Hotel, Harrogate, which was refurbished in the spring at a cost of £10,000, is about to be enlarged at a further cost of £11,000. Messrs. Richardson and Simpson, of Wakefield, are the architects.

At the meeting on Monday evening of the Society of Engineers, a paper on "Machinery for Discharging and Storing Grain," illustrated by diagrams and detail drawings, was read by Mr. William G. Wailes, A.M.Inst.C.E.

The foundation-stone of the Thanksgiving Church at Holtenau, to be erected in memory of the completion of the Emperor William Canal, was laid on Sunday by Prince Henry of Prussia.

The High Sheriff of Bristol opened, on Friday, new board schools, which have been erected at Victoria Park, Bedminster, at a cost of £11,387, at the instance of the Bristol School Board.

A bust of the late Mr. Herbert Ingram, who formerly represented Boston in Parliament, has been presented to the parish church by Sir Edward Watkin.

New drapers' premises in Chequer-street, St. Alban's, were opened last week. They have been built from designs by Mr. F. W. Kinneir Tarte, M.S.A., of St. Alban's, and are faced with red brick, with half-timbered gables above. Messrs. C. Miskin and Co., of the same city, were the contractors.

At Bramhope, near Leeds, a new Wesleyan chapel was opened last week. It is Decorated Gothic in style, is faced with Apperley stone, and has tower and spire 75ft. in height. At the rear are Sunday-schools and vestry. Mr. W. J. Morley, of Bradford and Harrogate, is the architect.

The urban district council of Barry have decided to offer premiums of £100 and £50 for the best designs submitted for the new Municipal Buildings. The limit of cost is £10,000, exclusive of fittings, and the site is in Holton-road, Barry Dock, opposite the free library.

A new Board school in Fircroft-road, Tooting, built at a cost of £19,102, and accommodating 877 children, was opened by the Marquis of Londonderry on the 1st inst.

The Corporation of Bury, Lancs, have adopted a recommendation by Mr. J. Cartwright, the borough surveyor, to construct a new main from Rawtenstall to Nimble Nook, at an estimated cost of £10,000.

Providence Congregational Chapel, Ovenden, near Halifax, which was nearly destroyed by fire in November, has been rebuilt, and was reopened last week. Including a new organ, the cost has been £2,000.

The Great Northern Railway Company are at present spending many thousands of pounds and employing large gangs of men in the Hithin, Stevenage, and Hatfield districts upon the work of widening the line.

On Saturday night, Mr. Henry Harland, town surveyor of Houghton-le-Spring, county Durham, fell dead in the Market-square while superintending the allotment of sites for shows at the annual feast.

The foundation-stone of a Bible Christian chapel was laid in Tower-street, Launceston, on Thursday last week. The building will be Early English in style, will be paved with local limestone, with dressings of granite and Bath stone. It occupies a site of 67ft. by 38ft., and will seat 270 persons. Messrs. Wise and Wise, of Launceston, are the architects, and the contract has been let to Messrs. Broad and Werron, of the same town, at £1,230.

STATUES, MEMORIALS, &c.

NEWCASTLE.—At St. Nicholas Cathedral, Newcastle-on-Tyne, on Monday, the Earl of Ravensworth unveiled a recumbent statue of the late Dr. John Collingwood Bruce, the well-known historian of the Roman Wall. The memorial, which is placed in St. Margaret's Chantry, consists of a Renaissance altar tomb. The lower part is a sarcophagus of grey Sicilian marble. It is ornamented at the foot with the coat of arms of the Bruce family, while at the angles there are corner-pieces of ornament consisting of poppy-leaves and poppy-heads. The sarcophagus is supported by four lions' feet. On the top of the sarcophagus is a bier, richly carved, of white statuary marble. On the bier is a recumbent figure of Dr. Bruce, in his doctor's robes, his hands crossed on his breast. At the foot there is a fragment of a mural tablet that was found by Dr. Bruce buried in the walls of a farmhouse, together with an open book, on the leaves of which is engraved a quotation from the third edition of his "Roman Wall." The sculptor is Mr. George Simonds, of Reading.

The new military barracks in course of erection at what was formerly known as The Palace, Holywood, near Belfast, are approaching completion. At present two detachments of infantry are stationed there. The men, 250 in number, are quartered in blocks A, B, and C, the other buildings not being quite ready yet. Each block contains accommodation for 86 men, whilst there are sergeants' mess, canteen, barrack sleeping-rooms, and library in each. The length of each messroom in every block is over 30ft.

At Belfast, the premises of the Young Men's Christian Association in Wellington-street are being largely extended by additions adjoining the old hall. The annexe has a frontage of 86ft. and a depth of 240ft., and is faced with red Annandale brickwork. A feature of this building is a castellated tower with spire, carried to a height of 200ft. The extensions will include a gymnasium 90ft. by 50ft. and 60ft. in height, a suite of bath-rooms, and a large hall seated for 2,000 persons. Messrs. Young and Mackenzie, of Belfast, are the architects, and Messrs. McCammonds the builders. The heating arrangements are carried out by Messrs. Musgrave and Co.

The Court of the Worshipful Company of Makers of Playing Cards announce the result of the recent competition instituted by the Company for design for backs of playing cards. The first prize of five guineas was awarded to Mr. Ernest C. Collings, of Canourby; the second of three guineas to Miss S. Annie Willis, of Hill Park-crescent, Plymouth; and the third to Mr. Paul Woodroffe, of Alton, Staffordshire. Seventy-two designs were received, and the Court of Adjudicators were assisted in the work of selection by Mr. Walter Crane.

The foundation-stone was laid on Saturday of the Withington parochial school, which is to be erected in Wilmslow-road at a cost of £4,600. Mr. C. K. Mayor, of John Dalton-street, Manchester, is the architect, and Messrs. F. and E. Haynes are the contractors. The school will be of two stories, built in brickwork, and will accommodate 548 children—274 infants on the ground floor and 274 mixed scholars on the upper floor. The infants' department will consist of a main schoolroom, with three classrooms opening off the south side and running parallel with the main room. The mixed department will be a repetition of the ground-floor plan, with the addition of a small private room for the head master.

A public meeting was held on Monday night at the Northern Polytechnic, Holloway-road, to consider the adoption of the Public Libraries Act. The Rev. W. H. Barlow, vicar, and chairman of the vestry, presided. Sir Albert Rollit, M.P., moved a resolution expressing thanks to Mr. J. Passmore Edwards for his munificent offer of £10,000 towards the cost of a central and two branch library buildings, and pledging itself to adopt the Public Libraries Act. Mr. B. L. Cohen, M.P., seconded the motion, and pointed out that of the 14 parishes in London which had adopted the Act only one was lower rated than Islington. The resolution was unanimously adopted.

On Tuesday week the foundation-stone was laid of the new parochial schools of St. Barnabas, in Quarry-road, Tunbridge Wells. The building is Gothic in style, and has been designed by Messrs. Cronk, of the same town. It will be of two stories, in red brick with sandstone dressings, and tiled roof surmounted by a fleche. The ground floor contains an infant school and classroom, as well as teachers' room and cloakroom accommodation. The upper floor is reached by a fireproof staircase with steps of patent stone and has an open timber roof. The schoolrooms will be 71ft. by 22ft., and the classrooms 25ft. by 22ft., giving accommodation in the mixed school for 256 children, and in the infant school for 260 children. The contractor is Mr. W. E. Judd, of Stone-street, and the contract price £3,941.

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ILLUSTRATIONS.

BIDDULPH GRANGE, NEAR CONGLETON.—THE COURT ROOM
IN GIRDLETS' HALL.—FIREPLACE IN GROCERS' HALL.—
SILVER MEDAL MEASURED DRAWINGS OF HAMPTON COURT
PALACE.—COSMOR HOUSE, HITCHIN.—TECHNICAL SCHOOL,
PAISLEY.—CHIMNEYPIECE FROM THE DINING HALL OF
KING JAMES I. PALACE AT BROMLEY-BY-BOW.

Our Illustrations.

BIDDULPH GRANGE.

THIS is a well-known residence, situate at Biddulph, in North Staffordshire, and but a few miles distant from the town of Congleton, in the county of Chester. The old house was, at the commencement of this year, almost entirely destroyed by fire; the only portions that remained standing were the drawing-room and part of the servants' offices. At that time considerable alterations were in progress. The portions coloured on the plans indicate the old buildings left standing. The house stands on a broad terrace, considerably elevated above the Italian gardens, from which our illustration is taken. Hollington stone is used for the exterior. Mr. Thomas Bower, of Nantwich, Cheshire, is the architect; the builder is Mr. John Gallimore, of Newcastle, Staffordshire.

THE CITY GUILDS, NO. XXVIII.—GROCERS' COMPANY'S HALL.

IN continuation of our series of illustrations from the hall of the Grocers' Company, as rebuilt from the designs of Mr. H. Cowell Boyes, F.R.I.B.A., we give to-day an interior view of part of the great hall, showing the wide marble fireplace, with above it, the new Elizabethan overmantel in wainscot oak, surmounted by the arms, supporters, and crest of the Company. Other illustrations of the premises, including the grand staircase, drawing-rooms, and a general view of the great hall, will be found in the BUILDING NEWS for January 25, March 22, and August 2, 1895, and for April 17 of the present year. Messrs. Gillow and Messrs. Hollands carried out the furniture and fittings of the hall in wainscot oak.

GIRDLETS' COMPANY'S HALL.

WE also supplement our lithographic plate of July 17 last, showing the fine staircase, with rich oak screen, of the Girdlets' Company in their 17th-century hall in Basinghall-street, with a view of the interior of the Court Room at the same building. This illustration, and that of the fireplace of the Girdlets' Company described above, were photographed with a Sandell plate.

INSTITUTE SILVER MEDAL DRAWINGS, 1896.

HAMPTON COURT PALACE was founded by Cardinal Wolsey in 1515, and for fifteen years he lived here in great splendour. He presented the entire place to King Henry VIII., who, after Wolsey's disgrace in 1529, took possession of the palace, and enlarged and improved it considerably. It continued to be a Royal residence, and when William and Mary came to the Throne they instructed Sir Christopher Wren to design the portion illustrated. Wren did away with nearly the whole of Henry VIII.'s additions, the Great

Hall and a few other rooms being all that is left of Henry's building. The State apartments (see plan) are now used as picture galleries, and are open to the public. The materials of Wren's building are red brick and stone dressings, and the roofs are entirely covered with lead. The brickwork, ground to first floor, is of a mottled reddish colour, contrasting well with the gauged red brickwork above. Much of the stonework has weathered badly, and most of the carved key-stones to the ground-floor windows are very careful restorations. The centre portion of the river front was originally stucco, which was removed about nine years ago, and stone substituted. The sculpture in the pediment of the garden, or east, front is supposed to represent the triumph of Hercules over Envy, and was carved by Gabriel Cibber in 1694. The dates on the rain-water heads of this front are 1691, and the dates on the river front 1690. Internally, there is a great deal of fine oak panelling, that in the long gallery on the ground-floor river front being perhaps the best. The great stone staircase on the right of the garden entrance was considered by Wren himself to be one of his finest stairs.

GOSMOR HOUSE, HITCHIN.

THIS house is situated about a mile from Hitchin, on a site defined by that of the previously existing building. The aim of the new house was to combine a certain amount of accommodation with the severest economy. It was therefore the design of the architect to make as compact a plan as possible, and to rely for effect upon the proportions of the mass rather than on external embellishment. The design should be regarded as not yet complete, as it is hoped at some future date to make additions, which will give the house more interest, by lengthening it out and making it L-shaped. The materials are red brick and old roof tiles, obtained from old barns on the spot. All external woodwork is deal, stained a dull brown with carbolineum. No attempt has been made at interior decorations, with the exception of the fireplaces, which in the reception rooms are all open ones. The hall fireplace is of old Dutch tiles, that to dining-room of De Morgan tiles, and that to drawing-room of salt-glazed bricks, surmounted by a design covering the whole of the chimney breast, modelled in plaster, by Mr. Kennedy, from suggestions by the architect, Mr. W. L. Lucas.

PAISLEY TECHNICAL SCHOOL.

AMONG our illustrations is a premediated design for Paisley Technical School, by W. D. McLennan, architect. The design is for classroom accommodation only, old buildings at the back being adapted for workshops, and connected with new buildings by a corridor. The floorage accommodation is—theoretical science, 5,142½sq.ft.; experimental science, 4,586sq.ft.; art, 5,209sq.ft.; lecture hall, 1,606sq.ft.; total classroom floorage, 16,543½sq.ft. On the ground floor, to the right of the main entrance, are the board room, professors' and lecturers' rooms, opening in a private hall which is connected with the school, and has also a private entrance door from the street. To the left of entrance are lavatories, cloakrooms, &c., the ceilings of which are kept low to give additional height in the lecture-hall, which is over. On the ground floor are rooms for the elementary sciences, and on a solid concrete and wood-block floor, to prevent the slightest vibration, are placed the physical laboratories and lecture-room. On the first floor are the mechanical and architectural departments, and also two elementary art classrooms. The top floor is occupied by the chemical and art departments. The antique-room, design rooms, and the chemical laboratory are lit from the roof, and the painting and modelling rooms have very high north lights only.

CHIMNEY-PIECE FROM THE PALACE OF JAMES I., BROMLEY-BY-BOW.

THIS fine specimen of Jacobean woodwork is from an old brick-built mansion, sometimes known as "The Palace," and is supposed to have been a hunting-lodge built by James I., which until recently stood a short distance from the church of St. Leonard. The site was wanted a year or two ago for a school board, and it seemed probable at one time that the fate of this rich piece of decorative work would be to have been incorporated in the schools (which have now been built), and so lost sight of. The authorities at South Kensington have, however, succeeded in purchasing it for the Museum. It is not yet on public view, it being a difficult matter to find suitable quarters for it, but

it is fixed at present (together with the panelling shown in the accompanying sketch) in one of the workrooms. When handed over to the Museum the woodwork was covered thickly with paint. This has all been cleaned off most successfully, and reveals the work in its pristine freshness, the paint having served to preserve it. The date is probably 1606, those figures having been found on an old stone used in its construction. The fine ornamental plaster ceiling belonging to the same apartment has not yet been fixed. The mantel is of stone, and is richly carved in the style of the Italian Renaissance. The coat-of-arms is a very bold piece of carving, the projection in some parts being 5½in. from the ground. The horn of the unicorn is missing. The total width is about 8ft. 10in., and the height to top cornice is over 10ft. The height to shelf-level is 6ft. 6in.

CHIPS.

The latest addition to the pictures at the National Portrait Gallery is a kate portrait in profile of the late Lord Leighton, by Mr. G. F. Watts, R.A.

The Blackburn Town Council have resolved to apply to the Local Government Board for sanction to borrow £10,000 for laying down generating plant and equipping electric tramways in Blackburn. The corporation will supply electric current to the tramways company at 3d. per unit on car mileage of 120,000 car miles, and 2d. per unit beyond that distance. Estimates show an annual profit of £800 to the Corporation, and a saving to the tramway company over the present methods of working of £1,400 per annum.

The Leeds Corporation will seek powers in their Bill to be introduced next session, to compel the erection of water closets in all new dwellings erected within that city.

The Bristol Town Council have rejected the proposal to expend £46,000 for floods prevention in connection with the Cutlers Mills and Boiling Wells streams.

A large detached stone-fronted mansion on Arthur's Hill, Newcastle-upon-Tyne, known as Gloucester House, is being demolished, and on the site a board school will be built at a cost of £20,000. The builder is Mr. King, of Newcastle.

The Statute Labour Committee of Glasgow Corporation are making extended experiments with a tar macadam patented by Messrs. W. G. Walker and Sons, Ayr, with a view to substituting it for granite setts where a lessening of the noise of the street traffic is particularly desirable, should the result of the test prove satisfactory. The composition of the macadam is meantime a trade secret, but the cost is 4s. 6d. per square yard.

Alfred Sutherland Nixon, a master plumber, of Kettering, who last month was admitted to the Northampton General Infirmary suffering from terrible injuries to his head, was on Saturday before the Northampton magistrates charged with exploding gunpowder with intent to kill and murder himself. The prisoner on the 16th ult. was discovered by his wife lying in his bedroom in a pool of blood and minus one ear. The police allege that the prisoner filled his ear with gunpowder and ignited it. He was remanded.

A new conservatory, stocked with palms, valued at £10,000, supposed to be the finest in the country, erected in Sefton Park, Liverpool, by Mr. Henry Yates Thompson, was formally presented to the city on Monday. In its construction 600 tons of concrete were used for foundations, the quantity of glass is 20 tons, and on the apex of the dome is a representation of the ship in which Columbus sailed to discover America, 6½ft. high and 6½ft. long. The length of the building is 113ft., and the height 68ft. The conservatory was designed and erected by Messrs. Moncar and Mackenzie, of Glasgow and Edinburgh.

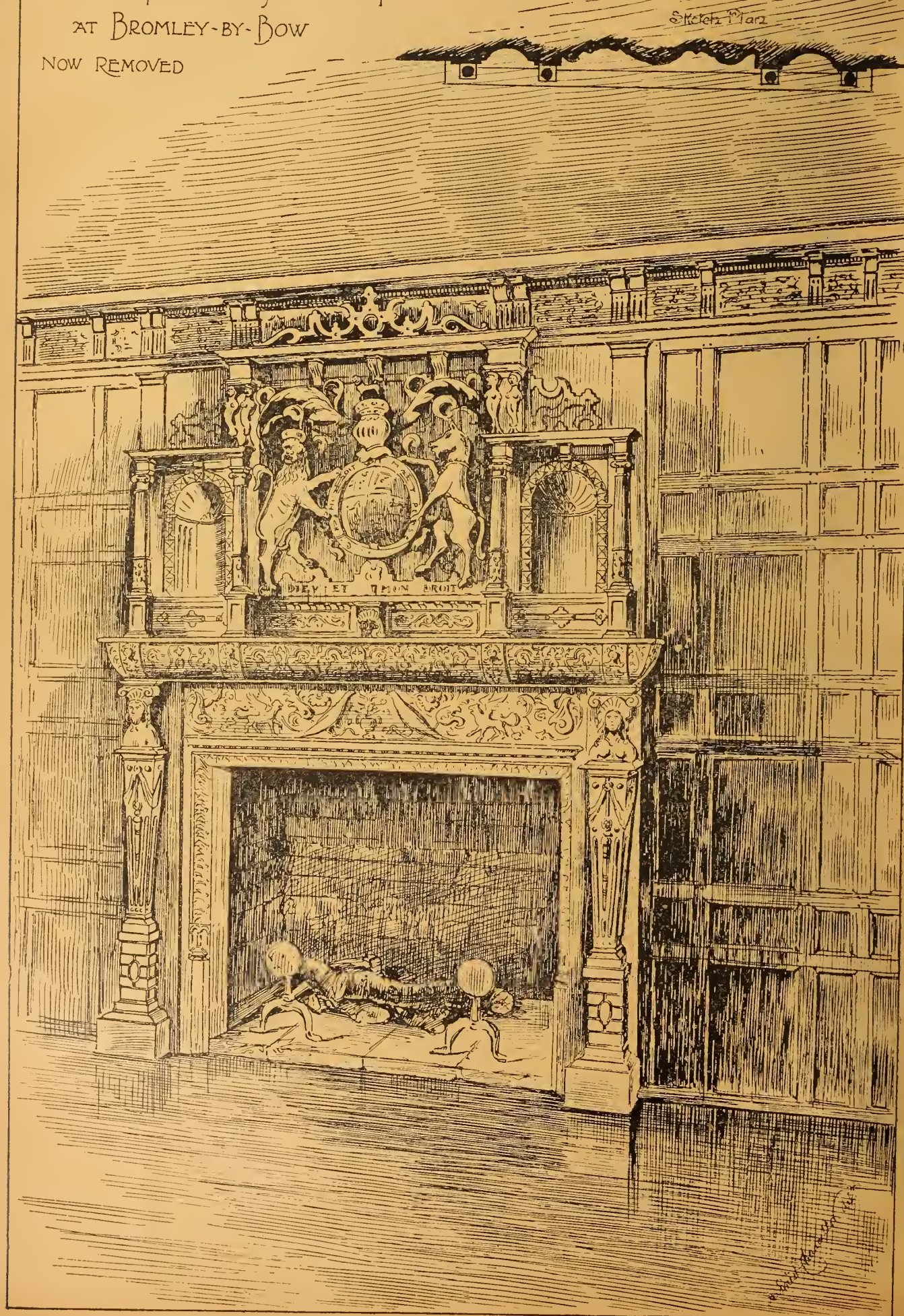
Mr. T. Newbigging, of Manchester, and Mr. Charles Sellers, of York, the arbitrators appointed by the parties, the Driffield Urban District Council and the Driffield Gas Light Company, in the matter of the sale of the latter's works to that town, have completed their valuation. The valuers state they have fixed the price to be paid by way of purchase at £22,500. The paid-up capital of the company is £9,900, and last year's dividend was 10 per cent. Mr. Cripps, Q.C., was appointed umpire, but his intervention was not required.

Mr. W. E. Willink, of Liverpool, has been appointed architect for the hospital for consumption proposed to be built at Mount-pleasant, Liverpool. The hospital is estimated to cost about £30,000, towards which £8,000 has already been subscribed.

A new Roman Catholic church at Midleton, co. Cork, was opened by Cardinal Logue on Sunday. Mr. G. C. Ashlin, of Dublin, was the architect, and Mr. J. J. Coffey the contractor. The cost has been £19,000.

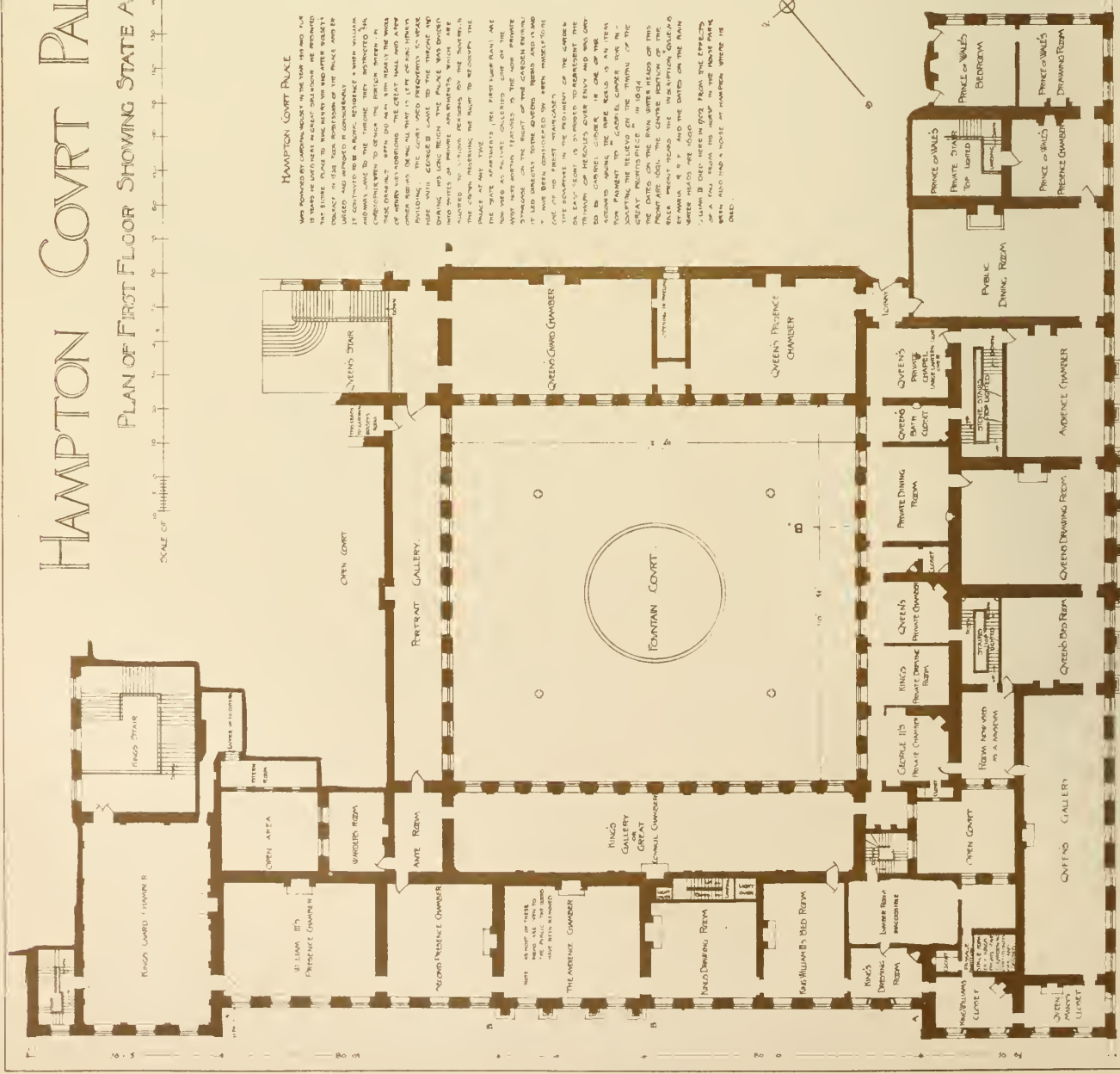
CHIMNEY-PIECE FROM THE DINING-HALL
OF THE "PALACE" OF JAMES THE FIRST
AT BROMLEY-BY-BOW

NOW REMOVED



HAMPTON COURT PALACE: (XREN)

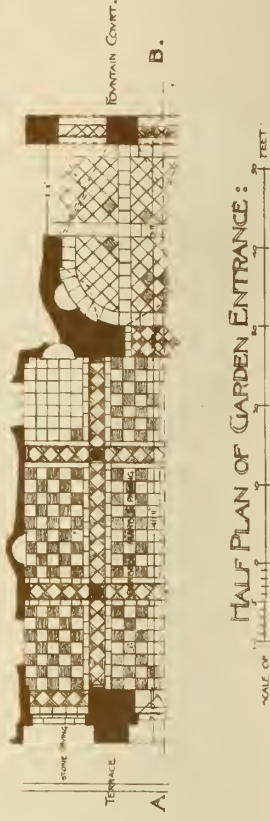
PLAN OF FIRST FLOOR SHOWING STATE APARTMENTS.



HAMPTON COURT PALACE

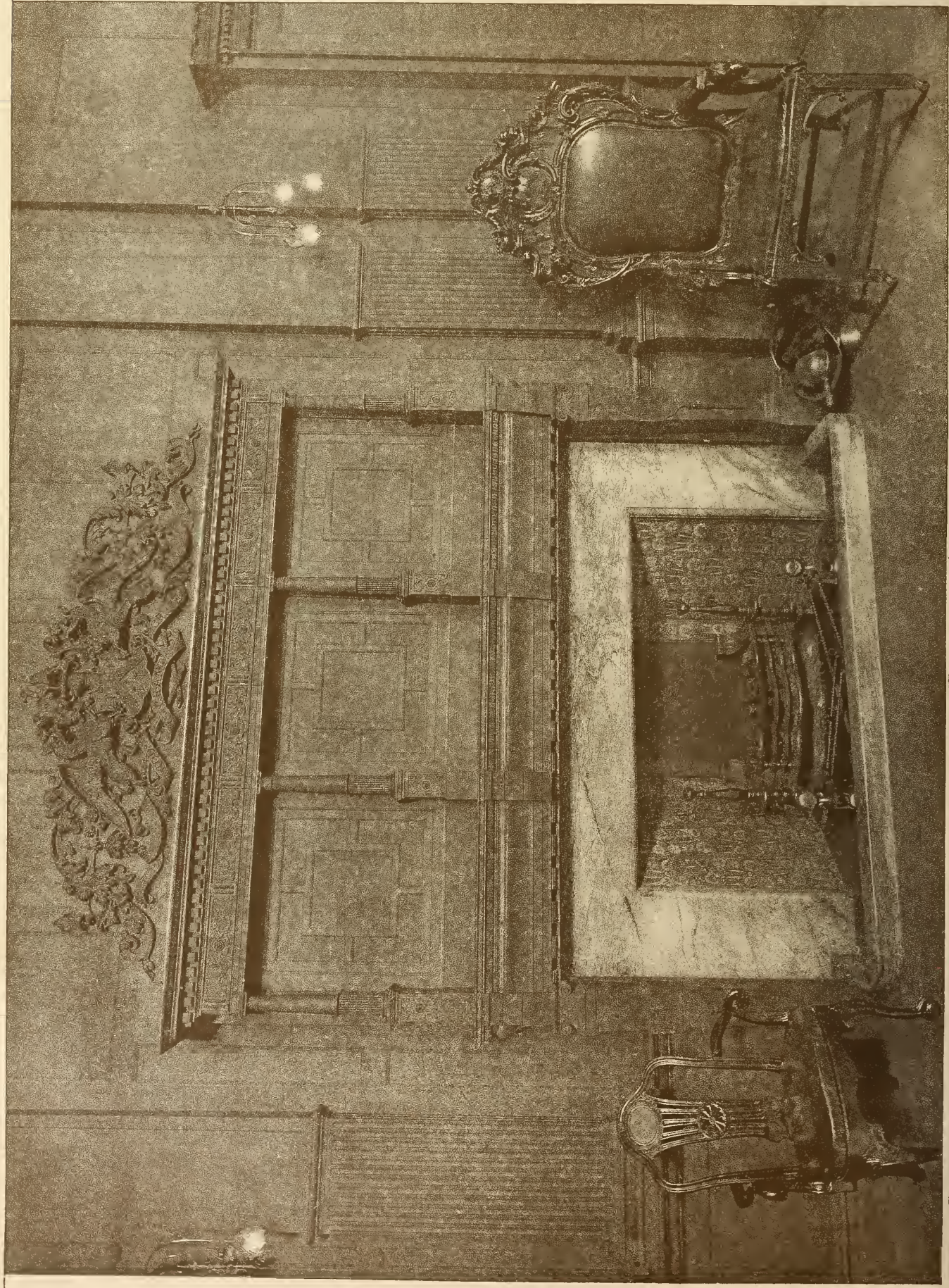
[illegible]

SECTION THROUGH GARDEN ENTRANCE ON LINE A-B:



HALF PLAN OF GARDEN ENTRANCE:

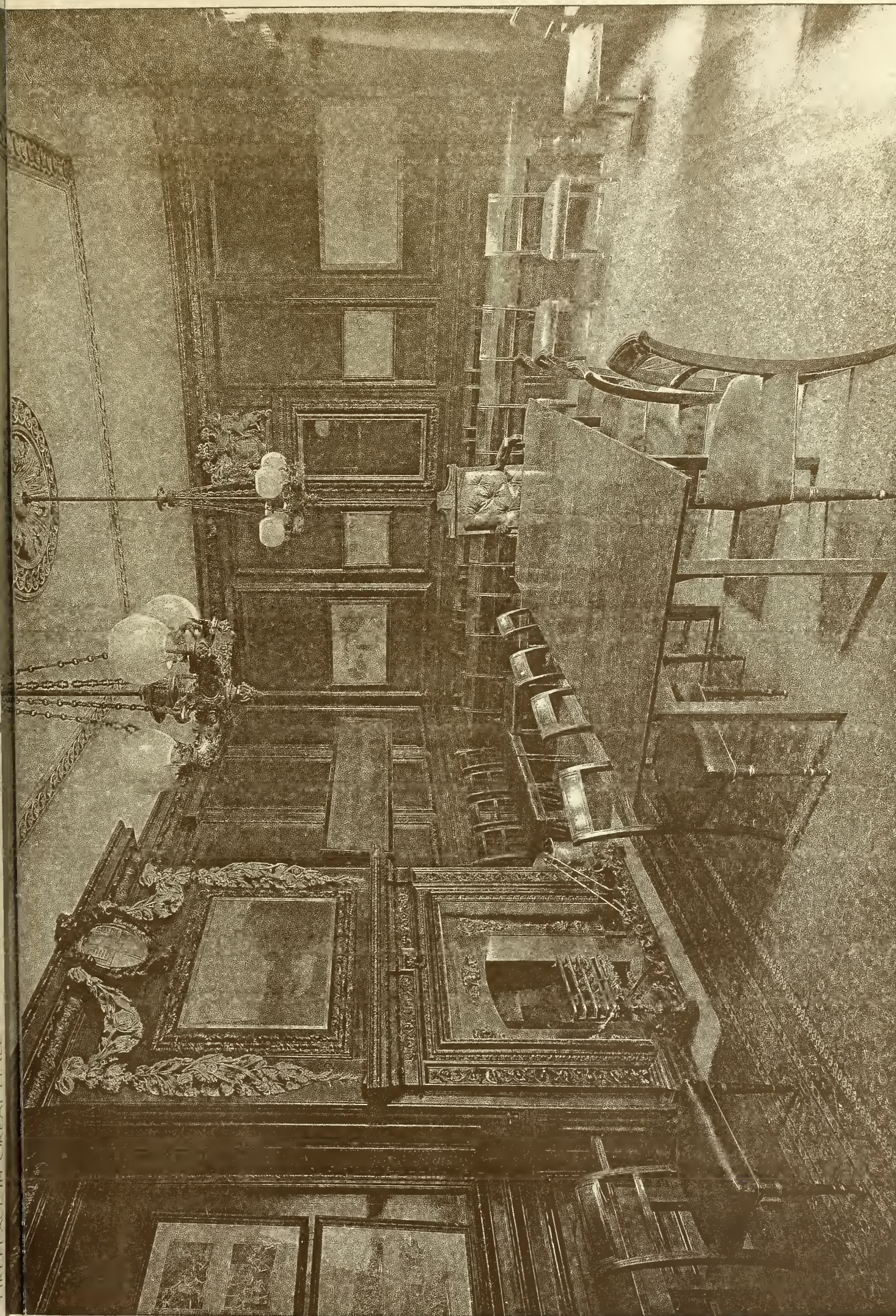
RIBA SILVER MEDAL AWARDED. HUGH P. C. MAULE



FIREPLACE IN GREAT HALL

HALL OF THE GROCERS' COMPANY

HENRY COWELL BOYES FRIBA ARCHT



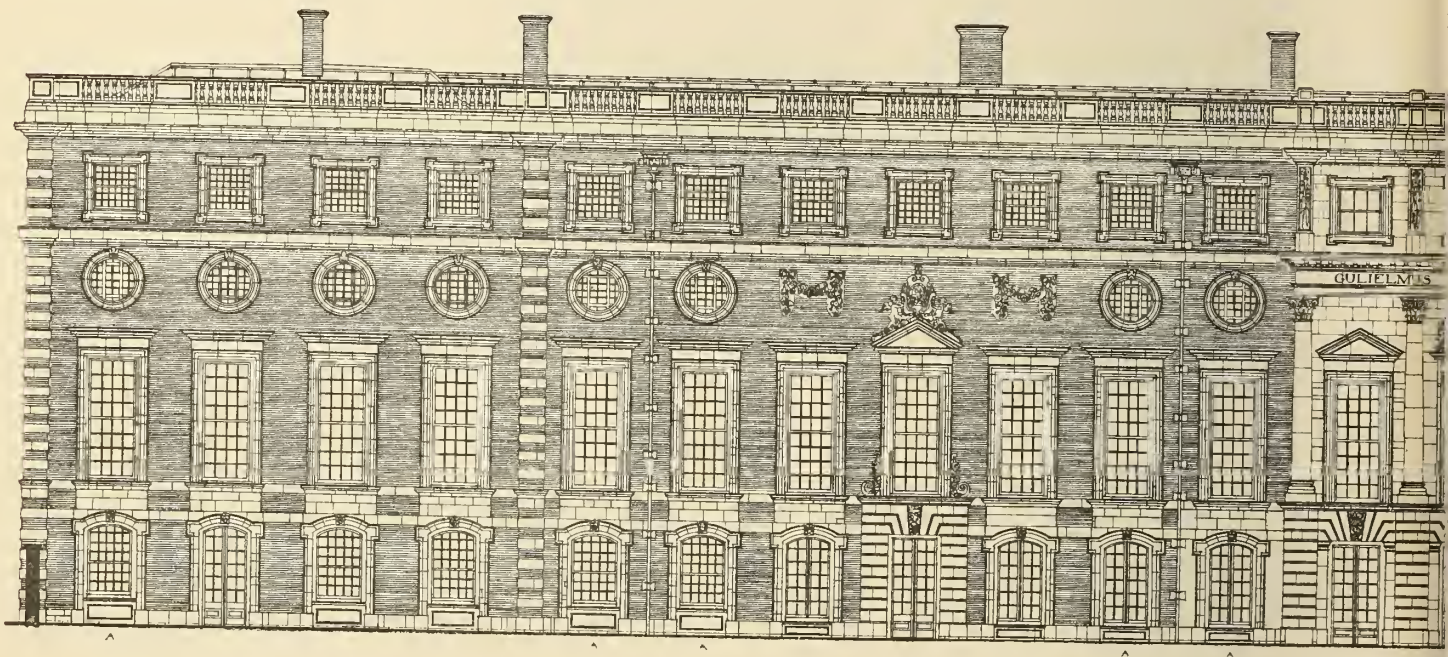
PHOTOGRAPHED WITH A SANDELL PLATE.

"PHOTO-TINT" by James Akerman 6 Queen Square London W.

THE CITY GUILDS No 28 THE HALL OF THE GIRDLE'S COMPANY



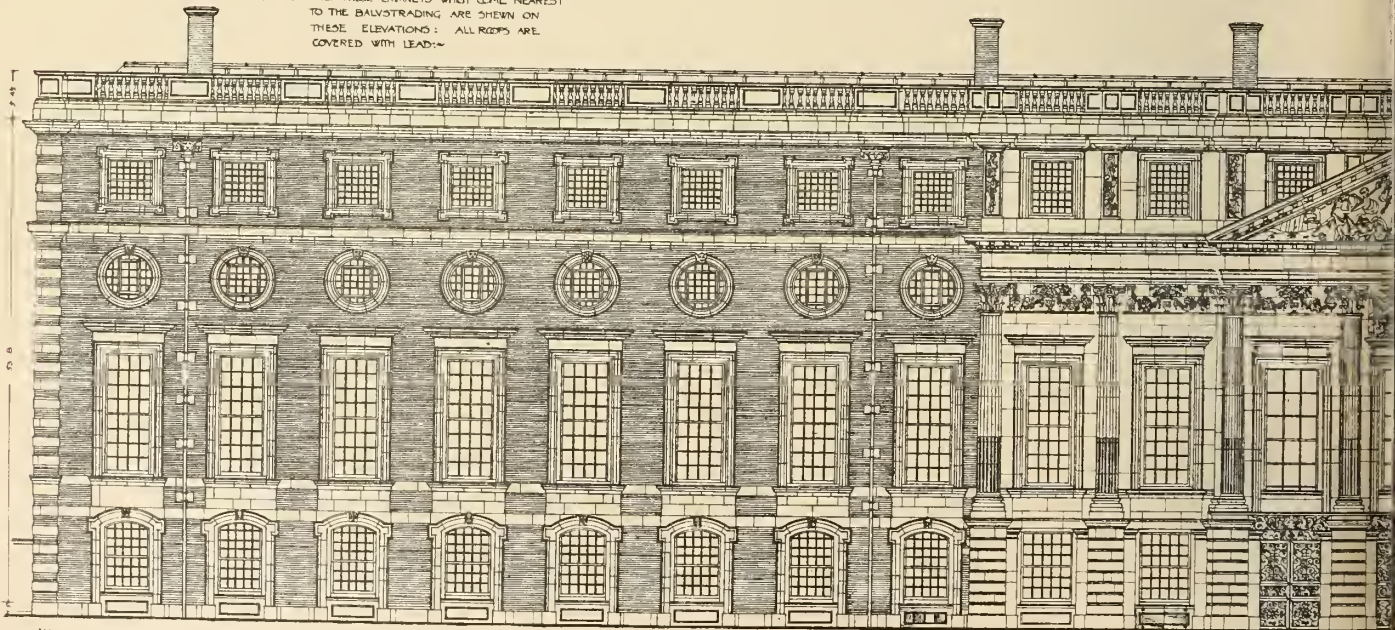
HAMPTON C



NOTE: ALL THE CARVED KEYSTONES ARE OF DIFFERENT DESIGN
THOSE TO GROUND FLOOR WINDOWS HAVE ALL BEEN
RESTORED. SECOND FLOOR WINDOWS MARKED A
UNDERNEATH, ARE CHAMPS, PAINTED TO LOOK LIKE THE OTHERS:-

ELEVATION

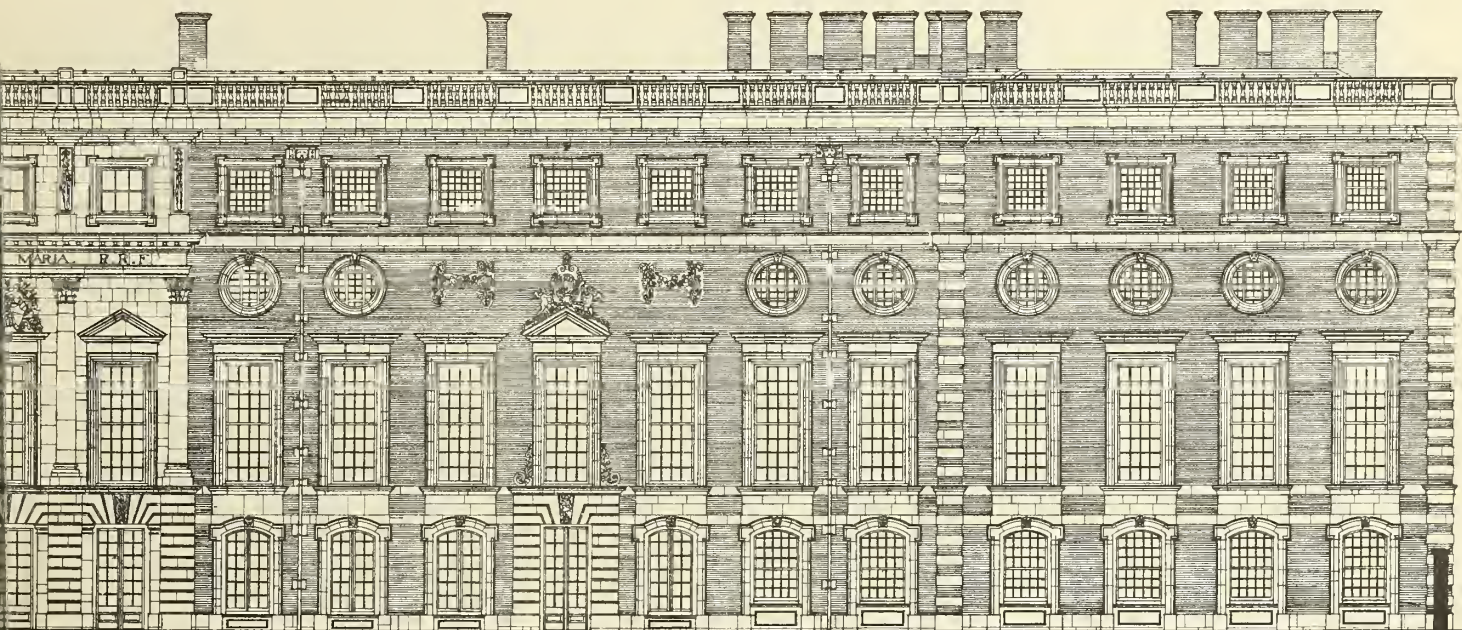
NOTE: ONLY THOSE CHIMNEYS WHICH COME NEAREST
TO THE BALUSTADING ARE SHOWN ON
THESE ELEVATIONS: ALL ROOFS ARE
COVERED WITH LEAD:-



NOTE: COMPARE THE NUMBER OF CHIMNEYS
AT EACH END OF THIS ELEVATION

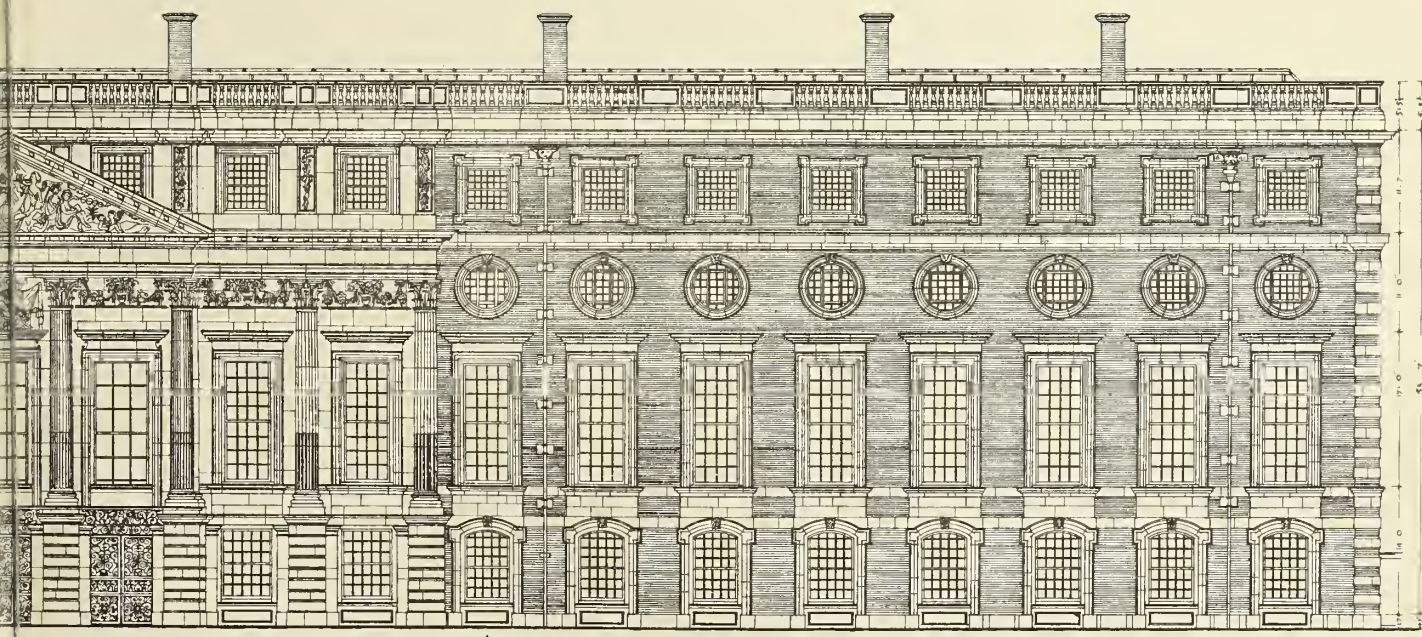
ELEVATION T

SVRT PALACE : (WREN:)



REPAIRED ABOUT EIGHT YEARS AGO.

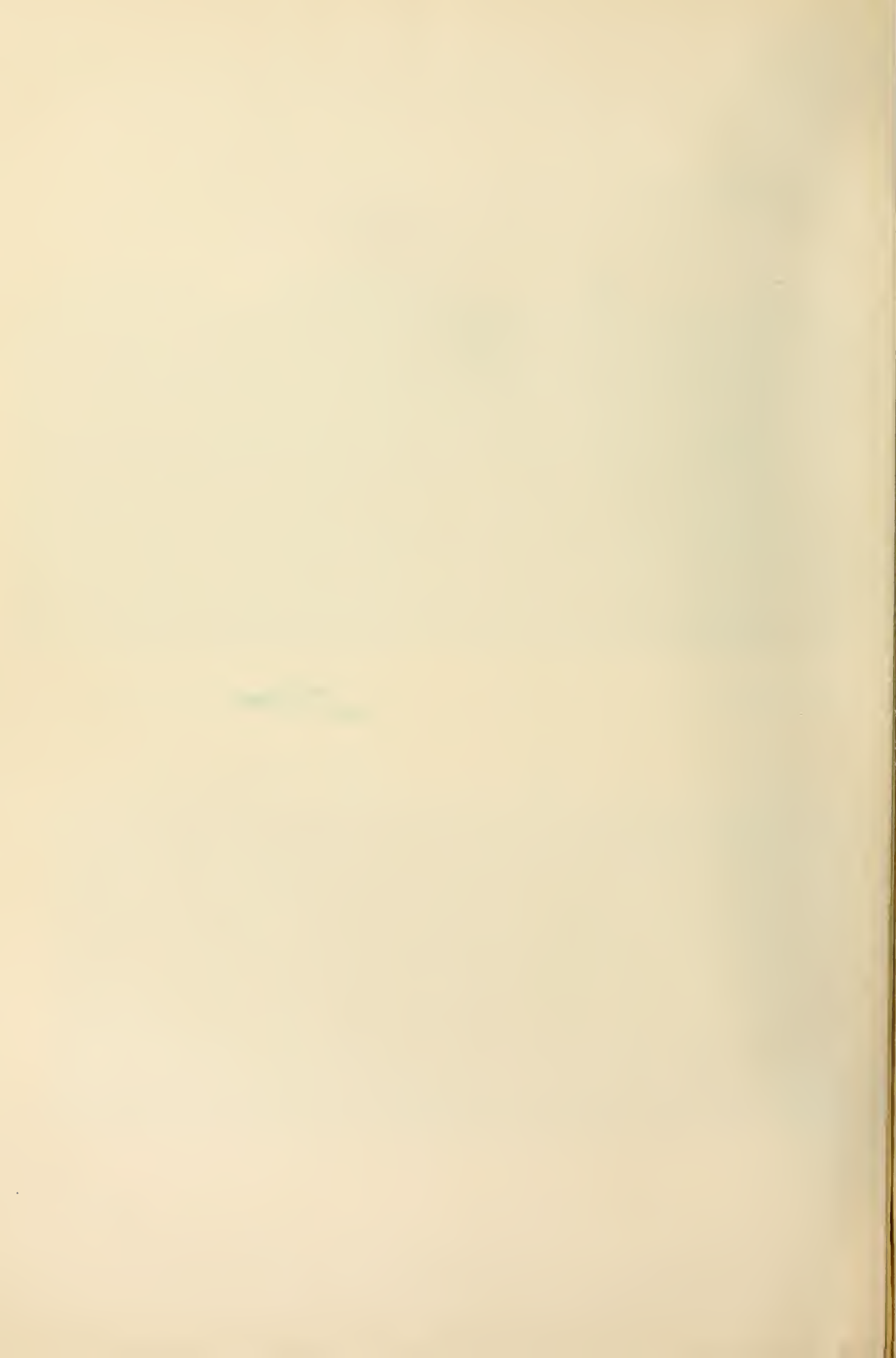
OWARDS RIVER :



OWARDS GARDEN :

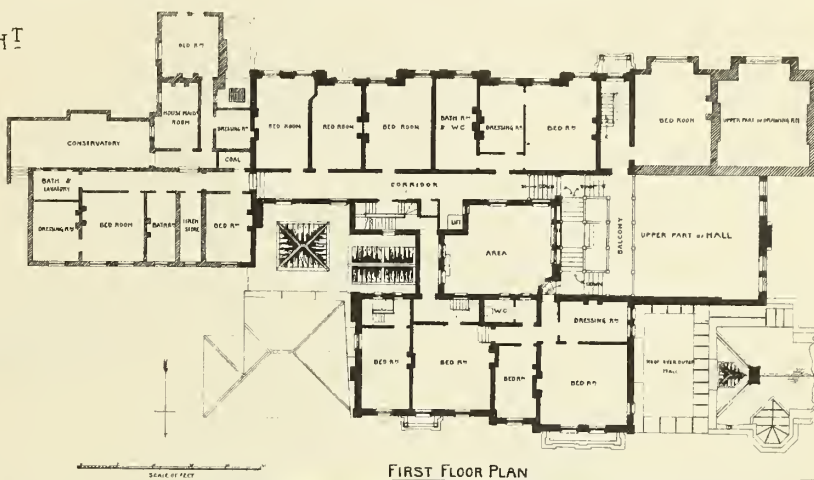
30 40 50 60 70 80 90 FEET

Hugh R. L. L. L.



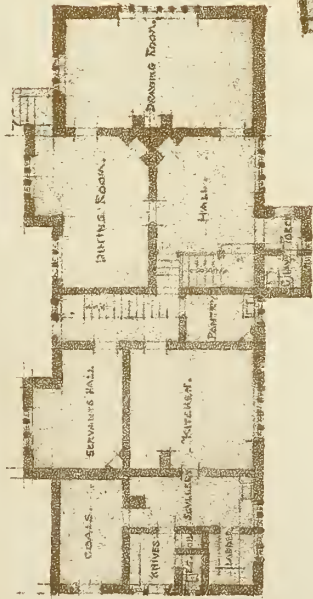
S. OCT^R 9, 1896.

AR · CONGLETON · THOS BOWER ARCHT

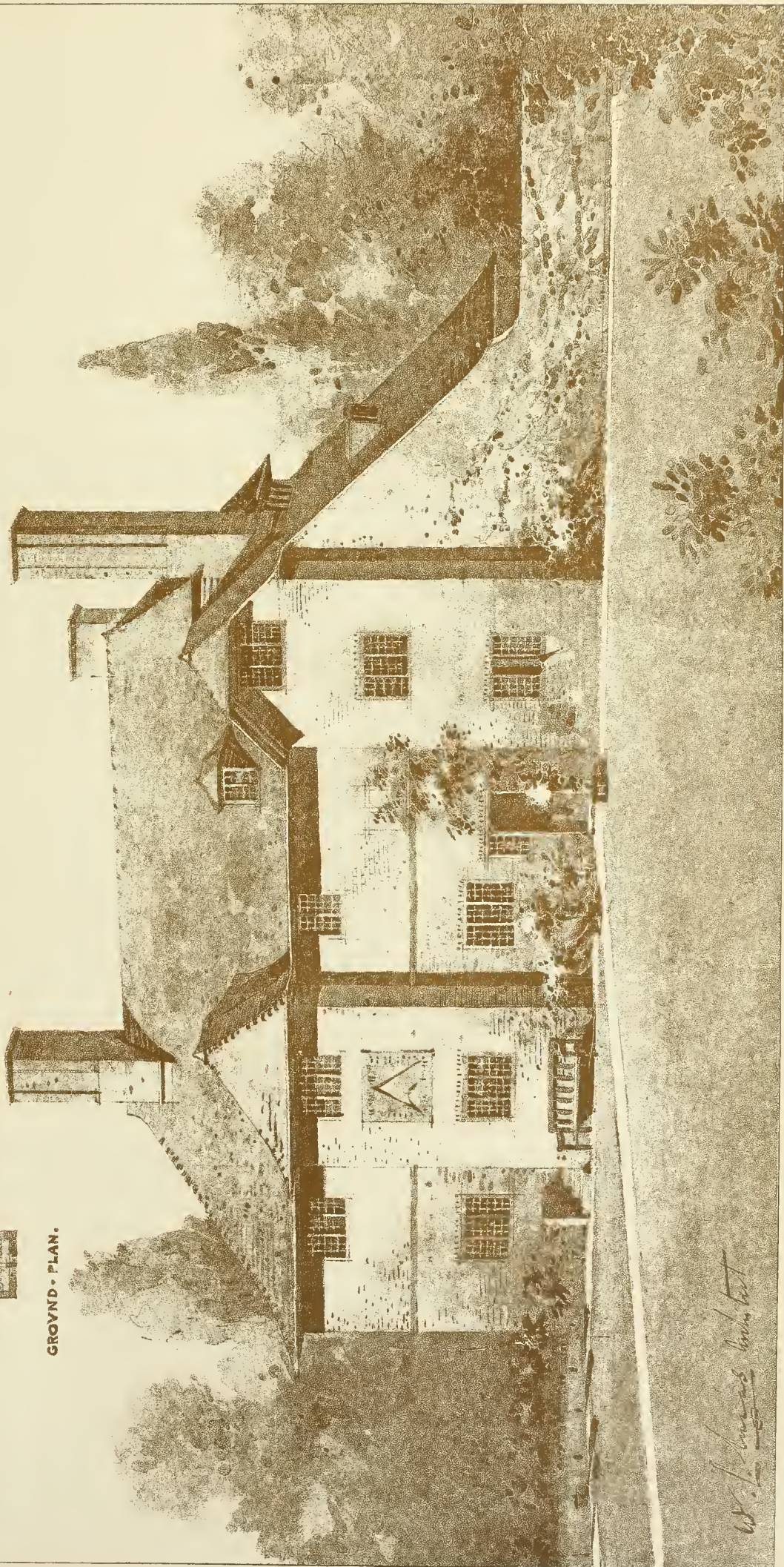


**COSMORE • HOVSE • HITCHIN.
FOR • MISS • KATE • CVRLING • HARRISON.**

W. L. LUCAS ARCHT.



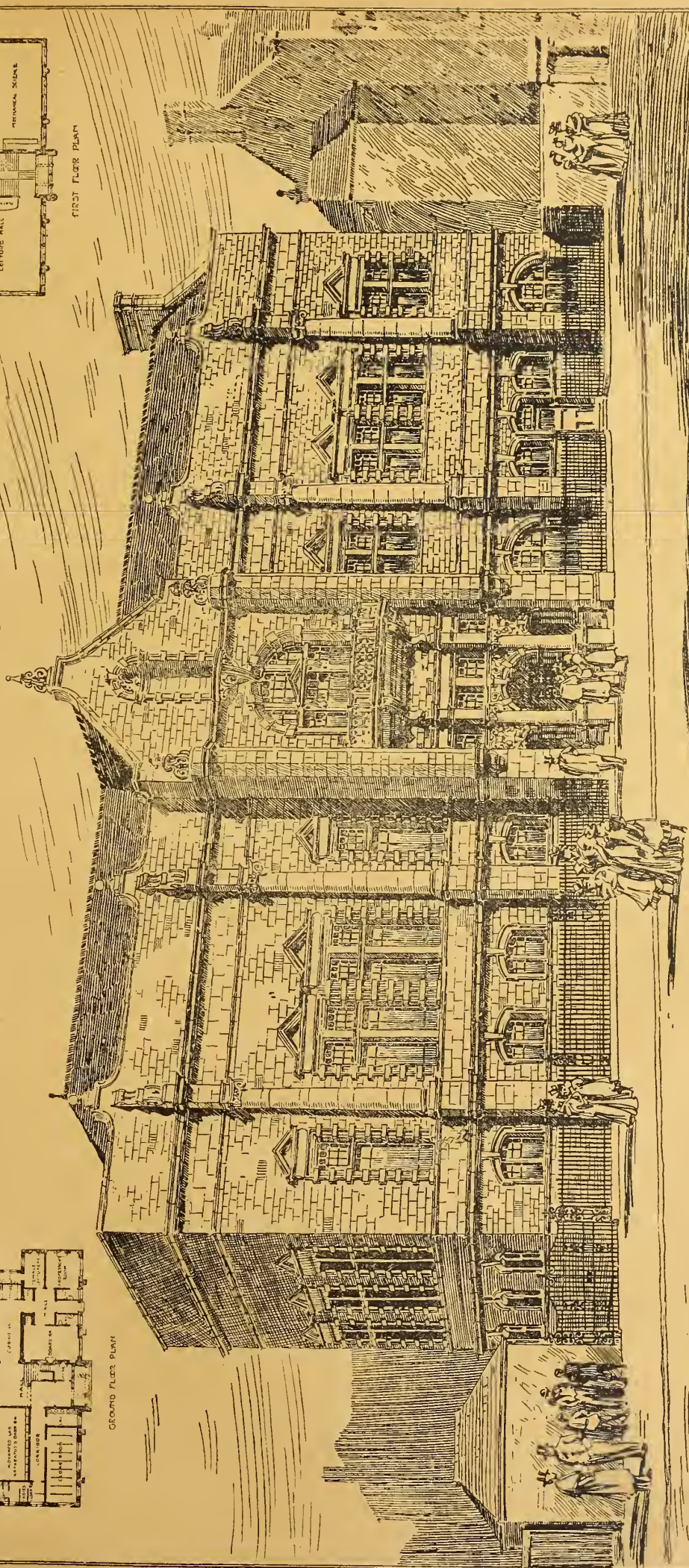
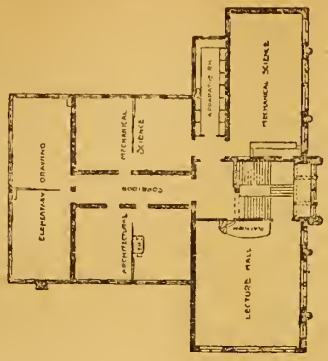
GROUND • PLAN.



W. L. Lucas Architect



TECHNICAL SCHOOL · PAISLEY · N.B.
SECOND · PREMIATED · DESIGN · BY · W.D. McLENNAN ARCHT.



TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. All communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondents.]

It is particularly requested that all drawings and all communications respecting illustrations or literary matter should be addressed to the EDITOR of the BUILDING NEWS, 332, Strand, W.C., and not to members of the staff by name. Delay is not unfrequently otherwise caused. All drawings and other communications are sent at contributors' risks, and the Editor will not undertake to pay for, or be liable for, unsought contributions.

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ADVERTISEMENT CHARGES.

The charge for Competition and Contract Advertisements, Public Companies, and all official advertisements is 1s. per line of Eight words, the first line counting as two, the minimum charge being 5s. for four lines.

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Front-page Advertisements 2s. per line, and Paragraph Advertisements 1s. per line. No Front-page or Paragraph Advertisement inserted for less than 5s.

Advertisements for the current week must reach the office not later than 3 p.m. on Thursday. Front-page Advertisements and alterations in serial advertisements must reach the office by Tuesday morning to secure insertion.

SITUATIONS.

The charge for advertisements for "Situations Vacant" or "Situations Wanted" is ONE SHILLING FOR TWENTY-FOUR WORDS, and Sixpence for every eight words after. All Situation Advertisements must be prepaid.

NOTICE.

Bound copies of Vol. LXIX. are now ready, and should be ordered early (price Twelve Shillings each), as only a limited number are done up. A few bound volumes of Vols. XXXIX., XL., XLI., XLVI., XLIX., LI., LII., LIV., LVIII., LIX., LX., LXI., LXII., LXIII., LXIV., LXV., LXVI., LXVII., LXVIII. may still be had, price Twelve Shillings; all the other bound volumes are out of print. Most of the back numbers of former volumes are, however, to be had singly. Subscribers requiring any back numbers to complete volume just ended should order at once, as many of them soon run out of print.

RECEIVED.—F. H. and Co.—S. B. Horwell.—Architect.—F. E.—T. E. R. and Co.—E. A. (Cambridge).

Correspondence.

THE SOCIETY OF DESIGNERS.

To the Editor of the BUILDING NEWS.

SIR,—Will you kindly place before the notice of your readers that this society has for its main object the emancipation of our brotherhood from the tyrannies of "Commercialism," or if not possible, at any rate to help each other for betterment as well as social elevation?

At the same time, our society is in no way connected or akin to the "Arts and Crafts," for which it has no sympathies; the former includes manufacturers, whilst the latter only appeals to our profession.

Whilst thanking you, Sir, for the kind report in your able journal,—I am, &c.,

ABOL. JOTQUET,

Membre du Comité des Dessinateurs de Londres, et le Représentant du Journal des Artistes de France.

The foundation stone of the Glasgow Bridge was laid with much ceremony yesterday (Thursday).

At a meeting in the Clyde Trust Offices at Glasgow on Tuesday, Mr. Wm. Forrest, City Sawmills, was appointed a ratepayers' representative on the Trust, in room of the late Alexander Mitchell, timber broker.

The London County Council discussed on Tuesday a motion by Mr. H. Marks, M.P., providing that in making future contracts the General Purposes Committee may take into consideration the question that higher wages are paid by London firms. This was opposed by various members, one of whom remarked that if the Council put a ring fence round London, the large provincial towns would retaliate. The motion was rejected.

Intercommunication.

QUESTIONS.

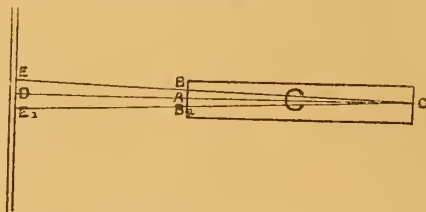
[11565.]—**History.**—I shall be much obliged if any of your readers would tell me the best way to get up the History of Architecture, Mouldings, Features, and Ornament, for the Final R.I.B.A. (taking the Gothic papers), and the list of books I shall require.—STUDENT.

[11566.]—**Yearly Consumption of Lead Piping.**—We should esteem it a great favour if some reader can give us the approximate annual estimated expenditure in soil and drain pipes or drain-ventilating pipes in London and environs, and in some of the principal towns in the United Kingdom.—B. AND E.

[11567.]—**Builder's Book-keeping.**—I would feel obliged if some reader could recommend a complete and accurate system of book-keeping for builder's concern. Is there any book published on the general management of builder's business?—ACCOUNTANT.

REPLIES.

[11553.]—**Testing Levels.**—The following is Heather's method of detecting and correcting the "error of collimation," or the axis of the tube of the telescope:—If the level be in adjustment, the line of sight or the axis of the instrument will be set truly horizontal. In the figure, let C be the telescope, O the point of sight, A the focus of the diaphragm carrying the cross-wires, and O A the line of sight when the instrument is adjusted.



Then any vertical object will be bisected by a prolongation of the line of sight O A through the telescope. Supposing the diaphragm to have become deranged, so that the point of intersection of the cross-wire be at B, then the level is out of adjustment, and the vertical object will be bisected at E below D. To adjust the level, turn the telescope half-round in the Y's, taking a sight through O B, the line which was formerly O A, and an intersection in the vertical object above D is the result. This latter point (E) is as much above D as E was below it; consequently the true level point is midway between E and B. The diaphragm must now be moved till the point of intersection of the cross-wires coincides with the true level point. By tightening one of the four capstan-screws near the eye end of the telescope and easing the one directly opposite, the diaphragm can be put into the required position. Now turn the telescope round again upon the Y's, and, if the same point be still bisected, the level is adjusted. If not, the same process of adjustment must be repeated till every position of the telescope bisects the same point.—F. E. YEWDALE.

[11553.]—**Notes on Domestic Drainage.**—In reply to the query respecting the thickness of lead pipes, if reference is again made to the issue of 27th March last, it will be observed that the weights given under the head of "strong" lead pipe are those required to comply with the regulations of water companies, for use as service pipes—viz.:—

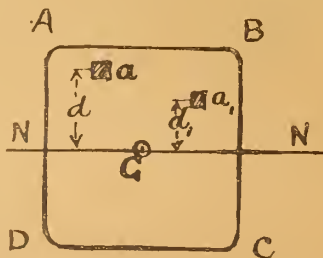
1½ in.	= 16lb per yard run
1½ in.	= 18lb. " "
2 in.	= 24lb. " "

A cursory examination of these weights shows that, compared with their respective diameters, the 1½ in. pipe is relatively lighter, and consequently thinner than those for 1½ in. and 2 in. pipes. The thicknesses given for those weights are correct so far as they can be expressed to two places of decimals. To be exact, it will be found that—

1½ in. dia. lead pipe	23 in. thick	weighs 15.870 lb. per yd run
1½ in.	" "	" 22 in. " " 17.635 lb. " "
2 in.	" "	" 23 in. " " 23.909 lb. " "

In compiling the table referred to, these thicknesses were given for lead pipes weighing 16 lb., 18 lb., and 24 lb. respectively, as being sufficiently accurate for practical purposes. If required extra strong, 1½ in. lead pipe weighing 21 lb. per yard run can be obtained.—THE WRITER OF THE "NOTES."

[11563.]—**Inertia.**—The term "moment of inertia" may be roughly defined as an abstract quantity, expressing the relative value of the form of any plane figure to



resist rotation about an axis lying in its plane when that figure is exposed to parallel forces which increase in intensity with their distance from the axis. In the case of a beam, its cross-section is the figure whose moment of inertia is desired. Thus, in the annexed figure, let ABCD represent the cross-section of a beam, whose

neutral axis NN passes through the centre of gravity G of the section. Suppose a to be a small part of the area. If we multiply this small area a by the square of its distance d from NN we obtain what is termed the "moment of inertia"— $a d^2$ —of the small area considered, with respect to the axis NN. Another small piece a_1 must be multiplied by its distance d_1 squared, giving its moment of inertia $a_1 d_1^2$. A third piece must be taken and treated in like manner, and so on until the whole area ABCD has been covered. The sum of all these moments will give the mom. of inertia of the whole section, or, in algebraic language—

$$I = a d^2 + a_1 d_1^2 + a_2 d_2^2 + \dots$$

To obtain an exact result, the little areas taken must be taken indefinitely small, and hence infinite in number; this operation, in most cases, requires the aid of the integral calculus. The values of I for various beam sections are tabulated in several works of reference, and may be obtained from Molesworth's "Pocket-book" (22nd Edition, p. 123). Sections of irregular shape may be dealt with by a somewhat troublesome graphic process (idem, p. 129). Some manufacturers of constructional iron and steel work now publish the Moments of Inertia of the various sections made by them, in their trade lists of sections, so as to be readily available for practical calculations. (See also reply No. 11425, BUILDING NEWS, Sept. 27, 1895.)—H. B. S. B. B.

CHIPS.

A stained-glass window was unveiled last week in the parish church of St. George, Salop. It illustrates the parable of the "Good Samaritan," and has been executed by Messrs. Ward and Hughes, of London.

New board schools at Llangold, county Anglesey, were opened on Monday. They have cost £2,000, and have been constructed from designs by Mr. Glynne Davies, of Bangor.

The pseudo-Roman stuccoed front of Furnival's Inn in Holborn, is about to be reconstructed, and at their meeting on Tuesday, the City Commissioners of Sewers agreed to a new building line on the give-and-take principle, by which an improvement will be effected in the thoroughfare.

The Earl of Lathom laid on Tuesday the foundation stone of new schools to be erected in Holy Trinity parish, Southport, on the site of old schools which were destroyed by fire in January last.

Last week was a very dull one at the Auction Mart, the aggregate for five days being only £22,465. Leasehold ground-rents and brick and mortar investments formed the staple of the business done, residential properties and land falling very flat. The supply generally was short, and at present the signs of improvement in this respect are not very encouraging, as, with few exceptions, the forthcoming sales this month are, as a rule, of an unimportant character. In the North of England, on the other hand, there is every prospect of a busy season.

The Unitarian Chapel in Elder-yard, off Skeltergate, Chesterfield, which was built in 1694, is being renovated at a cost of £1,000. Several fresh windows have been put in, a new vestry has been built, and the old one converted into an organ chamber. The gallery has been refloored and re-seated, and the body of the chapel is being refloored with wood. Messrs. R. Wragg and Sons have in hand the masonry; Mr. Charles Rollinson the woodwork; Mr. Goodwin the painting; Mr. F. Hill the plastering; and Mr. Mitchell, the plumbing. A new heating apparatus is being supplied by Messrs. Newton, Chambers, and Co., and the organ is being rebuilt by Keats, of Sheffield.

At Oxtown, Birkenhead, a new church of SS. Michael and All Angels is being built from designs by Messrs. F. and G. Holme, of Liverpool, selected in competition. The style is Early English, and a wide nave, with aisles and transepts and a chancel, will provide accommodation for 800 persons. The contractor is Mr. William Hall, of Liverpool.

An important improvement scheme was adopted on Friday at the meeting of the Hull Town Council. It was decided to construct a new street from the corner of Savile and Waterworks-streets to Prospect-street, and to extend George-street through to Prospect-street. The net cost will not exceed £41,000, but will result in the future in a financial gain to the Corporation.

Another stage in the evolution of the Church House is in contemplation. The Bishop of London is about to make an appeal for funds for the erection of a block of buildings to comprise, among other features, a permanent assembly-hall for the House of Laymen. This new building is estimated to cost £18,000, and it is intended to dedicate it to the memory of the late Mr. Henry Hoare, who took a prominent part in the revival of Convocation.

At Heatou, near Bradford, a new Baptist chapel, built at a cost of £4,000, was opened last week. The chapel is Gothic in style, and is faced with local stone. The rostrum and seats are of pitch-pine, and accommodation is provided for 400 persons in the area, and another 100 in the gallery. In the basement are an assembly-hall seated for 250 persons, classrooms, and a small mortuary chapel. Mr. John Jackson, of Bradford, was the architect.

LEGAL INTELLIGENCE.

IN RE ISAAC JACKSON.—The examination in bankruptcy has been concluded of Isaac Jackson, who traded as a builder at 230, Clapham-road. The ranking liabilities were returned at £2,665, and a deficiency of £2,101 was disclosed. The debtor commenced business in June, 1893, at 68, Lansdowne-road, Clapham, and in March, 1895, removed to the above address.

IN RE H. H. BRIDGMAN.—An adjourned first meeting of creditors was held on October 1 under a receiving order made against Henry Hewitt Bridgman, described as an architect and surveyor, of 12, Poultry, E.C. The debtor, who is a Common Councillor, commenced business in 1872, and during the last 15 years he has been engaged in building speculations in Camden Town and the City, and also in acquiring house property in London and Brighton. The liabilities are returned at £29,820, of which £5,873 are unsecured, with an estimated surplus in assets of £5,346. The debtor attributes his present position to his inability, through illness, to attend to his business during the present year, and also to his inability to dispose of his properties on advantageous terms. A proposal submitted by the debtor was not carried, and the proceedings were ultimately adjourned until November 2 next, the debtor intimating that in the meantime he would apply to the Court for leave to bring in a fresh proposal. In the event of this not being granted the creditors resolved that the debtor should then be adjudicated bankrupt.

BREACH OF BUILDING BY-LAWS.—At the Stipendiary's Court, Stoke-on-Trent, recently, John Sadler, builder and property owner, Basford, was summoned for a contravention of the borough by-laws by erecting a new building at the back of his house, and making certain alterations at the front and back of the house, without giving written notice of the same and depositing plans with the borough surveyor. Mr. W. Bowen, borough surveyor, proved the case. The defendant said he was simply improving the property, and his offence was an oversight rather than an attempt to set the municipal authorities at defiance. The town clerk said the corporation had had more trouble with Mr. Sadler than any other builder. The stipendiary remarked that a man who had built fifty houses in the town ought to know the by-laws. He fined the defendant £2 and costs.

On Saturday the Bishop of Marlborough laid the foundation-stone of the new church at St. Margaret's, Islsworth, which takes the place of an iron structure. The building is to be in the Early English style. At present it is only intended to erect the nave and aisles, baptistery, two west porches, vestry, and heating chamber, with a temporary east end of apsidal form.

The attention of the general purposes committee of the Corporation has been directed to the urgent necessity for the redecoration of the Mansion-house, and especially of the interior of the Egyptian Hall, which has not been touched since 1869. An estimate of the cost of the various works necessary and of new furniture amounts to £7,533, of which about £3,000 will be required for the Egyptian Hall, to include the provision of a parquet floor. A report by the committee to that effect will be brought up at the next meeting of the Court of Common Council.

The Bishop of Marlborough laid the foundation-stone of the new church of St. Margaret's, Islsworth, on Saturday afternoon.

The newly-erected chapel of Weymouth College was dedicated to St. Michael and All Angels by the Bishop of Salisbury on Tuesday. The chapel accommodates between 200 and 300 boys.

In a few weeks the first portion of the Jungfrau Railway, consisting of a tunnel and embankment from the Scheideg, on the railway between Grindelwald and the Wengern Alp, to the Eiger, will be completed. Thence a further tunnel will ascend through the mountain and under the Eiger glacier. After passing through the Monch it will be continued to the Jungfrau, and will gradually reach the summit of the latter peak, at an altitude of 13,000ft., the line to be completed in six years' time.

The Emperor of Austria opened, on Sunday, the Francis Joseph Bridge over the Danube, the third which connects Pesth with Buda. Its erection has cost two-and-a-quarter million florins.

At Norwich, on Wednesday week, a sheriff's court was held to appraise the value, under the Lands Clauses Act, of some cottage property in Rupert-street, Heigham, which the corporation desired to take to effect a street improvement. The owner valued the property at £870, and called as witnesses Mr. F. Nash, of Clowes and Nash, valuers, whose estimate was £903, and Mr. S. M. Mills, auctioneer, £820; while for the corporation, Mr. F. Horney, the surveyor to the city municipal charities, estimated the value at £679. The jury returned a verdict of £775.

WATER SUPPLY AND SANITARY MATTERS.

ELLESMERE.—The urban district council of Ellesmere held a special meeting on Friday to consider the scheme for the supply of water from the Vyrnwy main of the Liverpool Corporation. A report was received from Mr. Stooke, the council's engineer, estimating the cost of laying the pipes from the valve-house to the town hall at £2,948 15s. 4d., and advising the council to advertise the work in three contracts:—First, for cast-iron pipes; secondly, for the fittings, valves, &c.; and, thirdly, for the actual work of excavation and laying the pipes. A report was read from Mr. Parry, the water engineer to the Liverpool Corporation, estimating the cost of laying the pipes from the valve-house to the town hall at £1,550, with a possibility of a further reduction of 10 per cent. After some discussion, Mr. Stooke was instructed to prepare specifications for the work, and to advertise for tenders.

GLASGOW.—A deputation of three members of the Glasgow Town Council, who were appointed some time ago to visit a number of English and Continental towns to inquire as to the different methods of drying sludge at sewage works, have now submitted their report to the Glasgow Sub-Committee on Sewage. In summing up the results of their inquiries, the deputation report that they are satisfied that the method of drying by hot air is the simplest and best, both as to efficiency and economy. The Sub-Committee recommend that the plan of the machine submitted by Mr. Thomas Melvin, the general manager, which has been altered to work with hot air instead of exhaust steam, be approved, and that works be erected in accordance with Mr. Melvin's plan, the estimated cost being £1,005, exclusive of buildings, shafting, &c.

CHIPS.

Mr. T. G. Young, of Hexham, has been appointed lecturer in surveying and building construction at the South-Eastern Agricultural College at Wye, Kent.

Mr. Paine, for many years the surveyor of roads to the Wenlock local board, died on Sunday week at Westwood, Salop, to which village he had retired, aged 87 years.

The Lanarkshire and Dumbartonshire Railway was opened for passenger and goods traffic on October 1st. The new line, which is in direct communication with the Caledonian Railway, runs from Glasgow along the north bank of the Clyde to Dumbarton, a distance of seventeen miles.

The new branch free library at East Dulwich, built at the cost of Mr. J. Passmore Edwards, will be opened by Sir Henry Irving on Saturday, the 24th inst.

Another of Wren's City churches, that of St. Michael, Wood-street, is about to be demolished. The church was burnt down during the Great Fire, and was rebuilt by Wren in 1675 at a cost of £1,675, the old tower and lead-covered spire (190ft. in height) being retained and repaired. It is an aisleless parallelogram, 63ft. by 43ft., and contains some good oak carving.

The foundation-stone of the new St. George's Hall and Institute, Millom, was laid last week by the Archdeacon of London. The institute is estimated to cost £1,100.

At Rignall, near Stamford, memorial stones have been laid of a school, class-rooms, and vestries, now being added to the Wesleyan Chapel. The contractors are Messrs. Hinson, of Stamford.

The ruined church of the Grey Friars at Elgin, consisting simply of the roofless walls and the end gables, has been acquired by the Roman Catholics, and is about to be restored at the cost of the Marquis of Bute, under the direction of Mr. Kinross, architect.

Mr. W. Douglas Wiles, Coalville, Leicester, has been recommended for the appointment of architectural assistant to the city engineer of Norwich.

The Barnsley Town Council decided at their last meeting to construct a new reservoir by day labour, under the supervision of Mr. Hawkesly, who will be paid a commission of 5 per cent. on the expenses of construction. They also voted honoraria of £450 to their town clerk and borough surveyor for services rendered in connection with the Water Bill of last session.

The free scholarships at King's College, London, given by the Worshipful Company of Carpenters, have been awarded to William Drake, of 3, Lechmore-road, Willesden-green, N.W., and Sidney A. Switzer, of 9, Derby-street, Gray's Inn-road.

The Garth Schools, near Bridgend, Glam., are being warmed and ventilated by means of Shorland's patent Manchester grates, the same being supplied by Messrs. E. H. Shorland and Brother, of Manchester.

Our Office Table.

THE opening meeting of the Architectural Association's School of Design will be held at the Studio, 56, Great Marlborough-street, W., next Tuesday evening, when an address will be delivered by Mr. W. R. Lethaby. The annual conversazione of the Association will be held, by permission of the Archbishop of Canterbury, at the new Church House in Dean's Yard, Westminster, on this day fortnight, Friday, the 23rd inst. The large meeting hall and the Convocation Hall will be placed at the disposal of the members, and a feature of the evening will be an exhibition of ecclesiastical drawings and works.

THE annual distribution of prizes presented by the Worshipful Company of Carpenters, in conjunction with the council of King's College, London, to the successful students in the architecture and building construction classes, the architectural studio, and the wood-carving classes at King's College, Great Titchfield-street and Kensington, was held on Friday night at the College, Strand. The Rev. Dr. H. Wace presided. Prof. Banister Fletcher reported, in regard to the building construction and wood-carving classes, that there were 79 students in attendance, as against 75 in the previous year, and 42 the year before. Architecture had been added to the evening curriculum at the request of the London County Council, who had made a grant for that purpose. The examining judges were much impressed by the marked improvement in the work of the school. Mr. Jesse Jacob (the Master of the Worshipful Company of Carpenters) proceeded to distribute the prizes. The Rev. Dr. Wace, in thanking the Carpenters' Company for the assistance it had given to these classes, said he could not believe that the superiority in technical arts claimed for Germany over England was permanent; but, so far as it had existed, it had arisen from the fact that practical men in Germany had appreciated the necessity of combining scientific knowledge and training with practical work. That was what the council of the College, in conjunction with the Carpenters' Company, were doing in regard to these technical classes, and representatives of both bodies had met to consider how that great purpose of the union of scientific and practical work could best be carried out in all its branches. Mr. Jacob, in reply, assured the council of the College that the Carpenters' Company was anxious to do all that lay in its power to promote so good a cause, and said the Company spent on its own classes about £4,000 a year.

In his annual report as chairman of the London School Board, Lord Londonderry stated that the Board has now 448 schools open, accommodating 497,751 children, while there are also 18 new schools and 18 enlargements of schools, providing a total accommodation of 22,700 places, which are in the course of erection or for which tenders have been accepted; 31 enlargements, which will provide 10,160 places, have been sanctioned, 40 new sites have been, or are in the course of being, purchased. In addition, 16 sites for new schools have been scheduled during the session, and eight sites have been sanctioned, but have not yet been secured. When these buildings have been erected, 571,000 school places will have been provided, in addition to the 256,863 places given in non-board schools. In 1875 the average cost per head of sites was £4 15s. 3d., and of school buildings, including superintendence, was £9 2s. 9d. At Lady-day, 1896, upon the same basis, the average cost per head of sites was £6 14s. 3d.; and of school buildings, £12 18s. 3d. In regard to the increase in the cost of sites, the mere appreciation of the value of land in London during 20 years sufficiently accounted for the change. The increased cost of buildings was attributed by the chairman to the rise in materials and in labour, also to the much more stringent agreement adopted with contractors, and the more detailed supervision of the schools during erection.

THE committee of the Edinburgh Town Council, which has in hand the proposals for the new town hall, to be built at a cost of £100,000, given by Mr. Thomas Usher, has decided to recommend as a site the level area at the front of Castle Hill, embraced with Castle-terrace, Spittal-street, Grindley-street, and Coruwall-street. This site forms a compact block nearly square, surrounded on all sides by streets. It has a frontage to East Castle-terrace of 227ft., to Castle-terrace and

Spittal-street of 260ft., to Grindlay-street of 230ft., and to Cornwall-street of 282ft. 6in. With the exception of an hotel occupied by Mr. Lampard and two other business premises, the property now on the ground consists of tenement dwelling-houses. It contains an area of 6,731 square yards, is central, and yet sufficiently removed from main thoroughfares to secure it from noisy traffic. From the west end of Princes-street, near the University Club, the proposed building will form a prominent feature with the view, which includes the West Gardens, the Castle Rock, and the Synod Hall. On the other hand, the appropriation of this site does not involve injury to any view of the Castle or the destruction of any characteristic piece of architecture which cannot be replaced.

In consequence of the rapid development of the cycle-making industry Coventry has become overcrowded to an extent unknown in any other community of equal size. The price of vacant building land has steadily gone up, and is now quoted at 4s. per yard. Dr. Fenton, the medical officer of health, reports that there are upwards of 3,000 unsanitary houses out of the 12,500 dwellings in the city. During the past fortnight several town's meetings have been held calling the attention of the authorities to the need for house accommodation for the working classes. The city corporation have now entered into a contract to sell a piece of land in Red-lane at £400 per acre, for the erection of workmen's dwellings, and they have also referred to a committee the question of providing a scheme for building tenements in blocks, to be let to those tenants who, for sanitary reasons, are rendered homeless by the action of the city council. Since March last plans have been passed for the erection of 350 houses suitable for artisans, and another hundred applications will be considered this week, whereas the average number of new houses for the past four years has been only 150 per annum. In the opinion of the borough surveyor, there is land available for an increase in the population of 7,500, assuming prices could be arranged, and the various sites built upon. Not only is the town overcrowded at present, but in every direction new factories are being built and others extended to provide employment for additional men. Within a stone-throw of the station the new Beeston Company is erecting a building covering seven acres, which will find employment for about a thousand hands. Other new buildings are either in progress or contemplated by J. K. Starley and Co. (which, when finished, will probably be the largest in the district), Allard and Co., the Triumph Cycle Company, and extensions of existing premises are being made by the Humber Company, the Rudge-Whitworth, Coventry Machinist Company, and the Sparkbrook Machinist Company, besides premises for several new motor-car companies that have been formed. It is computed that 500 artisans' houses are required to meet the existing conditions, and that another 500 would be needed to provide for the prospective influx of workmen caused by the extension of the cycle and other industries. Private enterprise does not seem to be able to overtake the difficulty, and the corporation have refused to put into force the provisions of the Artisans' Dwellings Acts.

At the Birmingham Art Gallery Mr. Whitworth Wallis has brought together a loan collection of nearly two hundred paintings in oil and water colours by William J. Müller, of Bristol (1812-45). The exhibition, which was opened on Tuesday, illustrates the freshness, vigour, individuality, and versatility of this brilliant young artist's works. Among the exhibits (chiefly landscapes and genre subjects) are "Bel-bucks at (oring)," "The Piazzetta at Venice," "The Chess Players" (two versions), "The Money Changer," "Turkish Merchants in the Valley of Xanthus," "Carnarvon Castle" (from the Tate collection), and "The Bird Trap." Müller is represented by three paintings in the permanent collection at Birmingham, and by two landscapes at the National Gallery.

A FINE-ART exhibition was opened at Galashells on Saturday, the only display of this kind seen in that Border town for fourteen years. The place of honour on the walls has been accorded to Sir George Reid's "St. Mary's Loch." Israel is represented by two interiors, the late Lord Leighton by "Teresina," painted twenty years ago; H. W. Mesdag by three sea pieces, Tom Scott by "The Moss Trooper" and four small landscapes; Paton Reid by an Eastern market scene, and Scott Lauder by "The Ten Virgins."

Andrew Black sends a number of architectural drawings, and Tait Brothers show several decorative schemes in colour—one Elizabethan, another Greek, and a third distinctively Scottish in character.

The Light Railway Commission, appointed by Act of Parliament in last session to give assistance to would-be promoters of light railways throughout Great Britain, has now been given temporary offices at 23, Great George-street, Westminster, where all plans of light railways must be considered before the end of December next. Every application going before the Commissioners must be accompanied by a full statement of the proposed light railway, gauge, motive power, county and parish where proposed, advance of money, requisition, and a certificate that a fee of £50 has been paid to the Board of Trade. The commissioners are now quite ready to advise applicants with the desire of constructing light railways in the procedure necessary. The commissioners are the Earl of Jersey, Colonel G. F. O. Boughy, R.E., and Mr. Gerald FitzGerald, and Mr. Bret Ince is the secretary.

The annual general meeting of the Sanitary Inspectors' Association was held on Saturday evening at Carpenters' Hall, London Wall, Mr. H. Thomas, of Bermondsey, presiding. The report of the council, which was adopted on the motion of the chairman, referred to the work carried on during the past year, special reference being made to the formation of several provincial branches. The membership, it was stated, was increasing by leaps and bounds, the number having risen from 295 last year to 525 at the end of the period under review. They hoped in the course of time to enrol every sanitary inspector and inspector of nuisances in the United Kingdom as members of the association. Then, and only then, would they be able to command the attention of the Government and demand their just rights—namely, security of tenure of office, fair salaries, and superannuation when incapacitated through old age and infirmities. During the evening 23 additional members and two associates were elected, and Mr. W. W. West, of Walthamstow, was chosen chairman of the council for the ensuing year.

In order to facilitate certain family arrangements, Messrs. Hayward Brothers and Eckstein, of Union-street, Borough, London, S.E., have converted their business into a private limited company, under style of Hayward Brothers and Eckstein, limited. The business will remain under the management of the partners in the late firm, who will act as directors of the company. All liabilities of the late firm will be discharged by the company, and all debts due to the late firm should be paid to the company. We are sure the support hitherto given to the old and well-known firm will be extended and increased to the new company.

THE *employés* of Mr. George Ferguson, sen., of Lenzie, commemorated on Friday night the completion of his fifty years' experience as a master wright and contractor in Glasgow. Mr. McKinnon acted as chairman, and Messrs. Mercer and McPhail were the croupiers at a supper, which took place in Buchanan-street Station Hotel, Glasgow. Mr. Mercer read an illuminated address in which Mr. Ferguson's *employés* testified their respect for their master. On the conclusion of the reading, the address was placed in the gold casket which had been prepared for its reception, and was presented to Mr. Ferguson by Mr. Logie, the shop foreman. Mr. Ferguson having accepted the casket and address, thanked his men in suitable terms for their expression of goodwill. During the evening songs, recitations, and violin solos were contributed by some of those present. Mr. Ferguson has been longer in business than any other Glasgow master joiner now living, and during his fifty years of business life has carried out some important contracts. Among the buildings of which Mr. Ferguson has executed the wright, carpenter, and joiner work may be mentioned—the house in Dumbartonshire from which Lord Overton takes his title, mansions for Sir John Watson of Earnock, Mr. Kirkman Finlay of Dunlosil, Islay; Mr. Victor Coats, and Mr. James Dickson, near Belfast; Lord Provost Ure, at Cairndhu; Mr. James Coats, at Strone; as well as many others along the shores of the Firth of Clyde. Other works were the mills and half-time schools for Messrs. J. and P. Coats, at Paisley; Lady Mary Hozier Convalescent Homes, Lanark; the Municipal Buildings at Hamilton

and Coatbridge; and the Botanic Gardens Railway Station, Glasgow. Among Mr. Ferguson's present contracts are the Art Galleries, Kelvin-grove; Hartwood Asylum, Shotts; schools and hospital, Clydebank; Bridgeton Cross and Possil new stations, and air-shaft for the Caledonian Railway Company; and new buildings for Messrs. Wordie and Co.

MEETINGS FOR THE ENSUING WEEK.

TUESDAY.—Opening Meeting of the A.A. School of Design, 56, Great Marlborough-street, W. Address by W. R. Lethaby. 7.30 p.m.

CHIPS.

The Indian Forest Report for the past year will shortly be published, and will show that the net revenue from Indian forests is about 80 lakhs, or about $4\frac{1}{2}$ lakhs better than the results of the previous year.

At St. Margaret's Church, Ward End, Aston, a stained-glass window was unveiled on Monday. The subject is St. Luke the Evangelist, and has been executed by Messrs. J. Hardman and Son, of Birmingham.

An oak reredos, designed by Mr. W. Hilton Nash, F.R.I.B.A., of London, and executed by Messrs. Harry Hems and Sons, of Exeter, has just been placed in the parish church of Faruborough, Kent. It is Early Perpendicular in character, and has, in the central panel, the Alpha and Omega interlaced, and on shields on either side the cross-keys of St. Peter and the sword of St. Paul.

The Blackburn Town Council have resolved to apply to the Local Government Board for sanction to borrow £10,000 for laying down generating plant and equipping electric tramways in Blackburn.

On September 17 the Lieutenant-Governor of Quebec visited Trembling Mountain, about 75 miles north of Montreal, in order to open a national park, 2,500 square miles in extent, stretching across the northern limits of Ottawa, Terrebonne, Montcalm, and Berthier counties.

The Earl of Dartmouth will lay at Willenhall parish church, on Tuesday next, the corner stone of the extension by which the chancel and south aisle of nave are about to be enlarged, at an estimated cost of £3,000. The contract has been taken by Mr. Guest, of Stourbridge.

Colonel W. L. Coke, M.I.C.E., an inspector of the Local Government Board, held an inquiry at Failsforth on Friday with reference to an application of the Failsforth District Council to borrow sums of £5,800 for the purpose of completing the scheme of sewerage and sewage disposal, and of £6,390 for works of street improvement. Mr. C. J. Lomax, A.M.I.C.E., the engineer to the district council, explained the plans.

At the Guildhall, Walsall, on Friday, Col. Durnford, R.E., held an inquiry on behalf of the Local Government Board as to an application for leave to borrow £2,500 additional for electric lighting purposes. It was stated that of a loan of £19,000, the corporation had spent £18,690 in providing a generating station and plant.

The Bridlington Urban District Council have under consideration a series of recommendations for improvements exceeding in magnitude anything hitherto suggested in the town. Amongst these is one for procuring a Provisional Order for the acquisition of certain properties required in the construction of a marine drive from the Esplanade to the Beaconsfield Sea Defences. It is also proposed that the Prince's Parade be extended, one feature of the plan submitted being a semi-elliptical pier in front of the present structure. A committee has been formed to report as to the desirability of widening three streets at the Quay and two in the Old Town.

The first sod in the preparation of a site for a monument which is to be erected to the memory of John Wycliffe was cut at Luttermouth on Friday. The monument will be a granite obelisk, 30ft. in height, placed in front of a group of buildings, consisting of a museum and caretaker's house.

The collection of oil-paintings, old china, and bric-à-brac belonging to the late George Holloway, of De l'Angle House, Chartham, a portion of which has been exhibited at the South Kensington Museum, is about to be sold by auction by Messrs. Worsfold and Hayward, of Cannon-street, E.C., and Dover.

The Senate of Hamburg some six years ago decided, with the approval of the town council, to construct three deep-water docks, the total area of which amounts to 60,000 square metres. The depth of the docks, which are now completed, is eight metres, or about 26ft., below the average low-water level, and they will therefore accommodate the largest ocean-going vessels.

Trade News.

WAGES MOVEMENTS.

THE PENRYN SLATE QUARRIES.—The 3,000 men at Lord Penryn's Carnarvonshire slate quarries were paid off on Saturday, having refused to retake their contract. Labour has since been almost entirely suspended at that quarry, only a few labourers being employed in keeping the galleries clear from rubbish. Most of the men have removed their tools, and are seeking work elsewhere. The cause of the dispute, which threatens to be of long duration, is the suspension of the committee for advising a general strike next March.

CHIPS.

The 15th-century parish church of St. Benedict, Norwich, was reopened on Sunday, after restoration.

Professor Hubert Herkomer, R.A., has erected over the grave of his mother-in-law, at Ruthin, a Sicilian marble headstone in the Renaissance style, of massive proportions. The work was intrusted to Messrs. Geo. Roberts and Brothers, sculptors, Llandudno, N.W.

Alterations are being made to the Congregational church, Staines, embracing the ventilation, which will now be carried out on the Boyle system.

Messrs. Cook and Lamerton, builders, of Bideford, have decided to throw up their contract for the erection of the new County Police buildings at Bideford. Their tender was for £2,676. The firm on Monday found that a mistake had been made in calculating one item, involving a considerable loss. The next lowest tender was that of Mr. Laphorn, of Plymouth, for £2,844.

Mr. Charlie H. Sunderland, of Bradford, has been appointed assistant to the borough surveyor of Yeovil, being selected from 107 candidates.

The Victoria Park board schools in St. John's-lane, Bedford, were opened on Friday. They accommodate 1,146 scholars in the departments, and have been built from plans by Mr. Edward Gabriel, of Bristol and London, at a cost of £11,887. Mr. A. J. Beaven, of Bristol, was the builder, Messrs. Crispin and Sons, of the same city, carried out the heating, Mr. J. Wilkins the plumbing, and Mr. W. H. Brown the furnishing. The clerk of works was Mr. William Grey.

Colonel Durnford, R.E., on behalf of the Local Government Board, held an inquiry at the Guildhall, Walsall, on Friday, with regard to an application by the town council for permission to borrow £2,500 additional for the purposes of the electric-lighting scheme. Mr. Wyllie, electrical engineer, explained the proposals.

A new reredos in St. John's Church, Lynn, was unveiled last week. It was designed by Mr. Herbert Tilson, and executed by Mr. H. Brown, both of Lynn, and cost £160.

The interior of the Free Church in Easter-road, South Leith, opened fifteen years ago, has just been decorated in colours. The floral designs and a descending dove with outstretched wings (14ft. in span) have been painted by Mrs. Macdonald, the wife of the pastor. The other decorative work was executed by Mr. H. M. Ford, of Wallis-place, Leith.

The Roman Catholic Bishop of Liverpool (Dr. Whiteside) laid on Sunday the foundation-stone of the new home of the Little Sisters of the Poor in Aigburth-road, dedicated to St. Augustine. The building, when complete, and which will cost £10,000, will adjoin the existing premises and is intended to accommodate 100 poor inmates, with provision for further extension whereby 100 more may be provided for. The architects of the building are Messrs. Sinnott, Sinnott, and Powell, and the contractors Messrs. Fogarty and Son, all of Liverpool. The building will be four stories in height, and will cover an area of 114ft. by 58ft.; at the rear will be the chapel, 90ft. by 25ft. wide, and seated for 250 persons. The walls are faced with grey bricks, with dressings of Ruabon bricks and red sandstone.

On Saturday Mr. John Wilson, M.P. for the Govan Division of Lanarkshire, laid the memorial stone of a new church for the Evangelical Union congregation. The church, which is situated in Dumbarton-road, Clydebank, is seated for 500, and a large hall and suite of rooms are attached. The cost will be about £2,300.

The new chapel of Cheltenham College, which was projected by the late principal, the Rev. Dr. James, now Head Master of Rugby, as a memorial of the College Jubilee in 1891, will be opened on Wednesday next by the Archbishop of Canterbury.

A new branch synagogue for Spanish and Portuguese Jews was dedicated on Sunday at Lauderdale-road, Maida Vale. The building provides seating accommodation for about 500 persons.

The fine parish church of Castor, near Peterborough, is about to be restored.

A memorial tablet has been put up in the south transept of Ely Cathedral to the memory of the late Dean Merivale, who for 24 years was Dean of Ely. The tablet is of white Italian marble, surrounded by a moulded border of Verona marble, and bears a medallion likeness of the late Dean in oval shape. An inscription by the Master of Trinity College, Cambridge, records the fact that the late Dean was the historian of the Romans under the Empire, and adds that he was "rich in learning, caustic in wit; just, wise, tender, and magnanimous." The portrait was carved by a French artist; the remainder of the work is by Messrs. Farmer and Brendley, of Westminster Bridge-road, S.W.

A new and important development has taken place on the technical side of the People's Palace, Mile End. The governors have set apart a large portion of the buildings to a school of engineering, which is now equipped with a workshop and laboratory. The laboratory is provided with testing apparatus of the latest kind, and is adapted to the most advanced teaching in engineering science. The governors have placed Mr. D. A. Low at the head of this new development.

The Carlisle Race Stand Company have acquired by purchase the estate of Blackhall, close to Carlisle, for the purpose of a new racecourse. The purchase price was £8,788. The lease of the present course expires in ten years. The new course will be laid out, and will be a mile and a half round. It will also provide a natural steeplechase course. The nearest station will be Cummersdale, on the Maryport and Carlisle Railway, from which a siding into the ground will be constructed.

An ice factory and cold stores are being erected at Grimsby by the Linde British Refrigeration Company. The factory will cover an area of 1,300 square yards. The builders are Messrs. Hewins and Goodhand, of Grimsby.

On Saturday the memorial stone of Craigneuk Free Church was laid. The building is situated on the road leading from Motherwell to Wishaw, and takes the place of a wooden structure. The new church provides accommodation for over 500, with hall and vestry in the rear to seat 150. The style is Early Gothic. The roof will be of steel, incased in wood. This novel construction allows the introduction of a vaulted ceiling. The church will be heated through water. The total cost, including furnishings, will not exceed £2,150.

The guardians of Plymouth unions are about to build a group of cottage almshouses, from plans by Messrs. Wiblin and De Boynville, of Old Townstreet, Plymouth.

The Marquis of Bute is about to place in the parish church of Cogan a reredos in memory of his kinsman and estate agent, Mr. James Stuart Corbett, J.P., who was churchwarden of the parish for many years.

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TENDERS.

* * Correspondents would in all cases oblige by giving the addresses of the parties tendering—at any rate, of the accepted tender: it adds to the value of the information.

ABERDARE.—For the erection of master's house at the intermediate school. Mr. J. H. Phillips, St. John's Chambers, Cardiff, architect:—
Morgan, J. (accepted) £571 0 0

BANGOR.—For the erection of a county intermediate school for girls. Mr. J. H. Phillips, St. John's Chambers, Cardiff, architect:—
Williams, R. G. (accepted) £2,230 0 0

BARKING, ESSEX.—For erection of two houses, Linton-road, for Mr. W. Glenny. Mr. F. J. Sturdy, 41, Finsbury-pavement, E.C., architect:—

Norton	...	£1,540 0 0
Hearle and Farrow	...	1,497 0 0
Hoskin	...	1,479 0 0
Sayers and Son	...	1,438 0 0
Watson	...	1,150 0 0

BELGRAVIA.—For new annexe to the Hans Crescent Hotel, Belgravia, London, S.W. Messrs. Read and MacDonald, Cork-street, W., architects. Quantities by Mr. W. H. Elsmore, Barnes, S.W.:—
Stephens, Bastow, and Co., Ltd.,
Bristol (accepted) £10,000 0 0

BELPER.—For providing a temporary water supply, comprising the provision and fixing of a geared double-acting pump at the existing well near Chevin Mill, Belper, and also providing and laying about 2½ miles of 9in., 4in., and 3in. cast-iron pipes, together with sluice valves and other apparatus, for the Belper Urban District Council. Messrs. George and F. W. Hodson, Loughborough, engineers:—

Eyre, F., Sheffield	...	£1,734 17 8
Tomlinson, J., Derby	...	1,708 0 0
Price, J. F., Nottingham	...	1,700 0 0
Holmes, J., Clay Cross	...	1,644 14 6
Tomlinson, G. F., Derby	...	1,635 0 0
Gillet, H., Belper (accepted)	...	1,590 6 6

BLACKWALL, E.—For the plant required in connection with the lighting of the Blackwall Tunnel, for the London County Council:—

Boilers and fittings:—		
Davey, Paxman, and Co.	...	£1,566 0 0
Tinkers, Ltd.	...	4,350 0 0
Robey and Co.	...	3,351 0 0
Taylor, R., and Sons	...	2,985 0 0
Fraser and Fraser	...	2,882 0 0

Engines and dynamos:—		
Crompton and Co.	...	8,291 0 0
Siemens Bros. and Co., Ltd.	...	8,240 0 0
Johnson and Phillips	...	7,815 0 0
Electric Construction Co.	...	7,489 0 0
Laing, Wharton, and Down	...	6,579 0 0

* Accepted.

BLACKWELL, DERBY.—For the construction of about 7,372 lineal yards of stoneware pipe sewers, with man-holes, flushing chambers, precipitation-tanks, distributing carriers, and other works to be executed at Pleasley and Shirebrooke, for the Blackwell Rural District Council. Mr. Herbert Walker, A.M.I.C.E., Newcastle Chambers, Nottingham, engineer:—

Smart, T., Nottingham	...	£7,215 4 0
Holmes, J., Clay Cross	...	6,858 7 0
Binnis, J. and T., Horwich	...	6,663 6 9
Vickers, H., Nottingham	...	6,295 15 0
Price, J. F., Nottingham	...	6,247 0 0
Vickers, J. H., Nottingham	...	6,239 12 0
Eyre, F., Sheffield	...	6,023 15 2
Weldon, H., Birmingham	...	5,947 1 9
Barry, H., Ratcliffe-on-Trent	...	5,582 13 0
Bradley, J., Lincoln	...	5,481 0 0
Lane, J., and Son, Skegby, Mansfield (accepted)	...	5,441 0 0

BODMIN.—For erection of new stores at the Cornwall County Lunatic Asylum:—
Grose & Brown, Bodmin (accepted) £1,870 0 0

BRECON.—For alterations and repairs to the Congregational Memorial College. Mr. J. H. Phillips, St. John's Chambers, Cardiff, architect:—
Morgan, T. E., Brecon (accepted) £541 0 0

BREDBURY, CHESHIRE.—For the following work, for the Bredbury and Romiley Urban District Council: (Contract No. 3) tanks, filters, house, store, fencing, &c.:—
Meadows, T. & W., Heaton Norris, Stockport (accepted).

BRIGHTON.—For alterations to the bars, &c., building additional rooms, and doing sundry repairs to the Eight Bells public-house, West-street, for Mr. Ben Parker. Mr. Robt. W. Pollard, 108, Church-street, Brighton, architect. Quantities by the architect:—

Lockyer, G. R.	...	£716 0 0
Freeman, V. P.	...	692 0 0
Bostell Bros.	...	657 0 0
Barnes, J.	...	668 0 0
Wright, J. J. (accepted)	...	657 0 0

Pewtering:—		
Postlethwaite	...	59 0 0
Brown, W., and Son (accepted)	...	49 12 0

All of Brighton.

BRISTOL.—For alterations at St. Philip's police-station, for the city council:—
Gay and Son, Bristol (accepted) £450 0 0

(Continued on page XIII.)

LIST OF COMPETITIONS OPEN.

Farnham—School Infirmary		E. Kempson, Clerk to Managers, 121, West-street, Farnham	Oct. 13
Peel (Isle of Man)—New School and Master's House (£1,600)	£22	Alfred N. Loughton, High Bailiff of Peel	" 14
Gorton—Laying Out Cemetery	30gs.	R. T. Holland, Clerk, Town Hall, Gorton	" 24
Belfast—New City Hall (Assessors, A. Waterhouse, R.A., and J. C. Bretland) (limit of cost, £125,000)	£300 divided	S. Black, Clerk to Corporation, Belfast	" 25
Poplar—Coroner's Court, Mortuary	£30, £20	W. H. Farnfield, Clerk, 117, High-street, Poplar	" 26
Malmö, Sweden—New Gasworks	3,000, 2,000, & 1,500 Swedish crowns	Corporation Gas Works Offices, Malmö, Sweden	Nov. 1
Bootle—North Board School for 1,000 children (local architects only)	No premium	F. K. Wilson, Clerk, Balliol-road, Bootle	" 11
Sunderland Corporation—Artisans' Dwellings (for 450 persons)	£50, £30, £20	Fras. M. Bowey, Town Clerk, Sunderland	" 14
Darlington—Laying-out Southend Estate	£35, £15	R. C. Pearce, Estate Agent, Darlington	" 20
Douglas, I.M.—Municipal Buildings (£10,000 limit of cost)	£40, £20, £10	T. H. Nesbitt, Town Clerk, Douglas	" 21
Peel, Isle of Man—Approach Road to Shore-road	£20, £10, £5	Geo. Cannell, Town Commissioners' Office, Peel	" 30
Newport, Mon.—Hospital (£16,000 limit of cost)	£100, £50	J. K. Stone, Secy., 39, High-street, Newport	Dec. 1
Rhos-on-Sea, Colwyn Bay—Laying-out Building Estate	£100, £30, £10	Philip J. Kent, Rhos Abbey, North Wales	" 5
Kieff, Russia—Theatre (£45,000 limit, 1500 seats)	£250, £160, £120, £76, £32	Imperial Society of Architects, 83, Quai de la Moika, St. Petersburg	" 15
St. Gilles, near Brussels—Town Hall (£42,000 limit of cost)	£160 and two lesser premiums	Municipal Authority, St. Gilles, Belgium	Feb. 1
Osgodby, Lincolnshire—Wesleyan Chapel & Schools (cost £690)	No premium	E. H. Davy, Secretary to Trustees, Kirkley, Market Rasen	"
Kirkmuir, N.B., Parish Church Hall			"
Kesteven District Lunatic Asylum (C. H. Howell, Assessor)			"
Eccleshill, Bradford—Sewage Disposal	£25, £10	Jos. Richardson, Clerk, U.C., 4, Town Hall-square, Bradford	"
Barry, Glam.—Municipal Buildings (£10,000 limit)	£100, £50	Clerk to Urban District Council, Barry	"

LIST OF TENDERS OPEN.

BUILDINGS.

Highley, Salop—Alterations and New Infants' School	Highley School Board	W. M. Roden, Clerk, Kidderminster	Oct. 12
Esk-Winning—Dwelling House		John Bowe, Durham-road, Esk-Winning	" 12
Steeeton, Yorks—Twenty Houses		Judson and Moore, Architects, York-buildings, Keighley	" 12
Darlington—Primitive Methodist Chapel, Bank Top		Frank Martin, Architect, Darlington	" 12
Burnley—St. Margaret's Church		Thos. Bell, Architect, 14, Grimshawe-street, Burnley	" 12
East Brook, S. Wales—Parish Room and Vestry		W. H. Dashwood Capel, Architect, 1, St. John's-square, Cardiff	" 12
Harrogate—Additions, Prince of Wales Hotel		Richardson and Simpson, Architects, Wakefield	" 12
Irvinestown—Repairs to Church		T. Elliott, C.E., Enniskillen	" 12
Dursley—Offices		J. Fletcher Trew, M.S.A., County Chambers, Gloucester	" 12
Dundalk—Tun-room and Stores		A. T. M. Nair, Architect, Crawe-street, Dundalk	" 13
Harrow—Additions, Sudbury-road and Greenhill Schools		A. Fillmore, Clerk, High-street, Harrow	" 13
Barnes, W.—Timber Jetty at Small Profit Dock		G. Bruce Tones, Surveyor, High-street, Mortlake	" 13
Dover—Stables, Sheds, and Cottage		E. Wollaston Knockner, Town Clerk, Dover	" 13
Marazion—Cemetery Walls		Geo. Laity, Clerk, Marazion, Cornwall	" 13
Sutton, Co. Dublin—Three Dwelling-houses		A. Scott and Sons, Architects, 16, William-street, Donegal	" 14
Camberwell Workhouse—Fitting Padded Rooms		The Clerk, Camberwell Workhouse	" 14
Stockwell—Ambulance Station at Fever Hospital		T. Duncombe Mann, Clerk, Norfolk-street, W.C.	" 14
Brixworth—Alteration to Board Room		W. C. Woodford, Clerk, 18, Market-square, Northampton	" 14
Sheffield—Baths, Victoria-street		C. F. Wike, City Surveyor, Sheffield	" 14
Listowel, Ireland—Dispensary Residence		Michael O'Connell, Clerk, Listowel Workhouse	" 15
Merthyr Tydfil—Workhouse Infirmary (120 beds)		Frank T. James, Clerk, Merthyr Tydfil	" 16
Culter, N.B.—Two Villas		J. A. Beattie, Architect, 21, Bridge-street, Aberdeen	" 16
Mary Tay—Cottage		W. Squire, M.S.A., Tavistock	" 16
Leeds—Wesleyan Chapel, Cardigan-lane		Geo. E. Danby, Architect, 46, Great George-street, Leeds	" 16
Kendal—Alterations, Wheat Sheaf Hotel		Joseph Bintley, Architect, 7, Lowther-street, Kendal	" 17
Chelmsford—Pantechicon, New Writtle-street		Chas. Pertwee, A.R.I.B.A., Chelmsford	" 17
Swansea—Additions, Terrace-road School		A. W. Halder, Clerk, Dynevor-place, Swansea	" 17
St. Alban's—Superstructure, Hill End Asylum		P. W. Dumville, Clerk, St. Alban's	" 17
Edinburgh—Additions, Craigleith Poorhouse, Comely-hank		Andrew Ferrier, Clerk, Castle Terrace, Edinburgh	" 17
Morley—Five Houses, Troy-road		T. A. Buttery, Architect, Morley	" 17
Neath—Workmen's Club		W. Wilkins, Secretary, Neath	" 17
Newcastle-on-Tyne—Shop and Warehouse, Bigg Market		Wm. Hope, Architect, 40, Westgate-road, Newcastle	" 19
Shoreditch—Underground Transformer Sub-Station		H. Mansfield Robinson, Vestry Clerk, Old-street, E.	" 19
Preston—China Clay Show (150ft. by 110ft.)		H. Hamer, Town Clerk, Preston	" 19
Derby—Pear Tree School		Wm. Cooper, Clerk, Becket-street, Derby	" 19
Bedding—School Extension		F. T. James, Clerk, 131, High-street, Merthyr Tydfil	" 19
Bradford—Two Shops, Leeds-road		Ryeroft and Firth, Architects, Bank Buildings, Bradford	" 19
Burghead, N.B.—Semi-Detached Houses, Grant-street		Jas. Jamieson, Architect, Elgin	" 19
Limerick—Additions, Lunatic Asylum		F. J. Tuohy, Secretary, Customs House, Dublin	" 19
Bow, E.—Repairs to Vestry Hall		W. M. Mead, Clerk, Bow-road, E.	" 19
Wellington, Co. Hereford—Alterations to School		Ernest G. Davies, 6, St. John-street, Hereford	" 20
Stroud—Completion, School of Science and Art		W. H. C. Fisher, 6, Rowcroft, Stroud	" 20
London—West Central District Post-Office		Hon. Reginald B. Brett, Secretary, Whitehall, S.W.	" 20
Stroud—Parliament-street School		F. Winterthorn, Clerk, 5, Rowcroft, Stroud	" 21
Dover—Laundries and Kitchen at Workhouse		Cresswell and Newman, Architects, 14, Castle-street, Dover	" 21
Hyde—Technical School and Free Library		G. Stevens, Town Clerk, Hyde	" 22
Perth—Post Office		Hon. Reginald B. Brett, Secretary, Whitehall, S.W.	" 27
Parc Gwyllt—Asylum Block, 120 patients		T. T. Lewis, Solicitor, Bridgend	" 27
Hunslet, Leeds—Public Baths		J. Harrison, Town Clerk, Leeds	" 27
Erdington—Vagrant Wards		Jno. North, Clerk, Vauxhall-road, Birmingham	" 27
Holborn—Working-Class Dwellings, Brooke's-market		C. J. Stewart, Clerk, Spring-gardens, S.W.	" 27
Stratford—Movable Floor and Platform at St. Mary's		E. Harrow and Pinches, 5, John-street, Adelphi, W.C.	" 27
Stanningley—Four Houses and Shop		Ryeroft and Firth, Architects, Bank-buildings, Bradford	"
Keswick—Rebuilding Stabling, Duke of Wellington		A. D. Kaye, Architect, 4, Albion-place, Leeds	"
Exmouth—Wesleyan Chapel and Schools		W. J. Morley, Architect, 269, Swan-arcade, Bradford	"
Buttershaw, West Riding—Two Houses		Brayshaw and Dixon, Architects, Bowling Old-lane, Bradford	"
Belfast—Two Houses, University-avenue		J. G. Lindsay, Architect, 6, Chichester-street, Belfast	"
Ovenden, Yorks—Farmhouse		J. Robert Shaw and Son, Architects, 55, Tyrral-street, Bradford	"
Gateshead—Thirty Dwellings in Flats, Saltwell-lane		E. Bowman, 52, Westgate-road, Newcastle	"
Nuneaton—Galley Common National Schools		J. R. Veall and Son, Architects, Wolverhampton	"
Cardiff—Additions, Halfway House Hotel		Jones, Richards, and Budgen, Architects, Cardiff	"
Sheerness—Conservative Club		Wm. J. Shearburn, Architect, Dorking	"
Harrogate—Two Houses		W. Lupton, North Lodge, New Park, Harrogate	"
Hull—Repairs 23 Houses		75, Charles-street, Hull	"
Newland—Alterations Property		N. Swindle, Chemist, Keswick	"
Leeds—Pulling down House		J. W. Watson, 21, New Station-street, Leeds	"
Harrogate—House		J. M. Fawcett and Sons, 26, Albion-street, Leeds	"
Town—House		Hipkiss and Bassett, Architects, Aberdovey	"
Bury (Lancs)—Stables, Butcher-lane		F. Cartwright, C.E., Phoenix-yard, Bury	"
Sheerness—Club		E. Pover, Architect, Faversham	"
Bristol—Alterations to Fish Market		J. Thomas, City Surveyor, 51, Prince-street, Bristol	"
Leeds—Two Houses and Shops, Dewsbury-road		Percy Robinson, Architect, 72, Albion-street, Leeds	"
Kirkby Overhlow—Additions to School		T. E. Marshall, Architect, Harrogate	"
Belfast—Business Premises, St. Peter's Hill		J. Armstrong, 16, Shankhill-road, Belfast	"
Chopwell—Two Houses and Shops		T. Atkinson, 6, South-avenue, Ryton-on-Tyne	"
Harrogate—House in Duchy-road		J. M. Fawcett and Son, Architects, 96, Albion-street, Leeds	"
Devonport—Block Floor to School		G. Luff, Architect, 64, Chapel-street, Devonport	"
Aldershot—Queen's-road School		Clerk to School Board, Aldershot	"
Standish, Wigan—Additions to Grammar School		H. Lord, Architect, 47, John Dalton-street, Manchester	"
Leeds—Shed, Park-lane (3,000 square yards in area)		J. J. Mosley, 6, Wormald-road, Leeds	"
Tonbridge—Business Premises, High-street		W. H. Cuthbert, 192, Upper Grosvenor-road, Tunbridge Wells	"
Buxton—Additions, Harper's Hill Schools		W. R. Bryden, Architect, 1, George-street, Buxton	"
Coventry—Additions, Harpers School		G. and I. Steane, Architects, 22, Little Park-street, Coventry	"
Aberthaw—Mission Room		Seddon and Carter, Architects, St. Mary-street, Cardiff	"
Stotfield, Elgin—Villa		Reid and Wittet, Architects, Elgin	"
Kegworth—Extension, &c., of Licensed Premises		W. J. Moore, Architect, Ann-street, Belfast	"
Kegworth—Erection of Inn	Mr. W. J. Martin	W. T. Hampton, Brook House, Loughborough	"

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PERSONAL SUPERVISION.

BY some people it is imagined that a building can be "tumbled together," by certain official agencies, by the preparation of drawings and specifications by contract with a builder. They think that if a certain routine is set in motion by the architect and the contractor, the various trades will all fall into their right places by a kind of inscrutable law. This is the "regulation" or Governmental mode of carrying out works. It may be, and is, perfectly true that a certain sort of "architecture" can be turned out or "manufactured" in this sort of way, that will satisfy a number of persons who are quite content to think of building and to employ architects as they do of any of their commercial transactions, or just as they would engage a house-agent to find them a residence, or a tailor to make them a suit of garments. They look upon it simply as a matter of business. Mr. Pushington or Mr. Trudger will do quite as well for their purpose as anyone who has high credentials as an artist or has just been elected an A.R.A. We do not say that titles or initials make the architect; but they are supposed to represent a little more culture and taste than an average architect and surveyor possesses whose whole soul is not above his brass-plate or his suite of offices. The man who has pushed his way as a good building surveyor, has erected several shops and houses, is all that is desired by the class of individuals of whom we speak. Yet this indifference to the claims of the architect's vocation cannot be questioned. Many of our ablest men are sharpening their pencils, and sitting disconsolately at their desks, waiting for clients, while in the very next street, Mr. Bouncer Jones is "full up to his eyes in work," carrying out more contracts than he can possibly supervise. It may be luck or knack; or not, people still flock to the man who happens to be known, and who can do what they want expeditiously or cheaply. The really clever one pines away in despair, or is compelled to take a subordinate place as a draughtsman or designer of furniture. Hundreds of new residences are built every year, only a small fraction of which are designed by architects—a fact disheartening enough in itself without considering the ill effect of the system on the public taste. What people cannot appreciate they do not value. There are a few, indeed, who affect to disclaim against the monotony and commonplace baldness of our architecture; but they are often the last persons to avert it—they think it means a large expenditure of money, and of the two things—good art or money—they prefer the latter. But as long as the ordinary public look upon building merely as a mere business arrangement—the employment of so much labour and material at a certain cost, any marked improvement is out of the question. Skill in design and superintendence are two things which they dislike to pay for, but they are the only ones which give any result. They represent the "personal factor" of the architect's work, which places it above that of the builder and contractor.

Strangely enough, the supervision of buildings is undervalued by the professional man: he thinks his work is practically done when the contract is signed, and the clerk of works appointed. Really, his duty actually commences at that stage, for all previous labour has been official and preparatory; but now the actual building is about to com-

mence. His design on paper is to be realised, to assume an existence which it did not before possess—to be converted into the bone, flesh, muscle, and integument of material and structure. In these alone architecture consists. Technical qualities and performance are just as much a part of his work as the drawings on paper—in fact, they belong to the "personal factor"—to what the architect is paid for seeing carried out in their proper meaning. These qualifications lie at the root of the difference between builders' and architects' work. The connection has been much obscured by the absurd modern distinction sought to be made, that the "artistic" part of the architect's work, the design, has nothing to do with the builder's functions. Happily this distinction, the barrier between art and technical qualities, is on the point of removal. To the leaders in the profession it is, in fact, removed already. Many of our architects take a delight in watching for themselves the progress of their design, in inspecting and testing the materials, in visiting the workshops where the work is being set out, and in choosing for themselves the fittings and goods that are supplied by manufacturers. All know the personal interest which men like the late G. E. Street, J. D. Sedding, W. Burges, and others took in these matters: how assiduously they watched over a piece of moulded stonework, a carving; drew out full size the patterns for their ironwork; directed the hammered work, and even sometimes took the tool in their hands to show the craftsman their meaning. With them the design did not stop at the drawing, but was continued in the workshop or studio—it extended to the manipulation and to the fixing on the building. Men like the late William Morris realised this craftsmanlike ideal of design, and devoted their life to it.

In building operations the profession would not lose, but gain, if they tried to make their work more thorough. Some men in the profession are half-hearted. They begin well, but they do not go on; they leave the work to some one else—to the builder or a clerk of works, or they get disappointed with their design and take no further interest in it, and perhaps the commission is not very tempting, and they are glad to delegate the laborious part of the office. Even the foundations and excavator's work are not without some interest to the artist. If we looked at the foundation and footings of a building as if they were always visible, we might obtain a better notion of their value and importance. Like a well-shod man, a building which is well and securely footed has a sense of comfort and repose about it, while one supported insecurely at intervals, or standing on a few points of hard ground is constantly cracking and showing signs of subsidence. Surely it is worth the architect's attention to see that the foundations are sound; if he neglects other things, he can ill afford to neglect this, as upon it his whole reputation as an architect rests. Attention to so important a matter as the state of the soil at the bottom of the trenches, or trial borings on opposite sides of a site, ought to be strictly given. We do not mean with so imperfect an implement as a stick or the end of an umbrella, but with a sufficient auger driven by a lever. For to imagine that a foot or so of concrete, however good, will render such examination unnecessary in a high building is self-deception. The different bearing powers of soils ought to be "writ large," and taken as a maxim before concrete is put in or footings are laid. How seldom does the architect think of the foundation till the footings are laid, and hope of detection of soft soil or inferior and ill-mixed or rammed concrete for ever lost. Though it may mean a journey of many hundreds of miles, the opportunity only occurs once of saving a reputation; but the misery and dis-

credit of failure is never absent. The argument applies with greater or less force to all portions of buildings which are covered up or are visible only once during progress. If not seen then, they are irretrievably lost to inspection. An architect ought certainly have great faith in his coadjutors; his life would be unutterably wretched in some cases without that entire dependence and trust which he must place in them, for a great number of operations and works are entirely beyond his personal control. And it is in this sense, as well as in the confidence and enjoyment of mutual assistance in design, that we value co-operation in building. Imagine for a moment a building contract in which there was no sort of co-operation, no confidence in any of the officials, mutual distrust between architect and builder and foremen superintendents. We can hardly imagine such a thing; but there is an approach to such a case of anarchy when an architect and contractor are at variance, or when the undertaking is profit or ruin to the contractor. The saying, "To be fore-armed is the best guarantee of peace" may be applied most truly in such a case as this. Every loophole is taken advantage of by the impecunious contractor: the clauses of the specification are misinterpreted, and flaws eagerly turned to account, unless the architect has defended his position by frequent supervision and inspection. Can an architect be assured that his instructions and plans are really followed unless he sees that they are? Take, for instance, the arrangement or proportioning of footings under buildings of great height. Piers ought to be arranged proportioned to the weight to be carried; inverted arches put in under the openings, or the footings of each pier made complete under the openings and filled in by a dwarf wall; but who is to see these carried out unless the architect or clerk of works? He should direct that the heavier piers are not bonded into the walls of less height or weight, as those of "curtain" walls; that the footings vary in width directly as the wall they have to carry, so as to produce equal distribution of load. On compressible soils careful supervision on these points is absolutely necessary.

In other duties the architect may do much to preserve his intentions by taking personal trouble. The masonry or stonework of a building is vital to the design. If it is slovenly or badly executed in its details, the whole building suffers externally. The cut stonework is often not in accordance with working drawings or specification; the details are not strictly adhered to by the mason when an inch or so of stone can be saved in cutting the block. We have seen cornices robbed of their full perfection; a member or moulding omitted; three-quarter columns and shafts reduced to half-columns by cutting the shaft in two; a capital made to project less in front than the sides—all dodges to save a little stone. What is commoner than to find window-sills made too narrow to go a proper distance beyond the face of the wooden sill; or to find quoin stones and ashlar cut thin at the bed and perpendicular joints, and splayed where they ought to be cut square some inches from the face? These are masons' tricks to save stone, or to make two stones out of one block. The execution of brickwork may also frustrate the intentions of the best design. Owing to the inferior quality of the bricks, the jointing, or the colour, the architect's design is sacrificed; a building otherwise well designed is spoiled by the use of moulded cornices, banded courses, or architraves of common manufacture, or meagre projection from the face. The face bricks are of bad colour or make, the pointing defective in thickness or workmanship, the surface ornamentation or diapering hard and of crude colour. Personal direction is here of more importance than the most definite specification. The contractor may

comply with every provision, but unless they come under the immediate eye of the artist, they are tame and mechanical. A little irregularity in the surface or colour of the bricks or the thickness of the mortar joints may make all the difference, and these touches can only be given under the architect's direction. It has only been by the introduction of the personal factor in these matters that our modern school of brick architecture has been rescued from the mere trade traditions.

Personal supervision supplies just those elements to building which the painter, the sculptor, or carver can impart by his own hand to the work he produces. Only by the artistic touch of the pencil or chisel is he enabled to make his work what it becomes, and no work worthy of art has been accomplished by leaving to an intermediary or a commercial agency the realisation of the design. To the system of remunerating the profession we may attribute much of the failure of modern work. What incentive is there to personal supervision on the part of the architect when he is paid a percentage on the cost, when he gets a larger commission for buildings of the commonest kind, covering acres, than he does for a design on which the most thoughtful invention and artistic skill has been expended in the production of the minutest feature? No system of remuneration could have been thought of which so entirely subjugates the personal interest of the designer, or which so hopelessly discourages supervision and individual care. The commercial practitioner sees that his remuneration is not affected by the frequency of his visits, and that is enough for him.

PROFESSIONAL UNIONISM.

THE return of the winter sessional meetings of provincial societies will give an opportunity for the discussion of many professional topics. One of these is the relation of the provincial society to the Institute, an alliance which is not very cordially reciprocated by some of the provincial members. The Liverpool Architectural Society at least do not appear to be very anxious to affiliate themselves to the London body. We reported last week the inauguration of the Liverpool Society session, when the president, Mr. George Bradbury, diocesan surveyor, made some timely observations on the relations between the Society and the Institute, from which we gather that the members of that provincial society are, on some points at least, desirous of maintaining their independence. The election of president and other officers from those who are not members of the Institute is a departure of moment, as showing a change in the attitude of some leading members of these local bodies, or the mutual relations existing between the local affiliated societies and the central London body. These local societies are agreed as to the value of social gatherings and intercourse with other bodies, particularly between provincial and London associations, and this is a kind of interchange which the provincial practitioner is most in quest of; a sort of alliance which can better be obtained by a professional union such as Mr. Bradbury spoke of. The union wanted by the provincial architect is one of self-protection, advancement of professional knowledge and brotherly feeling; but these objects he cannot get by affiliation with a self-contained institute in London, which is restricted in its mode of election of students and architects. As the President of the Liverpool Society observes, "there will have to be great changes in the Institute to bring about these objects. For the admission of a student an exceedingly moderate fee per annum should be demanded, and he should be supplied with all printed matter issued, even if it cause a slight loss." The student, when he has completed a certain number of years of

study at a recognised school, and passed an examination, should be registered as an Associate. As it is, the requirements of this rank are now prohibitive to hundreds of students who know probably more about construction and architectural design than many who have passed the examination; but the subscription is also prohibitive. Few young men in the profession can afford to pay the fees demanded, and to undergo the expense of preparing for the exams. When the Institute rises to the occasion by making an effort to draw within its fold all practising architects and students who have been duly articulated, it will have accomplished something practical; but the subscriptions of both classes must be reduced to £1 1s. and £2 2s. as suggested. We have the presidents not only of Liverpool, but of Manchester and of Birmingham societies, agreeing on these questions. As Mr. Holden pointed out not long ago, gentlemen in practice for some years would rather remain outside the central Metropolitan body than place themselves in the position of being voted upon by gentlemen who had passed through their own offices—viz., the "Associates"—a remark which will find many sympathisers. Mr. William Henman, President of the Birmingham Architectural Association, has also referred to the want of provincial representation on the council of the R.I.B.A., and the question is repeatedly asked, "What benefit a provincial member would derive by becoming a Fellow?" Mr. George Bradbury's remarks fully bear out these views of the leading local societies. He says: "Until the Institute have amended their charter and by-laws, so as to make it possible for every practising architect and those associated with him to become members, it is useless for us to look to London for guidance in our profession; but rather that our efforts and—what is not of so much importance—our money, should be devoted to helping forward and encouraging all our local efforts, which, I feel you will all agree with me are now, and will be in the future, second to none in the kingdom." The keynote that is now being sounded by all our great towns is local *v.* Metropolitan aims. Is there not at Liverpool a school of architecture at the University worthy of the profession?—a school that is said to give to the students a superior education to that given by the Association? We must not overlook this fact of the claims of provincial schools on the country members. The local student and practitioner naturally asks, Why should I contribute to a London body when I can get the same and better training here? These are elements in the question that have to be taken into account. Will Liverpool or Manchester architecture be advanced by alliance with a Metropolitan body? Will it promote the professional interests of local men? It is, as we have said, professional unionism that is desired, and to this end the provinces will very naturally give their support.

Other topics will be foremost in the coming session. A very important question is that of competitions, and every provincial architect has a particular interest in adopting a code of rules that shall be binding upon all members. No doubt there will be a few who will refuse to be so bound, but all the more respectable men in the profession will be glad to come to an understanding, to protect the interests of their craft. If the local architectural societies could co-operate in this matter, they would obtain one of the obvious advantages of professional union. Those who now take contracts, and also provide designs and plans, in our larger towns would receive a check, for no professional architect who had agreed to such a code of rules would care to deal with tradesmen of this kind. Then there is the question of remuneration which might form a subject of discussion. The provincial architect is often a sinner in this respect than his

Metropolitan brother; he is tempted to do work below the recognised scale, and sometimes he is provoked to do so by circumstances and local tradition and custom. By affiliation with other societies it would be easy to come to a resolution that would be fairly comprehensive. The question of a form of contract is one upon which the large centres ought to have something to say, or at least to express an opinion on the form which the Institute has put forward. Then there are a host of minor matters which could be usefully discussed, such as the question of quantities and its position in the contract, the acceptance of the lowest tender, illicit commissions, methods of measurement, &c. In all these things provincial co-operation is much wanted; that, to our mind, can hardly be expected by a plan of absorption into one body, which will ever take care to keep the reins of power in their own hands. The idea of a trade-union is no doubt, repugnant to many; but we are not bound to anything that has been done under that name. But whatever may be argued about it, *pro* or *con*., there can be no doubt the conception of a professional union is favourably entertained. The desire of all professional men in the provinces is to exchange opinions with their brethren in London, to meet together on an equality, to unite in the interest of their orders, and to discuss matters of interest to the profession. These are requirements which concern them more deeply than to belong to a Metropolitan clique, however powerful, who desire to keep everything in their own hands.

THE ARCHITECTURAL ASSOCIATION.

THE inaugural meeting of the fiftieth session of the Architectural Association was held in the R.I.B.A. meeting hall, 9, Conduit-street, W., on Friday evening, and was numerously attended. The chair was occupied by the President, Mr. Beresford Pite, F.R.I.B.A.

The adoption of the annual report and balance sheet (summaries of which were given in our issue of the 18th ult., p. 406) was moved by Mr. G. H. FELLOWES-PRYNNE, vice-president for last session. He remarked that the deficits of recent years, since the introduction of the new educational scheme, were matters for regret. In the session of 1892-3 the deficit amounted to but £21; but the adverse balance increased to £148 in 1893-4, and to £247 in 1894-5, while in the session just completed—that for 1895-6—it was again reduced to £141. The committee made last year a great reduction in students' fees, and in consequence the receipts from this source fell from £912 in 1894-5 to £586 last session. From entrance fees, however, the sum received had risen from £107 in the previous session to nearly £160 this year. He trusted that senior members would not resign, as it was only by the continued help of old workers who had passed through the classes that they could keep their finances straight.

Mr. HAMPDEN W. PRATT, hon. treasurer, in seconding the motion, pointed out that one reason why the receipts from classes were less last session was because they had largely reduced the fees. He considered that their funds were now in a fairly sound condition. By an extraordinary coincidence, the additions to the membership had exactly balanced the inevitable losses by deaths, resignations, and removals, so that their roll still stood precisely as last year at 1,111.

Mr. J. H. TYARS complained that so much money—over £57—was spent on medals and prizes; but added that the great deficit was really due to the heavy expenditure on the *conversazione* and entertainment, which ought, in the present state of the funds, to be curtailed. They were expending, too, £340 on the rent of the Studio in Great Marlborough-street, a sum which, capitalised at the present value of money, would go far towards providing permanent buildings of their own.

The report and balance-sheet were then unanimously adopted.

A vote of thanks to the honorary auditors, Messrs. F. G. W. Buss and Matt. Garbutt, was carried by acclamation, on the motion of Mr. H. W. PRATT, seconded by Mr. E. W. MOUNTFORD; a comprehensive vote of thanks to all who assisted in making the entertainment and the

summer excursion to Tunbridge Wells successful was also agreed to, having been moved by Mr. BANISTER F. FLETCHER, senior hon. secretary, and seconded by Mr. R. LANGTON COLE. The PRESIDENT moved, and Mr. W. D. CAROE seconded, a vote of thanks to the Council of the R.I.B.A. for granting the use of their meeting-room, and to the general body of members of the Institute for continuing their grant of £100 to the Studio and Classes, and this also was heartily accorded.

Two new members—G. R. C. Harding, of Lincoln, and H. J. Pearson, of Brixton—were elected, and Mr. B. F. FLETCHER read a list of twenty-four nominations to come up for election at the meeting to be held four weeks subsequently.

The PRESIDENT announced that the annual *conversazione* would be held on that day fortnight, Friday, the 23rd inst., at the Church House, Westminster, by kind permission of Dr. Benson, Archbishop of Canterbury, at whose request the committee were organising a special exhibition of ecclesiastical drawings, which would be found, he believed, both interesting and important.

DISTRIBUTION OF PRIZES.

The PRESIDENT then distributed the prizes for last session in accordance with the following list:—

A.A. Travelling Studentship, value £25, and Bronze Medal, C. de Gruchy; Second Prize, not awarded; Essay Prize, value £10 10s., and Silver Medal, A. Stratton; hon. mention, Alexander Wood, M.A., F.S.A.; the Andrew Oliver Prize, First Prize, value £3 3s., A. C. Long, letter; ditto Second Prize, value £2 2s., J. G. N. Clift, letter; the Arthur Cates Scholarship, value £10 10s., J. S. Lee; Measured Drawings Prize, Discussion Section Prize, Architectural Union Co. Prize, and the A.A. Medal, not awarded.

LECTURE SIDE.—Division I.: A. Smithers, Silver Medal; T. Bee, Bronze Medal; J. E. Franck, hon. mention. Division II.: P. Morris, Silver Medal; E. H. Evans, Bronze Medal; V. Steadman, hon. mention.

STUDIO SIDE.—Division I.: E. Bates, Silver Medal and Certificate; J. G. N. Clift, Bronze Medal and Certificate; R. T. Miller, hon. mention. Division II.: No award.

Elementary Class of Design: G. C. Carter, Silver Medal, Certificate, and £5 5s. scholarship; W. H. Ward, Bronze Medal and Certificate; J. S. Lee, hon. mention. Advanced Class of Design: W. J. Devlin, Silver Medal, Certificate, and £5 5s. scholarship; T. H. Lyon, Bronze Medal and Certificate; E. Nicholson, hon. mention. School of Handicraft (Carpentry): E. F. Cobb, Bronze Medal.

ORDER OF MERIT.

DIVISION I.—Greek and Roman Orders: A. Smithers, Certificate and Book; T. Bee; A. M. Torrance. Elementary Construction and Materials: A. Smithers, Certificate and Books; T. Bee; J. C. Hawes. English Architecture: R. A. S. Macalister, Certificate and Books; T. Bee; A. Smithers. Elementary Physics: A. Smithers, Certificate and Books; T. Bee; H. A. Douglass. Plane and Solid Geometry: A. Smithers, Certificate and Books; T. Bee; A. M. Husbands. Mensuration, Land Surveying, and Levelling: A. Smithers and T. Bee, Certificate and Books; W. H. May; O. C. Hills. Formule and Calculations: A. Smithers, Certificate and Books; T. Bee; A. M. Torrance.

DIVISION II.—History of Architecture: E. H. Evans; P. Morris; J. H. A. Phillips. Special History Subjects: C. W. Surrey and C. E. Varnell; P. Morris; V. Steadman and E. H. Evans; T. Tyrwhitt. Materials, their Nature and Application: P. Morris, Certificate and Books; C. F. Dawson; F. G. Adcock. Construction: L. C. Gregory; E. H. Evans; N. M. Doncaster. Stresses and Strains: P. Morris; J. H. Coram. Drainage and Water Supply: P. Morris; C. J. S. Holcombe; T. T. G. Donaldson Selby. Ventilation, Lighting, and Heating: C. W. Surrey and P. Morris; F. Catling; N. M. Doncaster; E. W. Sloper and V. Steadman. Specifications and Estimates: P. Morris; F. Catling; E. H. Evans. Professional Practice: P. Morris; A. Hannaford; C. W. Surrey.

EXTRA SUBJECT.—Elementary Ornament and Colour Decoration: S. Perkins; J. H. Jones; H. I. Triggs.

The PRESIDENT then delivered his

INAUGURAL ADDRESS.

In opening her fiftieth session, and upon the threshold of her actual jubilee, the Architectural Association is, he remarked, again able to justify the terms of her name and the definitions of her constitution by inviting you to earnest co-operation, in concentration of energy and warmth of comradeship, as those whose lives and interests have been claimed by the vocation of her patron, the foundation art of architecture. Our session serves no purposeless end, no one of our engagements, however slight its apparent and momentary import, is without result, and widely beyond our calendar the acquaintances formed and deepened friendships in such Architectural Association act and perpetually re-act, wittingly or unwittingly, upon ourselves and the art we practise—inscribing catholicity and progress solidly in the history of our architecture. To those conscious of some measure of attainment and power the Association says Unite; contact with your fellows cannot harm or dissipate your talents, it may perchance affect it with some beneficent emulation, and closer acquaintance may increase esteem of your brethren, while the light of your genius may give, as to finders, a spark of living motive and art to

many associated in the earnest wish to obtain advancement in their art, such as is in your power to give. Talent is not at present rare, though genius may be. Let us, therefore, with diligence and self-denial, in the higher interests of our art and generation, heartily join in association, so that all who enter upon an architectural life may find in our society the invaluable assistance of a sincere and infectious enthusiasm, and thus we may attain a higher and truer art through a renaissance of artistic vigour, and an extended sphere of cultivation render the advent and development of genius in our midst probable and immediate. It is, therefore, in the general interest of the art of our time that these sessions are held, and that the fellowship of our members should be maintained with the widest possible freedom of entry and union, and jealously guarded against the accretion of any other qualification than that of the simple desire to exercise the art of architecture. May it thus continue to be increasingly recognised that this society welcomes all architects, both students and masters, as members. It is a meeting place for the young and inexperienced, with the matured and well-practised professor, for the designer of ideal beauty, with the surveyor of patient humdrum building, without selection, without distinctions, even without qualifications. Indeed, in fulfilment of the truest instincts of the human hearts all should find disinterested friendship, and the beneficial pleasures of mutual intercourse, around the centre, not within the sphere, for the radius is unbounded, of the Architectural Association. The maintenance of this universal character in our membership happily insures freedom from electoral or professional controversy. A constitution which would include all architects cannot adopt any policy which tends to divide them against themselves, and unavoidable though differences of opinion may be, and necessary as are principle and discipline both in theory and practice, inevitably and of necessity they must not disturb us, who exist apart from all relations which would affect and injure our primal object of mutual advantage and friendship in the pursuit of our art. Leaving obvious and necessary professional regulation to those charged with such interests, our own course and functions will undoubtedly lead to the more important and practical issue of a continually elevated standard of artistic and scientific attainment, and a warmer and more natural sense of brotherhood within our ranks. Similar considerations must govern our attitude towards bodies and institutions that undertake branches of professional education and some of which, though honouring portions of our system and classes with their imitation, are liable perhaps to be considered as our rivals or competitors. The energies of University and of King's Colleges, the kindly feeling of whose professors we are not slow to recognise, in their classes and arrangements for architectural students are developing yearly, renewing their youth after our pattern, but aided by substantial resources and financial aid from the Carpenters' Company. Architectural classes and drawing schools in connection with polytechnics and technical institutes also increase and obtain shares of the large sum placed by the Government at the disposal of the London County Council for the furtherance of technical education. Towards all who join any of these bodies with the intention of fitting themselves for architectural practice we extend a welcoming but not competing hand. Retain your class interests in whatever institute or college you prefer, attend whatever lectures appear most convenient, more economical, or may be, more elaborate than those of our curriculum; but, at all events, become a member of the Association, and continue so for life, and in your education do not miss the more valuable qualities of culture, breadth, and enthusiasm, which are generated more readily and more powerfully here than elsewhere, the absence of which will limit your life's usefulness materially. We are now enabled to add to the educational forces at the disposal of the architectural student in London the programmes of the Art Students' Guild and of the London County Council Central School of Arts and Crafts—both of which should be heartily welcomed by all members of the Association. The County Council School of Arts and Crafts, which has become actual under the hands of Mr. W. R. Lethaby and Mr. G. Frampton, is the more important institution, and its programme includes practical instruction by craftsmen of proved capacity in stained glass, textiles, wall-papers and furniture, silversmith's work, moulding

and casting in metals, with general modelling, drawing, and designing. Sculpture and ornament as applied to architecture will be under the guidance of Mr. Roscoe Mullins, and architecture under Mr. Halsey Ricardo. The advantage to the architect of studying the crafts, which he usually in ignorance directs, is obvious enough, perhaps too obvious to be considered a necessary part of his scheme of education. This want has been felt in the classes of the Association for some time past, and steps have been recently taken in our School of Design and Handicraft to meet some portion of the need by obtaining access to works, as well as to workshop classes, for our members, and the new school, we agree, corresponds to the requirements of the architectural student, and deals with the higher and decorative crafts upon an admirable plan. The Art Students' Guild is equally a sign of the same movement, and will afford a limited number of students, in the various crafts that comprise the Art Workers' Guild, facilities for meeting, discussing, exhibiting, and working together, in much the same way as their seniors; but we will not predict that the vitality of the elder will suffer by its maintenance of the younger branch, as we have observed in similar bodies. An important suggestion is made in the programme of the School of Arts and Crafts as to the provision of a special course of lectures in the mechanics of construction, including the application of iron and steel to builders' work. Of all such privileges the architectural student should take full advantage. The Architectural Association urges its members to avail themselves unequivocally of every opportunity for improvement in architectural perception and facility in execution, but ever and only with the broader and nobler end in view, that all such delightful spoil be brought home to the Association for the more widely extended benefit of its fellows. Passing from our relations to other educational bodies to the consideration of our own activities in the sessional programme and work of our classes, and, taking the latter first, we find no apology necessary for the existence of any part of our course of study, each having a place among either the necessary or desirable equipments of an architect. We are entitled to go further in declaring that all the studies upon which an architectural student should enter, and the means of their profitable exercise in practical design, are afforded by the Association in its classes, studios, and School of Design and Handicraft. The Association classes provide, in the first place, for the subjects in which it is essential that an architect should be proficient. These are the nature of building materials, building construction, elementary physics, geometry, hygiene, specifications, estimates, professional practice, and drawing. In the second place, our classes provide for subjects which are desirable additions to an architect's education, but which cannot be considered as essential to it. Generally speaking, indeed, they are non-essential. These are the history of architecture in several stages, land-surveying, the history of features, mouldings, and ornament, quantity-surveying, modelling, water-colour drawing, ornament, sketching and measuring, and perspective. It is, however, impossible to regard a real architectural education and training as capable of acquisition in classes and at lectures, and it may be suggested that the term education, in connection with architecture in its current use, does not apply to the art of architecture at all, but to those subjects upon which reading and lecturing are required. Such of these as can be described as essential will be found to have relation to public health and order, and not to architecture as a fine art, education in which has a different and, as yet, imperfectly understood character. Training in architecture as a fine art is, so far as possible, undertaken in the practice of our studio, and more completely in our School of Design, which requires actual architecture upon paper from the student, and submits it to the detailed criticism of recognised masters, as well as of fellow students. To this training the workshop demonstrations, the sketching and measuring, modelling, and many of the classes that we have described as "non-essential" properly and necessarily belong, as well as very much else, such as our organised visits to ancient and modern buildings and to works in progress, our sessional meetings, and other facilities for the culture, by observation and mutual criticism, of a sound enthusiasm for healthy architecture. This training cannot be stereotyped in a curriculum confined to one set of accomplished teachers, or summed up in an examination, and though an

ideal training in the art of architecture may not yet have been attained, we may claim to have found and marked out an approach to this by no means Utopian goal, and to have made it available for all students who desire to enter upon an architectural course. The educational classes of the Association provide instruction for architects in subjects essential to the welfare of the community, and though perhaps inferior in interest to our other work, lay the basis of all real architecture in the practice of good building. That the whole of this instruction can and should be tested by thorough examination will be admitted, and it would seem natural and proper that the teachers or teaching body should examine and test the completeness of their education; but this the Association does not undertake, for the unusual reason that our educational classes were not first instituted and an examination eventually found to be necessary, but that the foundation by the Institute, which does not educate, of examinations in architectural qualifications for its membership called into existence a new educational scheme within this Association. This reversion of natural growth has produced many solecisms and some more serious results. Among these are manifestly the dissociation of the teachers from the examiners, in the unsatisfactory conclusion of the class-work to the former, and in the difficulties of the latter through inexperience as instructors. We may, therefore, point out to the Council of the Institute that the inclusion of some of our instructors as assistants to the Board of Examiners is desirable in the interests of sound education. The connexion of the educational work of the Association with the Institute examinations is of necessity a close one, and good will result from the connection becoming more definite and less inferential. A healthy mutual policy of thorough education in those subjects which the interest of the community as well as of the profession demand must form the basis of an architect's qualification, to erect buildings for the use of his fellow-creatures, and cannot but be welcomed as reasonable by all architects. This Association, with its past record and present work of architectural training, has a wider scope of view than that of qualification for candidature of the senior body; but we cannot be unconscious of the tendency that exists to use our membership and classes only as a means to the Institute qualification. To make the examination a goal instead of an introduction to paths of architectural knowledge is an idea which has always been rightly and fully deprecated by the Institute as mischievous, and this needs not only additional emphasis, but some readjustment of the examination programme to deal effectively with the evil in the future. It will be manifestly impossible, even without discussing its propriety, to distend the scope of the examination in order to include the whole art of architecture as its subject, but nothing short of this will effect the inclusion of everything desired, within the focus of either the parent earnest for his son's diploma qualification, or of the individual or collective crammer. The alternative which I would urge very earnestly is to concentrate the examination upon those subjects as to the essential character of which all architects are unanimous, and which the voice of public opinion will acclaim as in the interests of the community, and to eliminate those other subjects which, however desirable as additions to a designer's general knowledge and acquirements, are not of any public importance as necessary to a satisfactory discharge of an architect's duties in erecting good building. In the subjects that are indispensable, it is possible to obtain a satisfactory test of complete knowledge, as each is definite as to the point of qualification to be attained, while the omission of the non-essential portions will remove the practically illimitable and indefinite subjects of architectural history, ornament, and design upon which only a wide general reading and cultivated observation can afford any useful breadth of view. Examination in the power of design of course can be achieved if undertaken under proper conditions, as also in the power of expressing ideas of design in drawings; but such conditions do not exist in the present programme of the Institute, and power of design cannot possibly be brought at all to a test apart from a freedom of mind and wide access to authorities, and is most alien to the atmosphere of an examination hall, which indisposes and freezes the imagination, rather than aids it to warmth and vigour. The limits of the examinations should be reduced to concentration upon the needful work of qualification

for the proper direction of building works; and the Institute will then be in a position to attain to that wider representation of architects to which it rightly aspires. The constitution of our classes is not materially affected by this source of failure in the present examination programme, apart from the course of lectures on architectural history—a most delightful study, that perforce is lamentably hurried by the teachers and sadly crammed by the taught—as we pursue the training of the powers of the students in the studio and school of design, under more satisfactory methods, capable of progression and always receptive of new light. The work of our educational classes, which is distinct from the general scheme of the Association, involves heavy expense beyond the receipts from the students' fees, which fees practically balance with the payments to the lecturers and instructors, the special educational and premises fund being charged with the cost of maintenance. Our members should realise that their ordinary subscriptions to the Association afford no help to its educational work, which is dependent, as already stated, upon special contributions. The spirit in which the instructors and lecturers have met the committee in reducing the cost of the classes to the lowest possible limits deserves our heartiest appreciation. It is satisfactory to be able to record that the number of individual students in our classes, in spite of growing facilities elsewhere, increased last session to the highest number yet recorded—viz., 209, and that the policy of reducing the class fees by one-half has been justified in the result already indicated of balancing the costs of the lecturers. But the Association has a greater influence to exercise than that over the education and training of those about to practise architecture. The greater part by far of its members do not belong to its classes, and are precluded from sharing in the benefits of its studio. In the exercise of its more ordinary and greater usefulness the sessional meetings have a large share. All our members, through the assistance of the professional journals, can profit by the valuable information given and by the interesting discussions at our meetings, the character of which has not only been maintained, but has risen during recent sessions. There is another function of considerable importance fulfilled in what, for want of a better phrase, may be called the social side of the Association's work. The benefits of pleasant intercourse with colleagues and brethren would not exist for London and representatively for British architects but for the annual gatherings of our *conversazione, soiree*, and dinner, while the annual country excursion and the facilities that occur for smaller social gatherings in lyric and other clubs make up an important sum of really useful influences which we alone afford to architects as fraternally united. Let us cultivate an enthusiasm for our Association by seeking still to enlarge its membership; the modesty of its usefulness may need your commendations, and its broad catholicity your personal ardour. It is fitting that the President of your fiftieth session, in your behalf, should salute the name of the President of your first session, and congratulate its respected bearer upon the significant fact that he survives in undiminished power to witness the still growing vitality of our enthusiasms. Professor Robert Kerr is to us an abiding justification of the policy which has consistently obtained in this Association, of putting into its presidential office men of tried juvenility. Of the forty-two holders of this office during the past half-century, no less than thirty-three—that is, more than three-fourths—survive, and this probably forms a new record among societies. For the future, a maintenance of our past free representation of current feeling will insure not only the existence but the growing usefulness of this Association, which has always simply reflected the activities and spirit of its members. There is ample scope for all the new life and energy of the day, and personal efforts and zeal will not be suppressed or thought out of place at any point in our system. The interest of the ordinary meetings can be almost indefinitely extended by those who will prepare thoughtfully for the discussions, and this session marks some new departures with practical demonstrations, and a further use of lantern illustrations than before. A suitable house for all our labours we still hope for, but having now learnt how to wait and survive disappointment from within and without, we watch the more eagerly for the opportunity which shall embody our hopes of a proper and useful centre for our now rather disjointed machinery, assured that certain growth in all our

branches will attend a transplanting from our now sadly potbound condition. We have as a relief from this survey of our domestic politics the happy duty of offering welcome to beginners in the career of architecture. The happiness of this obligation lies in the brightness and charm of the realised enthusiasms of past student years and days. This may perhaps be accentuated, to some little degree, by the harder service which the necessities of business life have exchanged for the volatile freedom of more youthful excursions in design; the love and earnest service of art, however, remains and increases, never permitting that the modest but honourable title of student shall be laid aside, and ever summoning to the conflicts of our daily work the stimulus of that perpetual youth which really lies within the soul of each of us. Upon the service of such art we enter through the patient toil of our own day and generation, attending, may be, at the heels of some mere commercial architect of the 19th century, but learning even from him, negatively or positively, that doing is the work of life, that thought in doing is the obligation of life, and that beautiful thought in doing is the high privilege of the architect's calling. Having referred to the losses sustained by art in the recent deaths of Sir J. E. Millais and William Morris, the President addressed a few words to fellow students, concluding as follows:—Avoid as unworthy the affectation that copies and simulates greatness, which sees only the mannerisms or insignificances of the artist, and knows little or nothing of that art which has real life. This passing caution is a needful one; forgetfulness of it has already, in the course of a few years, led architecture into dry-as-dust archæology, and promises yet to plunge us into an antithesis of affected nakedness. From mouldering old age to simpering idiocy seems as short a step in the passing fashions of the day as in the decay of physical existence. Be manly, think for yourself, humbly as a learner, and therefore unostentatiously in expression; let good, honest, sincere thought characterise your design, as it must your workmanship; and affected originality is not original; you are inevitably reflected in your work, however slight; be true yourself; be true to yourself, and your architectural career will be worthy of praise as it will prove delightful to your experience.

Mr. ASTON WEBB, past-president, proposed a vote of thanks to Mr. Pite for his eloquent and epoch-making address. The motion was seconded by Mr. W. D. CARÖR, ex-president, and supported by Messrs. F. WILMINGTON LANE, Mr. E. W. MOUNTFORD, past-president, and Mr. W. H. SETH-SMITH, vice-president, and was carried by acclamation.

THE RECONSTRUCTION OF NORTH BRIDGE STREET, EDINBURGH—SELECTED DESIGN.

[WITH LITHOGRAPHIC ILLUSTRATIONS.]

MR. ALFRED WATERHOUSE, R.A., acted as referee in this competition, and in accordance with his award the design of which we give several illustrations to-day has been chosen. The following is the description from the report of this scheme furnished us by the architects, Messrs. J. N. Scott and James A. Williamson, of Edinburgh, who are conjointly the authors of this design.

"We assume, to begin with, that no scheme will commend itself which does not so develop the site as to produce the greatest revenue from lettable subjects. The plans have been prepared in strict accordance with the instructions issued to architects, and are the result of much consideration and careful study. Generally speaking, the plans consist principally of the following, namely:—

"(1) *A Series of Shops to North Bridge-street, High-street, and Cockburn-street.*—All the flats above the street floor, it is proposed, should consist of warehouses or mercantile offices. The sub-division of the various blocks has been indicated in a tentative fashion; but it is obvious there would require to be considerable elasticity allowed with regard to these internal arrangements. They would require to be such that with modifications they would meet the varied character of the many businesses which would be concentrated in these buildings; but, subject to that explanation, the plans may be taken to show how the various floors can be converted from one to four apartments, with suitable lavatory accom-

modation. The staircases are in short, easy flights, and within the well of the stair goods lifts are shown, which would serve the various floors of the building. On the upper story of each block it is proposed that there should be a suitable dwelling-house for the caretaker. This person, among other duties, would be responsible chiefly for the cleanliness and security of the premises. Every shop would be provided with lavatory and water-closet accommodation, lighted in all cases from the outside.

"ARCADE.

"(2) *An Arcade of Shops forming an Access from Cockburn-street to North Bridge-street.*—We claim this as a special feature of the plan, inasmuch as while retaining the present access to Cockburn-street, a number of revenue-yielding shops have been obtained in an otherwise unusable angle of the site, without interference with the light and air of subjacent buildings. Advantage has been taken of the levels at the Cockburn-street and North Bridge-street extremities of this arcade, with the result that the floor is level between these two important thoroughfares, and the position also is such that basement stories are available (without excavation) between the arcade floor and the present ground level at the Poultry Market. Another point of some importance to which attention is directed is that, having obtained the arcade in this position on the plan, it forms a central feature in the North Bridge and Cockburn-street frontages, which enables a greatly enhanced character of architectural dignity to be obtained. Of this full advantage has been taken in the composition of these elevations. The central part of the arcade is lighted by a domical roof—this not only forms a feature of pleasing architectural character, but is the pivot on which the arcade passage deviates from the straight between the two thoroughfares before mentioned.

HOTEL.

"(3) *A Hotel at the Corner of Market-street and the Fleshmarket-close.*—Various ideas have suggested themselves as to the utilisation of this particular part of the site, but the proposal to build a moderate-sized hotel commends itself for a variety of reasons. The proximity and directness of access to the railway station renders a hotel at this point convenient for commercial men. This is especially so in view of the fact that when this scheme has been completed a large commercial and business centre will be formed, and the importance to business gentlemen of being in the immediate neighbourhood of their customers, and in close touch with the surrounding warehouses, should render the necessity for a hotel with moderate tariffs a *sine quâ non*. A large entrance-hall and staircase is placed at the level of Market-street, almost opposite the suburban bridge of the railway, and by means of a lift and staircase access is obtained to the various floors of the hotel. The instructions to architects do not prescribe plans of all the flats—those submitted only show specified floors of the hotel buildings according to instructions, but sufficient probably to indicate the extent of the accommodation provided. We particularly point out in connection with this proposal for a commercial hotel that ample stock-rooms, although not shown as such, can be got in direct communication therewith, having private and separate access from the Fleshmarket-close for retail traders to the block of buildings facing the Close and lying between the hotel and the north gable of the Cockburn-street buildings. The hotel would have a handsome entrance-hall with office from the North Bridge-street level. There would be the usual public apartments, including restaurant, bar, billiard-rooms, private parlours, bed-rooms for visitors and servants, administrative, and other necessary departments.

MARKET PREMISES.

"(4) One of the most difficult problems connected with this scheme concerns the proper utilisation and lighting of the lower stories of the buildings to North Bridge-street and Fleshmarket-close. These stories must be well lighted, and to effect this a large open central space is provided not only to bring the lower stories into use, but also for the thorough lighting and airing of the properties at the higher levels. For the most profitable appropriation of the space referred to it appears to us that a public market has much to recommend it, especially when considered from a financial point of view, and we understand that among the wholesale fruit merchants of the city there is a desire to have such a centre as this pro-

vided for the more convenient transaction of business, in lieu of the somewhat scattered character of the neighbouring warehouses in which business is at present conducted. Taking the rentals of the warehouses for this class of trade already existing in Market-street as a basis of calculation, it will be found that a market for similar purposes will produce handsome results in the way of revenue. It is not too much to anticipate a rental from the proposed market of £2,000 annually when fully let. This figure is based on the rentals of existing properties, and may be considered as fair. The capitalised value of this sum at thirty years' purchase is £60,000. A market in this position, to be of service, must be easily accessible for goods. The general area, therefore, is provided with an entrance and exit gateway at the west and east sides respectively, both at the level of Market-street, so that vehicles may be able to discharge goods at any particular house without confusion or overcrowding. To further increase the usefulness of the building (which has an ample supply of light) an upper floor is shown for stores and offices, accessible from a wide gallery placed round four sides. The premises on this story are reached by a wide internal staircase from the main floor of the market, as also from the outside by the inclined roadway under the wholesale fishmarket for the loading and unloading of carts and lorries. An essential adjunct in connection with a fruit market are stores for the maturing of fruit—such, for instance, as the banana. As is well known, this trade is a growing one in Edinburgh. The fruit comes to this country in a green state, and is thereafter ripened in suitable stores, in which a certain temperature is maintained, and accommodation of this nature, it is proposed, should be provided in the east (and dark) half of the two lower stories of the North Bridge buildings, thus profitably utilising the buildings to the utmost extent, and this is an important point.

"Should the corporation in the future desire an extension of the new market, this might be done by taking in the under part of the wholesale fishmarket, and connecting it by means of a subway. This appears to be practicable at moderate cost.

LADIES' LAVATORY.

"(5) With regard to this building, the conditions leave it in the option of competitors to retain it, or use the site for buildings of more importance. We have decided on the latter alternative, as it is felt that the present building, being of an absolutely unremunerative character, occupies a site of great value, and blocks the way to a profitable use of the ground. Such accommodation can fitly be relegated to some less important and more secluded spot. This has been done on the plans; but the lavatory has been retained in the same quarter.

JEFFREY STREET AND CARRUBBER'S CLOSE.

"(6) *New Buildings at Jeffrey-street and Carrubber's-close.*—These buildings are shown with independent access from North Bridge-street. Should it be considered advantageous to have back saloons to the street floor shops these could be connected thereto by means of a light bridge across the area. In the mean time all the back buildings have been arranged as separate warehouses. This observation also applies to the north-east or Jeffrey-street block, which, along with those to Carrubber's-close, enters from North Bridge-street. It is apparent that all these rear buildings on the east side of the new street will have a special value from a rental point of view if entered and numbered from the principal thoroughfare.

PROVISION FOR LIGHT AND AIR, ETC.

"(7) The provisions of the statute and the regulations of the Dean of Guild Court have been kept constantly in view in considering these important matters. Should it be said that too much space has been needlessly sacrificed in the provision of open area between the several blocks of buildings, it is assumed that no more is left open than is necessary, and essential to the healths of those compelled to occupy the buildings, mostly for long periods, so that consistent with the circumscribed nature of the site and its full utilisation the buildings have been kept apart as far as possible, and at certain points they have been restricted in height to permit of a free and constant circulation of air. There are no parts of the buildings which are dark, and generally speaking, all places have windows to the open air.

ARCHITECTURAL STYLE.

"The style is Renaissance. We start with the statement in your instructions that you will consider favourably 'designs of effective external treatment.' The importance of this scheme to the City of Edinburgh is fully realised. It will form a city improvement of the first magnitude, and it is presumed the corporation have determined to carry it out in a manner worthy of the subject. The prominence of the northern parts of the buildings demands that they be treated architecturally in a manner befitting that prominence. As the principal approach to the Old Town, the buildings should be treated with monumental dignity, and as the spirit of the present and prospective buildings in the vicinity is Classic, those lines have been followed.

"It is thought desirable that the north ends of the new buildings should be treated in a manner distinct from those to the east and west towards Carrubber's and Fleshmarket Closes respectively, which are separated from the former by connecting buildings of restricted height. The main blocks are therefore treated with monumental character, while those to the east and west are of less height, and are accorded a free treatment to differentiate them from and accentuate the two end façades, which are also made to group along with, and suitably terminate, the southern extremity of the new bridge. To attain this the building area at this point has been restricted sufficiently to show the full extent of the southern spandrel of the bridge. This apparent sacrifice of ground is considered absolutely necessary, and is the only part of the building ground which is sacrificed to appearances. The effect of this northern group is gained by a natural development of the plan, and any effort to strain the general lines of building merely for the sake of gaining external effect has been avoided; but taking advantage of the general irregularity of the buildings occasioned by the utilisation of as much ground as possible, we have endeavoured to produce such a group of buildings as will at once be dignified and pleasing without in any way detracting by their bulk from the general picturesqueness of the Old Town as viewed from Princes-street or the north generally. The points from which these northern buildings will be mostly viewed will be, firstly, in advancing from the north towards the bridge, and as before stated the two wings or ends of the North Bridge-street are grouped in such a manner as will afford an imposing finish to the bridge as well as entrance to the old town; and, secondly, from the direction of Princes-street, looking across the Waverley Market roof, and of this view an illustration is given, being that which includes the greatest amount of the general group, and it will be seen from this that a collection of buildings has been formed as is thought will harmonise with the surrounding aspect.

"The treatment of the street façades, while similar to that of the north elevation, is ruled by the absolute necessity for ample lighting to the commercial or warehouse property, and these frontages have been designed with this in view. The shop fronts, as is demanded by all tradespeople, are entirely free of ornamental obstructions, and the supporting piers which carry the upper walls are so grouped as to avoid the appearance of weakness sometimes unavoidable where the exigencies of trade demand a large amount of glass on the street floor, thus endeavouring to combine business requirements with architectural truth. The frontages to the High-street and Cockburn-street are freely treated after the manner of the Scottish Domestic style, as naturally follows from the instruction to make the High-street elevations harmonise with the already existing bank premises at the corner of Cockburn-street and High-street."

The only thing that suggests itself in addition to the above account is a brief statement as to the origin of the competition and the necessity of the improvement. The old North Bridge was found to be too narrow to accommodate the greatly-increased traffic upon it. It was, therefore, resolved to demolish it and rebuild it wider. This is now being done, and to render this widening of more effect it then became necessary to widen North Bridge-street to the same extent—the street is a continuation of the bridge. This could not be done without pulling down all the buildings on either side and setting them back. This operation would interfere in turn with the properties lying behind the tenements, and in consequence the town council resolved to purchase the whole properties on the area lying between

Carrubber's-close on the east and Fleshmarket-close on the west with the purpose of rebuilding on that area such buildings as would sell or let remuneratively, in place of allowing the present comparatively valueless properties lying behind the tenements to remain, thus turning a valuable site in the centre of the town into a revenue-yielding subject, and at the same time effecting a much-needed city improvement.

ADAPTABLE SPECIFICATIONS.—XIII.*

IRONFOUNDER'S AND SMITH'S WORK: FACTS AND MEMORANDA.

THE commonest "elements," chemists tell us, are generally the most remarkable in their properties. This is certainly the case with iron, which has been more studied than any other metal, and which is still so far from being completely understood. Absolutely pure iron is hardly to be met with outside the laboratory. It is white and lustrous, very soft and tough, and extremely difficult of fusion. It is curious that neither pure iron nor pure water, separately, will cause iron to rust, though water containing air, and air containing moisture, oxidise it rapidly, especially if a little carbonic acid is present.

Iron, as it is obtained from the ore, is liable to contain a great variety of impurities, many of them hurtful, but some of them, in small quantities, rendering it more suitable for particular purposes. Carbon is universally combined with it, and makes it fusible and comparatively brittle. Silicon acts somewhat in the same way. Phosphorus is very objectionable, though frequent. Wrought iron, if it contains as much as one part in 200 of this metalloïd, becomes "cold-short" and brittle, while one part in 1,000 is enough to destroy the quality of steel. Manganese, in minute quantities, may be advantageous. Sulphur, in wrought iron and steel, produces "red-shortness." "Cinder-iron," a very bad quality of the metal made from the slag, contains much phosphorus and sulphur, but, being very fusible, it is used for mixing with more refractory qualities. The three main varieties of iron are cast iron, steel, and wrought iron. Cast iron is iron containing much carbon, steel is iron containing only a little carbon, while wrought iron is iron almost free from carbon.

1. *Cast Iron*.—This is made by re-melting the pig iron which is obtained from the ore, though common castings are sometimes run direct from the furnace. "Grey cast iron" is soft, smelts freely, making sharp castings. It contains much free carbon, in black specks diffused through its mass. It has a large bright grain. "White cast iron" contains little carbon in a free or uncombined state. It is white and brittle, and very hard, and by itself is unsuitable for any but the commonest castings. "Mottled cast iron" is a compound of the white and the grey, or a form intermediate between them. The ironfounder mixes, or should mix, the various qualities in proportions suited to the nature and purposes of each particular casting. The tensile strength of cast iron varies from six tons or less per square inch of section in the common qualities to 10 tons or more per square inch in the better ones. The compressive strength varies from 20 to 60 tons per square inch.

Cast iron contains from 2 to 6 per cent. of carbon, which may either be chemically combined with the metal, and be consequently undistinguishable by the eye; or, on the other hand, may be mechanically diffused through it in visible particles, resembling those of graphite or plumbago. "White" cast iron, though there is little visible carbon in it, may contain as much as 3 per cent. in chemical combination. By melting and slowly cooling it, this combined carbon may be changed into the free or graphitoid form, and the metal then acquires the properties of "grey" cast iron.

Cast iron was formerly much used for girders. The favourite form was the Γ section; but, as the material is about six times as strong against compression as it is against tension, the bottom flange, which is exposed to the latter description of strain, was usually made about six times as large in section as the top one. A favourite rule was to make the depth of the girder from 1-12th to 1-16th of the span, to keep the web as thin as practicable, and to put the great bulk of the metal in the flanges. Cast-iron girders, however, showed themselves so liable to sudden failure

without the slightest warning, and were so sure to be destroyed, along with their superstructures, by comparatively trifling outbreaks of fire, that they have long been almost superseded by rolled iron and steel ones.

Cast-iron columns, unless too long in proportion to their diameter, are fairly safe against unforeseen collapse, and being cheap and strong, are not likely to go out of use. Mr. Wyndham Tarn gives in the "Mechanics of Architecture," a table showing the breaking weights of solid cast-iron columns of various lengths and diameters, and considers that the safe load, where there are no vibrations or sudden shocks to be encountered, is one-sixth of this breaking weight. From these data the following list has been prepared of:—

SAFE LOADS FOR SOLID, CIRCULAR, CAST-IRON COLUMNS.						Tons.
A column 3in. dia. and 6ft. long will safely carry	3in. dia. and 8ft. long	3in. dia. and 10ft. long	4in. dia. and 6ft. long	4in. dia. and 8ft. long	4in. dia. and 10ft. long	16½
" 3in. " " 8ft. " " " "	" 3in. " " 10ft. " " " "	" 4in. " " 6ft. " " " "	" 4in. " " 8ft. " " " "	" 4in. " " 10ft. " " " "	" 5in. " " 6ft. " " " "	11
" 4in. " " 10ft. " " " "	" 5in. " " 6ft. " " " "	" 5in. " " 8ft. " " " "	" 5in. " " 10ft. " " " "	" 6in. " " 6ft. " " " "	" 6in. " " 8ft. " " " "	7½
" 5in. " " 10ft. " " " "	" 6in. " " 6ft. " " " "	" 6in. " " 8ft. " " " "	" 6in. " " 10ft. " " " "	" 7in. " " 6ft. " " " "	" 7in. " " 8ft. " " " "	40
" 6in. " " 10ft. " " " "	" 7in. " " 6ft. " " " "	" 7in. " " 8ft. " " " "	" 7in. " " 10ft. " " " "	" 8in. " " 6ft. " " " "	" 8in. " " 8ft. " " " "	29
" 7in. " " 10ft. " " " "	" 8in. " " 6ft. " " " "	" 8in. " " 8ft. " " " "	" 8in. " " 10ft. " " " "	" 9in. " " 6ft. " " " "	" 9in. " " 8ft. " " " "	21
" 8in. " " 10ft. " " " "	" 9in. " " 6ft. " " " "	" 9in. " " 8ft. " " " "	" 9in. " " 10ft. " " " "	" 10in. " " 6ft. " " " "	" 10in. " " 8ft. " " " "	15½
" 9in. " " 10ft. " " " "	" 10in. " " 6ft. " " " "	" 10in. " " 8ft. " " " "	" 10in. " " 10ft. " " " "	" 11in. " " 6ft. " " " "	" 11in. " " 8ft. " " " "	76
" 10in. " " 10ft. " " " "	" 11in. " " 6ft. " " " "	" 11in. " " 8ft. " " " "	" 11in. " " 10ft. " " " "	" 12in. " " 6ft. " " " "	" 12in. " " 8ft. " " " "	57
" 11in. " " 10ft. " " " "	" 12in. " " 6ft. " " " "	" 12in. " " 8ft. " " " "	" 12in. " " 10ft. " " " "	" 13in. " " 6ft. " " " "	" 13in. " " 8ft. " " " "	44
" 12in. " " 10ft. " " " "	" 13in. " " 6ft. " " " "	" 13in. " " 8ft. " " " "	" 13in. " " 10ft. " " " "	" 14in. " " 6ft. " " " "	" 14in. " " 8ft. " " " "	35½
" 13in. " " 10ft. " " " "	" 14in. " " 6ft. " " " "	" 14in. " " 8ft. " " " "	" 14in. " " 10ft. " " " "	" 15in. " " 6ft. " " " "	" 15in. " " 8ft. " " " "	25½
" 14in. " " 10ft. " " " "	" 15in. " " 6ft. " " " "	" 15in. " " 8ft. " " " "	" 15in. " " 10ft. " " " "	" 16in. " " 6ft. " " " "	" 16in. " " 8ft. " " " "	77
" 15in. " " 10ft. " " " "	" 16in. " " 6ft. " " " "	" 16in. " " 8ft. " " " "	" 16in. " " 10ft. " " " "	" 17in. " " 6ft. " " " "	" 17in. " " 8ft. " " " "	65
" 16in. " " 10ft. " " " "	" 17in. " " 6ft. " " " "	" 17in. " " 8ft. " " " "	" 17in. " " 10ft. " " " "	" 18in. " " 6ft. " " " "	" 18in. " " 8ft. " " " "	45
" 17in. " " 10ft. " " " "	" 18in. " " 6ft. " " " "	" 18in. " " 8ft. " " " "	" 18in. " " 10ft. " " " "	" 19in. " " 6ft. " " " "	" 19in. " " 8ft. " " " "	33

According to Dr. Downing ("Elements of Practical Construction"), the ultimate strength of a hollow cast-iron column is $\frac{4}{5}$ times that of a solid one of the same length, containing the same sectional area of metal, and half the diameter of the hollow one. This rule, however, cannot hold good for very short columns, but must evidently depend much on the proportion of the height to the diameter. Hurst's tables give the following as:—

SAFE LOADS FOR HOLLOW CIRCULAR CAST-IRON COLUMNS.						Tons.
3in. dia. .. 3in. thick .. 8ft. long ..	3in. dia. .. 3in. thick .. 10ft. long ..	3in. dia. .. 3in. thick .. 12ft. long ..	4in. dia. .. 4in. thick .. 8ft. long ..	4in. dia. .. 4in. thick .. 10ft. long ..	4in. dia. .. 4in. thick .. 12ft. long ..	5-4
3in. " " " 10ft. " " " "	3in. " " " 12ft. " " " "	4in. " " " 8ft. " " " "	4in. " " " 10ft. " " " "	4in. " " " 12ft. " " " "	5in. " " " 8ft. " " " "	3-8
3in. " " " 12ft. " " " "	4in. " " " 8ft. " " " "	4in. " " " 10ft. " " " "	4in. " " " 12ft. " " " "	5in. " " " 8ft. " " " "	5in. " " " 10ft. " " " "	2-8
4in. " " " 8ft. " " " "	4in. " " " 10ft. " " " "	4in. " " " 12ft. " " " "	5in. " " " 8ft. " " " "	5in. " " " 10ft. " " " "	5in. " " " 12ft. " " " "	11-3
4in. " " " 10ft. " " " "	4in. " " " 12ft. " " " "	5in. " " " 8ft. " " " "	5in. " " " 10ft. " " " "	5in. " " " 12ft. " " " "	6in. " " " 8ft. " " " "	8-5
4in. " " " 12ft. " " " "	5in. " " " 8ft. " " " "	5in. " " " 10ft. " " " "	5in. " " " 12ft. " " " "	6in. " " " 8ft. " " " "	6in. " " " 10ft. " " " "	13-9
5in. " " " 8ft. " " " "	5in. " " " 10ft. " " " "	5in. " " " 12ft. " " " "	6in. " " " 8ft. " " " "	6in. " " " 10ft. " " " "	6in. " " " 12ft. " " " "	10-4
5in. " " " 10ft. " " " "	6in. " " " 8ft. " " " "	6in. " " " 10ft. " " " "	6in. " " " 12ft. " " " "	7in. " " " 8ft. " " " "	7in. " " " 10ft. " " " "	8-0
5in. " " " 12ft. " " " "	6in. " " " 10ft. " " " "	6in. " " " 12ft. " " " "	7in. " " " 8ft. " " " "	7in. " " " 10ft. " " " "	7in. " " " 12ft. " " " "	23-6
6in. " " " 8ft. " " " "	6in. " " " 10ft. " " " "	6in. " " " 12ft. " " " "	7in. " " " 8ft. " " " "	7in. " " " 10ft. " " " "	7in. " " " 12ft. " " " "	18-6
6in. " " " 10ft. " " " "	7in. " " " 8ft. " " " "	7in. " " " 10ft. " " " "	7in. " " " 12ft. " " " "	8in. " " " 8ft. " " " "	8in. " " " 10ft. " " " "	14-8
6in. " " " 12ft. " " " "	7in. " " " 10ft. " " " "	7in. " " " 12ft. " " " "	8in. " " " 8ft. " " " "	8in. " " " 10ft. " " " "	8in. " " " 12ft. " " " "	11-9
7in. " " " 8ft. " " " "	7in. " " " 10ft. " " " "	7in. " " " 12ft. " " " "	8in. " " " 10ft. " " " "	8in. " " " 12ft. " " " "	9in. " " " 8ft. " " " "	21-7
7in. " " " 10ft. " " " "	8in. " " " 8ft. " " " "	8in. " " " 10ft. " " " "	8in. " " " 12ft. " " " "	9in. " " " 8ft. " " " "	9in. " " " 10ft. " " " "	17-2
7in. " " " 12ft. " " " "	8in. " " " 10ft. " " " "	8in. " " " 12ft. " " " "	9in. " " " 8ft. " " " "	9in. " " " 10ft. " " " "	9in. " " " 12ft. " " " "	33-6
8in. " " " 8ft. " " " "	8in. " " " 10ft. " " " "	8in. " " " 12ft. " " " "	9in. " " " 10ft. " " " "	9in. " " " 12ft. " " " "	10in. " " " 8ft. " " " "	27-5
8in. " " " 10ft. " " " "	9in. " " " 8ft. " " " "	9in. " " " 10ft. " " " "	9in. " " " 12ft. " " " "	10in. " " " 8ft. " " " "	10in. " " " 10ft. " " " "	22-7
8in. " " " 12ft. " " " "	9in. " " " 10ft. " " " "	9in. " " " 12ft. " " " "	10in. " " " 8ft. " " " "	10in. " " " 10ft. " " " "	10in. " " " 12ft. " " " "	18-8
9in. " " " 8ft. " " " "	9in. " " " 10ft. " " " "	9in. " " " 12ft. " " " "	10in. " " " 10ft. " " " "	10in. " " " 12ft. " " " "	11in. " " " 8ft. " " " "	23-3

Cast iron is commonly tested for its strength against tension by tearing a bar apart longitudinally. If it fails in this way with less than 7 or 8 tons to the square inch of section, it is unfit for structural purposes. It is tested as to power of resisting cross strain by casting bars for the purpose. These bars are frequently made about 3ft. 3in. long by 2in. deep and 1in. wide. They are then placed on knife-edges 3ft. apart, and a gradually-increased weight or pressure is applied to the centre of the bar. A 2in. by 1in. bar, 3ft. long between the supports, should not break with a less load than $1\frac{1}{4}$ tons in the centre, and if of superior quality will bear $1\frac{1}{2}$ tons. There should be a deflection before breaking of about $\frac{1}{16}$ in.

One great danger in hollow columns is that they may be uneven in thickness, most of the metal, when liquid, having flowed to the lower side of the mould. To prevent this, it is frequently specified that they are to be "cast upright," and not with the mould laid horizontally. Inequalities in the thickness of different parts of a casting, again, are likely to lead to flaws, since the thin parts cool while the thicker ones are still red-hot; and this source of failure should be guarded against in preparing the design. Sharp angles, especially internal ones, are also better avoided in cast iron, and should be rounded off into curves. Iron shrinks about one per cent. in cooling after being cast, and this shrinkage has to be provided for by an increase in the lengths and other dimensions of the patterns from which the moulds are prepared.

Air-bubbles are a common source of weakness. Their presence may be detected by the dull sound given out on tapping the surface of the casting with a small hammer. In the same way a judgment may be formed as to the quality of the iron. If the hammer slightly indents it, it is probably good. If not, and if slight tapping chips it or causes fragments to fly off, it is brittle, and unfit for its purpose. Columns that are slightly bent or uneven generally prove, if hollow, to have one side thicker than the others. Cast iron at a red heat will hardly carry its own weight, while wrought iron at the same temperature still retains much of its strength. Cast iron weighs about 450lb. per cube foot, or $37\frac{1}{2}$ lb. per foot super of 1in. thick.

"Malleable cast iron" is a name applied to castings which have been deprived of part of their carbon by prolonged heating in contact with powdered hematite or oxide of iron. In this way their thinner and outer portions become converted into a kind of wrought iron, and can be hammered and shaped, while cold, without fracture. A core of cast iron remains where the casting is thick.

2. *Wrought Iron*.—Wrought iron, theoretically, is pure iron, or, at any rate, iron free from carbon. In practice, it commonly contains a small fraction of it, say, 1 part in 600 or more. It is usually made from cast iron by melting that substance, and then causing the carbon in it to combine with oxygen, and so to pass away in the form of gas. The carbon, in short, is burnt out of the cast iron, partly by exposing its molten surface, with constant stirring, to strong currents of air, and partly by mixing it, while liquid, with other oxidising substances. Pure wrought iron, however, is almost infusible at such temperatures as can be produced for wholesale operations. The consequence is, that as the melted iron loses carbon and approaches a state of purity, it ceases to be liquid and becomes pasty. In this state it is hammered together, and repeatedly rolled at a high temperature. The rolling helps, by exposing it to the air, to get rid of still more carbon; and, what is equally important, it changes the iron from a crystalline to a fibrous condition. The metal in this state is known as "bar iron." The quality depends very much on the number of times the bars have been cut up, raised to a welding heat, and united again by rolling. "Best-bar," which has gone through the process twice, is suited for fair ordinary work. "Best-best" has been thus treated three times, and "best-best-best" four times.

Good wrought iron when broken gradually is invariably fibrous. When subjected to tension, it should not snap suddenly, but should stretch before giving way. Iron plates should not break with a pull of less than 20 tons to the square inch of section, and at the place of fracture, the area of this section should show a reduction of at least one-tenth. Angle-iron and T-iron should bear 21 tons of tensile strain per square inch, with a reduction at the point of fracture of at least one-eighth of the area. Rivet-iron should be still stronger and more ductile—not giving way with less than 22 tons to the square inch, and having a reduction of, at least, one-fifth at the point of fracture—which will thus have an area equal to four-fifths of that of the original bar. Wrought iron crushes with from 16 to 20 tons per square inch. Any iron under 12in. wide is technically spoken of as "bar iron." A weld is generally from 15 to 20 per cent. weaker than the plate or bar in which it occurs.

Swedish iron is tougher and more tenacious than any sort made in this country; but it is too expensive for general use. The best Yorkshire iron is considered the most trustworthy of English varieties; but some other kinds, though cheaper, are often little inferior to it. Best Staffordshire bar-iron is suitable for ordinary purposes in connection with carpentry, &c. "Best" iron is generally used for roofs and building construction, "best-best" for important engineering works, and "best-best-best" for rivets.

Wrought-iron girders, bearing a dead weight, should not be loaded with more than one-third of the pressure which would break them; or if they bear a live load, with not more than one-sixth. Compression-bars not subject to shocks should not carry more than one-fourth of the weight which would crush them. Rolled girders, at the outside, should not be exposed to a strain of more than 6 tons per square inch of section, in those parts of them which are subject to tension; and to not more than 5 tons per inch in parts subject to compression or shearing.

"BUILDING NEWS" DESIGNING CLUB.

AWARD OF PRIZES: SESSION 1895-1896.

WE have no difficulty in making the awards so far as the three prizes are concerned, and the order in which "The Owl," "Tadpole," and "Invicta" are arranged is simply determined by the records made in the several competitions held during the session of our Club. The Hon. Mention awards do not so readily fall into their places, and this is due to the failure of "Mysteriarch," "Drawde," "Thistle," "Canary," and "Koh-i-noor" to maintain their industry or standard of work, neither name obtaining a record more than once. We award the prizes as follows:

"The Owl," 1st prize, £10 10s., Mr. Charles H. Holden, 156, Bradford-street, Bolton, Lancs.

"Tadpole," 2nd prize, £5 5s., Mr. T. A. Pole, 35, Bernard-street, Russell-square, W.C.

"Invicta," 3rd prize, £3 3s., Mr. C. F. Palmer, 2, Invicta Villa, Park-road, Sittingbourne, Kent.

LIST OF SUBJECTS AND RECORD OF SCORES.

A.—A Country House.—"Owl," 1; "Drawde," 2; "Twitty," 3; "Monster," 4; "Deme-trius," 5.

B.—A Small Public Bath.—"Owl," 1; "Thistle," 2; "Country Cousin," 3; "Once More," 4; "E," 5.

C.—A Small Town Church.—"Mysteriarch," 1; "Owl," 2; "Cycle," 3; "Tadpole," 4; "Nala," 5.

D.—A Gamekeeper's Cottage.—"Tadpole," 1; "Owl," 2; "A. B. C.," 3; "Invicta," 4; "Moonraker," 5.

E.—An Architect's Secretaire.—"Owl," 1; "Canary," 2.

F.—A Village Public House.—"Owl," 1; "Tadpole," 2; "Clansman," 3; "Invicta," 4; "Saxon," 5.

G.—Stables and Cow Standing.—"Tadpole," 1; "Koh-i-noor," 2; "Owl," 3; "Brian," 4; "Invicta," 5.

H.—A Country Bank.—"Tadpole," 1; "Owl," 2; "Invicta," 3; "Mac," 4; "Pantile," 5.

J.—A Golf Clubhouse.—"Owl," 1; "Tadpole," 2; "Invicta," 3; "Moor," 4; "Pantile," 5.

RULES OF COMPETITION FOR SESSION 1896-7.

1. Drawings to be sent within 28 days after the publication of the particulars of each subject.

2. One or more subjects will be given every month, from which a competitor may choose.

3. The drawings to be executed in firm black lines on white drawing-paper, in sheets of the absolute size of 22in. by 14in., with no washes or tinting in colour whatever; outline to be the first consideration; but drawings may be slightly shaded with shadows executed wholly in line. Sectional parts to be shown in ruled "hatching," or blocked in. The scale to be used will be given with each subject.

4. Drawings to be forwarded, unmounted, by post, care being taken to roll the short way of the drawing, as packages over 18in. long are not transmissible through the book post.

5. On entering the Class (which may be done at any time) each competitor is required to furnish his name and address, which must be written legibly on the back of each drawing, as a guarantee of good faith, the *nom de plume* the author intends to adopt being boldly marked on the front of each separate drawing. The motto, once adopted, to be adhered to throughout the session.

6. Prizes of £10 10s., £5 5s., and £3 3s. will be awarded to the best series of designs. Our decision to be final.

7. Before awarding the prizes any contributor will be expected to furnish proof, if necessary, as to his age, and the time during which he has been engaged in professional pursuits, though no candidate need be strictly an architectural student.

8. We reserve the right of arranging the drawings for publication in any manner we deem necessary.

9. A critical notice of the designs sent in of each series will be given in an early issue following the receipt of the drawings.

SESSION 1896-7.—FIRST LIST OF SUBJECTS.

A.—A pair of *Country Cottages* suitable for middle-class tenants, one house to comprise three sitting-rooms and six bedrooms, and the other two sitting-rooms and four bedrooms. These villas are to have the usual kitchen and offices accommodation, a bath-room, and box-room each.

The treatment to be adopted is to be cottage-like and simple, but the materials are left to competitors. The dining-room is in each house to be essentially the living-room, and is to measure about, and not less than, 18ft. by 15ft. The drawing-room should be about the area of 16ft. by 15ft., and in the first house, where there is a third reception-room, it should measure 10ft. 6in. by 12ft., or at least that area. A good larder and scullery are necessary, and the hall should not be a narrowly passage. Economy is not to be ignored, and comfort is to be a prime consideration. Two elevations and sections to be $\frac{1}{4}$ in. to the foot, and the plans may be drawn to $\frac{1}{8}$ in. scale. A view must be included, and also plans.

NOTES FROM EDINBURGH.

THE extensive and varied operations now for so long being carried out at the Waverley Station and neighbourhood are the only works of any public interest at present, though there has been no falling off in the department of ordinary enterprise. The North Bridge is approaching completion on its east side, but will be much later in being opened for traffic than was at first anticipated. The gradient differs so greatly from the old, being about 7ft. higher than the old level at the south end, that some difficulty has arisen in accommodating it to the street. This was evident from the first, and what with this and the greatly wider proportions of the new bridge, the necessity for reconstructing the whole of North Bridge-street has arisen, and as the widening of the North Bridge was an undertaking much more essential for the accommodation of the railway than the city, it is to be hoped that the vast expenditure of reconstructing the street will not be left for the city to bear alone. The BUILDING NEWS has contained notices of the various designs for the scheme, which are now being exhibited in the premises recently purchased by the city from Messrs. McLaren. Some of the designs have 12 to 17 large sheets of drawings, and there are also several excellent perspectives, chiefly of the appearance towards Princes-street. It is noticeable that one and all of them are in some phase of the Renaissance, and all adopt more or less of the present fashionable style in their treatment of the gable, with some very original or odd varieties. All seem to have considered it essential to emulate more or less the groups of building at the north end and the Classic features of the modern city. The northern façade of the first successful design, which has four well-balanced blocks of buildings, has adopted, but with more ornate detail, the columnar and pediment decorative features, so conspicuous at the end of Waterloo-place. A large section shows that these are of considerable projection, and the only thing that a critical eye might perhaps object to is the circumstance that decoration of this sort is just a little too heavy for its altitude. At the south extremity and in Cockburn-street nearly all the designs give more or less of the Scottish Baronial elevations, and it is possible that if the same style had been carried out in the northern façade the contrast would not have been disagreeable and, perhaps, more suitable as a bit of the Old Town. The cost is, of course, conjectural.

The work of preparing for the foundations of the new railway offices and hotel has been very tedious, but is now completed. About 20ft. or more of solid sandstone has had to be quarried, and good progress is being made at other points. The access is shifted further north, and has, for a portion next the station booking office, a stately Ionic balustrade, beyond which the roadway is carried on massive iron piers, giving passage underneath. The new tunnels and Waverley Bridge have been completed for some time. The short tunnel through the Mound was made with every possible precaution, to avoid injury to the National Gallery building, but, notwithstanding, some unsightly settlements made their appearance in the west frontage, and a large portion of the ashlar and the heavy cornice and parapet had to be removed. The masons have now completed their task, which has taken the whole summer months.

The site of the Usher Hall has been at last determined by the Committee of Council, to whom the matter was remitted. Of the 30 sites suggested by an interminable correspondence in the newspapers, 10 were first selected, then five, and the five were lately reduced to three, these being the Canal Basin, Chambers-street, and Castle terrace ground. None of these are cumbered with large or costly buildings, and all are fairly central, without risk of any inconvenience from crowded

thoroughfares and heavy traffic. The only objectionable feature of these sites is the circumstance that they are all at a considerable distance from the City Chambers.

The McEwen Hall, though completed in its decoration, is still unopened. The Road Commission is at present laying wood pavement on the east side, round an odd triangular space formed by the adjoining buildings of Bristo-street and the Students' Union Hall. This space is causewayed and does not improve the aspect of the neighbourhood, as the parapet is high next the McEwen Hall, dying away to Bristo-street, where there is no parapet at all. The parapet has stone and iron pillars with chain, and this angular design has a most unhappy looking contrast to the gigantic circular sweep of the hall, and any other outline would have been preferable. The wood employed in this road is not the hardwood lately put down in Princes-street, which seems to stand better and get less disagreeably dirty in wet weather. The authorities with oversight of the streets are not given to making experiments, but some excellent samples of asphalt pavement have been laid by private parties, notably some in front of Jenner's buildings, bordered with marble, which is more pleasant under foot than even the best granite-faced concrete, which is now made in very superior style by other firms than Stuart and Co. There seems to be no reason why experiments with this asphalt, which is softer than the concrete, should not be made on some of the level thoroughfares. In durability it surpasses all the others. If Edinburgh may stand in need of some improvement in its thoroughfares, it is not behind in starting others, which will keep building trades busy for a period indefinitely long. The Municipal Building improvements have been begun, with the removal and alteration of the premises recently acquired by the city, The reconstruction of North Bridge-street, the Usher Hall, a new Fever Hospital at Colinton, and the cable traction of the tramways, must all be undertaken in the near future; and the improvements for the past year have occasioned a greater rise in the city rates than for many years has been experienced.

The electric light is being gradually adopted for main thoroughfares, and in the churches and larger buildings, but it is still expensive compared with gas as an illuminant for private houses. The incandescent gas light is largely used, giving better light, at less than half the cost of the electric incandescent light.

The Prudential Assurance building (from Mr. Waterhouse's design) is making very rapid progress. The ground floor is built in polished red granite to the spring of the arches, with red sandstone ashlar and dressings, of which the large wide arches are already laid. Fine and hard pressed terracotta bricks are also being used, of small dimensions, for internal walls, and the large underground apartments are all lined with white glazed bricks. The wall above the granite level is ashlar, with horizontal recessed but unchamfered joints. The entrance is at the corner, by a projecting octagonal porch, with large cusped granite lintel, over which is a small three-light window with elaborate design in the decoration of its dressings. The granite has little moulded work, but is effectively treated with fillet and linear enrichment when required. It is the only building in the city where polished granite has been so extensively employed.

THE WELSH WATER SUPPLY FOR BIRMINGHAM.

THE members of the Water Committee of the Birmingham City Council stayed from Wednesday till Saturday in last week at Knighton, in order to make a personal inspection of the works in progress in connection with the Elan supply. The length of aqueduct to be inspected was, says the *Birmingham Post*, the 10 miles between Dolan and Knighton, which was let more than two years ago to Messrs. Morrison and Mason, of Glasgow. It was put in hand thus early because, with the exception of the masonry dams upon the Elan, the Dolan tunnel of $\frac{1}{2}$ miles in length was the work that would occupy the longest time in execution. The resident engineer in charge is Mr. W. A. Brightmore, who was previously engaged upon an important section of the Liverpool Vyrnwy works. A start was made on Thursday morning, the first part of the work to be inspected being the inlet chamber of the Downton siphon. That is the point where a length of cut-and-cover

conduit on the hydraulic gradient line is connected to the iron pipes which cross a depression below that line. Provision is made in this chamber for the whole six pipes which will ultimately be laid, although for the first instalment of 27 million gallons a day only two will be required. These pipes are of 42in. internal diameter, with an effective fall of 3ft. in a mile. The conduit in cut-and-cover or tunnel is 8ft. high and 8½ft. wide at the springing of the arch, and has a gradient of one in 4,000, or 16in. in a mile. It is constructed of concrete, faced on the invert and side walls with blue Staffordshire bricks. Descending into the conduit at the inlet chamber the party walked along it for about a mile, emerging to inspect the bridges crossing the Frydd Wood and Gwern Afol brooks, and finally at the east end of the Knighton tunnel. This tunnel has now been driven about 1,300 yards from this end. Its total length is 2½ miles. The party drove over the high ridge through which the tunnel is being driven, and after examining the west end, from which also a length of 1,300 yards has been driven, walked across the valley to the river Lugg, in which the two 42in. mains have been laid, and inspected the crossing of that river, which is effected by two steel tubes of about 35ft. span. The inlet-chamber to this siphon was found to be about half-finished, and after seeing it and the overflow-chamber, a little to the west, a further length of about a mile and a quarter of the aqueduct was traversed, including the Pant-ywar tunnel, the invert and side walls of which are being built, but as yet none of the arch. The carriages were again taken, and the Bleddfa shaft, at the east end of the Dolan tunnel, and the deep shaft (280ft.) at the Graig Gorge were pointed out in passing. The tunnel is 4½ miles in length, and is now being driven from four faces. At Dolan station the train was taken through Llandrindod Wells and Builth-road Junction up to Ithayader. Here the committee embarked in an open truck, drawn by a corporation locomotive, and proceeded down the Mid-Wales line, and then on the line made specially for the purposes of the works, to the site of the dam of the Caban Coch Reservoir, which is the lowest of the six dams to be ultimately constructed in the Elan and Claerwen valleys for the storage of the water of these two rivers, which, down to the Caban, have a total drainage area of 45,562 acres. The party were here joined by Mr. Yourdi, resident engineer in charge of the watershed works.

The excavation for the dam at the large Caban Coch Reservoir has been completed at the Brecon side of the river, and the building of the foundation and the formation of the culvert on that side have been commenced. On the arrival of the committee at this point, the Lord Mayor of Birmingham invited Alderman Lawley Parker, the chairman, to lay a stone at the outlet end of the culvert.

Mr. Mansergh asked to be allowed to present Alderman Parker with a mallet with which to lay the stone, being a model of those used in the ordinary work. The mallet, which was of ebony with silver mounting, was inscribed as follows:—"Birmingham Waterworks. Mallet used in laying a stone in the outlet end of the Brecon culvert of the Caban Coch reservoir dam by Lawley Parker, Esq., chairman of the Elan Supply Committee. 8th October, 1896. James Mansergh, V.P.Inst.C.E. (engineer)."

The party were then taken up to a small reservoir which has been constructed on the Nanty-gro at about 860ft. above Ordnance datum, for the supply of the Elan village and the works. The evening was devoted to committee work, in conference with the engineers, and the land agent for the Radnorshire section of the aqueduct. Early on Friday morning a start was made for the stoneyard, where a small army of men were dressing stone for the several dams; and then in the truck the committee travelled up the railway to the site of the dam of the Craiggoch reservoir, which is the highest of the series on the river Elan, its top water-level being 1,040ft. above sea level. Here the excavation is being vigorously proceeded with on both sides of the valley, sidings and bridges having been constructed, and air-compressing plant installed for working the drills. Afterwards similar work was seen at Ponygareg, which is a good deal more advanced. At the submerged dam at Carregddu the building of the wall has been going on for about four months. All these dams are being constructed of Cyclopean masonry, consisting of rough blocks of stone from one to

six tons in weight, imbedded in a matrix of rich Portland cement concrete, forming, when finished, practically a monolithic mass.

On Saturday morning the committee inspected the Caethon siphon, the Wye conduit, and the crossing of the River Wye, which form part of the contract let in the early summer of this year to Messrs. John Aird and Sons, of Westminster. The contractors have made a connection with the corporation railway just below its junction with the Mid-Wales line, and thus obtain access to their depot, which occupies part of a spoil site acquired by the corporation, and from which they have already commenced to construct a temporary railway along the line of their work. Their contract extends from the Caethon siphon to the commencement of Messrs. Morrison and Mason's length at Dolan (a distance of about thirteen miles), where they will also obtain a connection with the London and North-Western Railway. The committee were met upon the ground by Mr. Basil Ellis (a member of the firm), by Mr. Beale (their chief agent), and by Mr. Legg (who is the resident engineer in charge on behalf of the corporation). Mr. Legg, like Mr. Brightmore, has previously been in responsible charge of important works on the Liverpool and Manchester works. The committee returned to Birmingham on Saturday afternoon.

TERRACOTTA CONSTRUCTION.

MANY architects have some misgivings about the mode of constructing terracotta in their buildings. Very few examples are given of construction in this material, probably owing to the idea that the pieces are put together like stone. To a certain extent this is true; but the general warping or twisting of the terracotta during "firing" makes it necessary to have recourse to methods of jointing the terracotta which will, as far as possible, conceal the joints or minimise the effect of warping. We may take, for example, a doorway or window with jambs or architrave of terracotta. It is important in such a case to divide the jamb into as many small blocks as possible; these ought not to exceed a foot in height; if any longer block be made it is difficult to insure true lines. Large pieces require particular care in burning, and are often untrue in line, so that when they are built into the jamb or architrave, the eye immediately detects the irregularity. The same care should be used in making drawings or specifications for mullions and transoms; these should show the joints at frequent intervals—the more pieces the better. Columns are often turned out of considerable length; but their production is expensive, and it would not be possible for an architect to specify a number of these columns with any guarantee of getting them in time. We have known considerable delay arise owing to these requirements. Window heads and sills in this material, unless very straight in line, cause considerable disappointment, and therefore they should be divided into pieces not longer than 18in. or 2ft. The eye immediately detects any warping or unevenness of surface and line, and thick, clumsy joints are often required to produce a true effect. The window-sill might have rolls over the joints like those of roofing tiles, and on a thick wall can be made in two hollow blocks weathered on the top, the inner one being made to lap over the outer block like a weathered face of a buttress. One of the frequent blemishes we see in this class of work is the introduction of blocks which do not agree with the courses or bond of the brickwork, the consequence of which is big and clumsy jointing. The joints of the terracotta should be so arranged as not to exceed in height a quarter of those in the brickwork. In designing the details, the architect would do well to consult the manufacturer as to the number and kind of joints required in any large detail. A terracotta window-head or piece of tracery, an arched opening, or a cornice requires a careful disposition of the joints and the modes of tying-back or "anchoring" the projecting members of a cornice. The manufacturer is better able to judge where the joints should be placed to produce the best and truest blocks. The terracotta cornice is best held down by copper or steel rods. In one example the upper projecting members of the cymatium and corona are carried on I-beams of steel at intervals, the inner ends anchored down by rods in the inner side of the wall. Each modillion under the projecting members is supported by small bolts run down from the outer end of beam into the body of modillion.

There are two 4in. L-beams to each of these. The lower members, or bed-mouldings, are also partially anchored by galvanised iron clamps into the wall. In this instance, the cornice projects 4ft. from the face of wall. Each member is separately cast hollow—a mode of construction which reduces the weight, and renders a terracotta cornice much lighter than one of solid stone, the parts of which have to be of considerable depth to tail into the wall to obtain sufficient counterbalance. There are, as every architect knows, drawbacks to the employment of this material. Several weeks are necessary after the drawings are made for the manufacture and delivery of the blocks, and on this account the designs and details require to be early prepared, as any haste in drying is prejudicial. The shrinkage of the pieces often give much trouble in the setting, and skilful hands are required. It is absolutely necessary in columns, piers, jambs, and shafts to fill in the hollows with brick and cement, so as to make them as solid as possible, and the usual plan is to build up the terracotta blocks a little in advance of the brickwork or backing. Unequal settlement between the casing and backing is the risk to be avoided in the use of this material, and on this account the bed-joints should be so truly formed that any weight which may be brought on the piers or columns should not crack the blocks or cause them to flush at the edges of the joints.

CONFERENCE OF HOUSE PAINTERS.

THE Master House Painters of England and Wales have held a conference in Birmingham this week. The conference has been attended by nearly 200 delegates, representing Manchester, Liverpool, Nottingham, Newcastle-on-Tyne, Edinburgh, Aberdeen, Burnley, Blackburn, Blackpool, Bradford, Halifax, Bolton, Hereford, Hull, Leicester, Middlesbrough, Sheffield, Scarborough, Nelson, Colne, &c. It was opened on Tuesday, under the presidency of Mr. John Taylor, at the Technical School, where an exhibition is being held. The Lord Mayor of Birmingham, in welcoming the members, laid stress on the importance of artistic surroundings, and paid a tribute to the influence of the association in elevating the trade and the workmen as well as exercising, in common with like organisations, a pacific influence on trade disputes. The first session was held at the School of Art in the afternoon, when Mr. John Taylor delivered his presidential address, which dealt with education in colour. Acknowledging a vote of thanks, Mr. Taylor said the association was started when their trade was rapidly declining. They wanted to cultivate a good feeling with their men, and he must confess that a really good house painter was now a rarity. The secretary (Mr. W. G. Sutherland, Manchester) presented the annual report, which stated that the year had been one of progress, and the association was, without doubt, filling the purpose in the economy of the trade which it was called into existence to occupy. Local associations at Llandudno, Huddersfield, Darwen, Bury, North Staffordshire, and Wolverhampton had been affiliated, and the private membership had been recruited in many other towns. The hon. treasurer (Mr. Thomas Preston, Burnley) also presented a satisfactory report, announcing a balance in hand of £20 19s. 1d. The reports were duly adopted.

In the evening the members met at the Technical School, under Mr. Taylor's presidency. Mr. J. T. Allon read a paper on the "Federation of Local Associations in Counties and Districts," and afterwards Mr. E. R. Taylor, head master of Birmingham Municipal School of Art, contributed a paper under the title of "A Few Words on the Art and Craft of the House-Painter." He contended that if the profession was to be maintained, masters and workmen must become teachers and artists. In Birmingham the apprenticeship system was practically dead, but without that or something analogous to it they could not hand down the art and craft of the painter. Teaching had ceased, and the craft was suffering in consequence. Art was as necessary for the simplest and least expensive furnishing of a room as for the grandest architecture, painting, or sculpture. Technique varied in quantity and direction, but the art was one, and was expressive of a feeling for the right relation of visible things in line, mass, and colour, and was based on nature's harmonies. The endeavour to inspire their workmen with that art-feeling, and to guide them in its expression, appeared to him the main object of their organisation. If the workmen could gain a

little art training which included individual observation and expression, then their commonest work would no longer be a monotonous slavery, but a handicraft, and all they did would be permeated with art-feeling. A new interest would be awakened which would be good for master and for man, and as that power spread new fields would be opened for its exercise. Why should not the new "posters" (especially those which had to be exhibited for a long time) be done by the house-painter as well as by the printer? Papers cognate with the same subject were also read by Mr. J. C. M. Vaughan and Colonel Robert J. Bennett, the former dealing with "The Early Training of a Painter," and the latter with "The Struggle of Craftsmen, Past and Present, to Maintain the Principles of their Trade."

On Wednesday morning visits were paid by members of the conference to Aston Hall, the Victoria Law Courts, and other places of interest. At the afternoon sitting, at which the president Mr. J. Taylor, occupied the chair, a paper was read by Mr. Lewis R. Crosskey, director of the industrial art department of the Glasgow and West of Scotland Technical College, on "The function of the technical class in the training of our boys." Papers by Mr. E. Breakspear on the "Delights and Uses of Colour," and by Mr. Walter Radcliffe, analyst to the association, on "Some Considerations in Oils and Pigments" were also read. The proceedings were concluded yesterday (Thursday).

A COVENTRY CORPORATION COMPETITION.

THE City Council of Coventry do not appear altogether satisfied with the result of the competition for new municipal and police buildings, for which premiums were awarded 15 months ago. In that competition the design of Messrs. Quick, of Coventry, and Brewill, Bailey, and Mallows, of Nottingham and Bedford, was selected, and awarded the first premium of £150 by Mr. C. Barry, F.S.A., and will be found illustrated in our issues for July 26, Sept. 6 and 27, of last year. But it is not likely to assume a more concrete form, as the city council, after awarding the premiums, postponed and practically abandoned the scheme as too expensive. Under pressure from the Home Office, however, who threatened to withdraw the grant for the police force if better accommodation were not provided forthwith, they decided to carry out this portion of the scheme, but instructed Mr. Quick to prepare fresh plans, which should take account of police necessities only. In December last this new plan was submitted to the council. The police block, according to the estimate then made, was to cost about £8,000, but the average of the nine tenders received a few months later was £16,327. What the lowest tender was has not been allowed to transpire; but the town clerk states that it was very little below the average. The watch committee, unwilling to face so large an outlay, instructed Mr. Quick to cut out all "unnecessary ornament and elaboration," while retaining the whole of the accommodation shown on the plans and the integrity of the front elevation. Fresh tenders were invited, and were opened last week; the lowest of these was still £12,841, and architect's commission and other charges brought up the total to £14,571 for police buildings alone without furnishing. Mr. Quick estimated the outlay on his entire original scheme at £33,668; Mr. Charles Barry, as assessor, put it at £37,695. For this, complete municipal buildings were to be provided, including accommodation for the police, a magistrates' court, a council chamber and committee-rooms, a fire station, and offices for all the departments of the corporation. Mr. Quick put block A, which included a police-station, and accommodation for the city accountant, public medical officer, inspectors of nuisances, and water department at £16,000, or nearly one-half of his estimate for the whole design, so that the amount saved by adopting a cheeseparing policy, and reducing the building to the plainest and most meagre character, was hardly worth consideration by a city that is so rapidly growing. The city council, with some misgivings and hesitation, have, however, now accepted the lowest tender, that of Mr. C. Gray Hill, of Coventry, for the mutilated scheme. The economists have gained very little. They get a police-station only, which includes a magistrates' court, but no fire-station. The scheme for complete municipal buildings is indefinitely postponed, and to comply

with the exigencies of a new and restricted plan, several of the corporation officials have been removed from the natural official centre at St. Mary's Hall to be lodged in rented offices in Little Park-street.

FOREIGN CATTLE MARKET, DEPTFORD.

A VERY large addition has been made to the Cattle Market at Deptford by the erection of an extensive block of buildings—to be used as "chill-rooms," capable of chilling 1,200 sides of beef—measuring about 180ft. by 56ft. These buildings have been built by the City Corporation, from the designs of Mr. Andrew Murray, City Surveyor, and carried out by Messrs. Rudd and Son, builders and contractors, of Grantham. The building is quite plain, and its interest mainly consists in its walls, which are hollow, with the cavity filled-in with flaked charcoal, and the manner in which the doors and floors are constructed to maintain the low temperature necessary for the meat. These walls are constructed of stock brick in two thicknesses, the outer one being 14in. and the inner thickness 4½in., with a 9in. cavity which is filled with charcoal. The doors are of special construction; each of these is 9in. thick, of two ½in. thicknesses of matched boarding on each side, with two layers of Willesden paper between, the space being filled in with charcoal. These doors are double rebated to thick frames, and have heads which fall inwards to allow the carcasses to enter the chill-room by means of the suspended steel rails or runners with which each doorway is provided. The floors above are similarly constructed in two layers, with charcoal filling between the matched boards of ceiling and floor.

One of the most important features in the construction of these chill-rooms, of which there are eight, each 52ft. by 18ft., separated by division walls with 4½in. charcoal cavity, is the paving, which is executed by the Claridge Patent Asphalt Company. Their patent asphalt is a material admirably adapted on sanitary grounds for floors of markets, and having undoubted advantages over harder and more brittle substances. These floors are laid with 1½in. of asphalt on a bed of cement concrete 6in. deep. The walls also have the Claridge patent asphalt damp-course. In all, we are told, something like 70 tons of this excellent asphalt have been used in these buildings. The arrangements for conveying the meat from the slaughter-houses by means of overhead steel runners with switches at every door, and the mode of ventilating adopted, are very perfect. The refrigerating machinery has been supplied by the Haslam Foundry and Engineering Company, of Derby, and is now an ammonia-compression apparatus. Mr. J. W. H. Bedford is the clerk of works who has superintended the building under the City Architect, and Mr. J. Fleming is the foreman. The Corporation have wisely adopted asphalt for the paving, which will not only tend to preserve the temperature, but give a durable and cleanly floor for the purpose unattainable by other materials.

CHIPS.

The corporation of Chichester propose purchasing the waterworks in that city for £50,000.

The Southampton Corporation have decided to obtain the services of Mr. J. Kincaid, C.E., at a fee of fifty guineas to advise them on the tramways' undertaking.

The parish church of Charminster was reopened last week, after restoration at a cost of £2,700. The work has been carried out under the direction of Mr. Charles E. Ponting, of Marlborough, the diocesan architect, Messrs. Merrick, of Glastonbury, being the contractors. The west window has been fitted with stained glass representing the Birth of the Saviour. At a future date, when funds permit, a chancel will be added.

On Saturday the Bishop of Lichfield laid the foundation-stone of a new high-class school for girls, which is to be erected at Shrewsbury by the Girls' Public Schools Company at a cost of £17,000.

The Leicester Corporation have unanimously approved of an important scheme with the view of housing the poorest of the poor, displaced as the result of improvements locally.

The Local Government Board have sanctioned the borrowing by the Town Council of Tiverton of £22,000 for the purchase of the gas undertaking of Messrs. Heathcoat and Co., and for the extension of the works.

OBITUARY.

HAMPSHIRE has lost a valuable officer by the death of Mr. JAMES ROBINSON, of Winchester, the county architect and surveyor, which took place at Bognor on Friday afternoon. Mr. Robinson, who had been unwell for some time past, left Winchester some weeks since for change of air at Bognor, but had only just arrived there when he became seriously ill with abscess. After a few days he underwent an operation; but complications afterwards set in which affected his brain, and he passed away on Friday afternoon at the early age of 45. Mr. Robinson was a native of Durham, and was articled to the surveyor of that county. In the summer of 1875 he succeeded the late Mr. T. Stopher (father of Mr. Alderman Stopher) as county surveyor of Hants, and has filled his office most efficiently. The public works carried out throughout the county under his supervision include the enlargements at the county asylum and the erection of the new county buildings. Mr. Robinson was an Associate of the Institute of Civil Engineers, and a Member of the Sanitary Institute. He leaves a widow and eleven children. He was an ardent cyclist, and a great patron of local sports. His fellow-cyclists have much to thank him for in the improvements in recent years of the main roads of the county.

WE regret to announce the death, at the age of three score years and ten, of Mr. STEPHEN SALTER, F.R.I.B.A., of 28, Woburn-place, Russell-square. Mr. Salter died suddenly on Wednesday week, at his residence, Hills Court, Watford. He enjoyed a large practice, and joined the R.I.B.A. as an Associate in 1859, and became a Fellow in 1876. Of late years he has taken into partnership Mr. Percy H. Adams. Among the later works carried out by Mr. Salter may be mentioned the Examination Hall of the Colleges of Physicians and Surveyors, on the Victoria Embankment, at the foot of Savoy-street, illustrated by us on March 26, 1886; some brick additions to Somerset House for King's College, and a children's hospital in Kennington. Messrs. Salter and Adams recently won the competition for building a new workhouse for Ipswich, on a fresh site in Woodbridge-road, the erection of which has just been started.

THE death is announced as having taken place at Ayr, on Friday, of Mr. GUSTAV VALENTINE ALSING, A.M.Inst.C.E., of West Regent-street, Glasgow. Born in Denmark sixty years ago, Mr. Alsing was long resident in England, and went to Glasgow as consulting engineer to the corporation in connection with the sewage works at Dalmarnock. His method of sewage disposal had previously been adopted at Bradford and Sheffield. Mr. Alsing had been in failing health for some time, but continued in the service of the sewage committee of the Glasgow Corporation. He joined the Institution of Civil Engineers as an Associate Member in February, 1886.

An adjudication in bankruptcy is announced in the case of Thomas Boardman Baldwin, of Aldborough Hatch, Ilford, road surveyor to the Ilford urban district council.

The half-yearly return of the Works Committee of the London County Council contains particulars of 19 jobs executed, the final estimates for which came to £85,244, and the actual cost to £80,912, a saving of over 5 per cent.

A tower has just been added to the parish church of Walton-on-the-Naze, and was dedicated by the Bishop of St. Alban's on Thursday in last week. It is Early English in style and 80ft. in height, and has been built at a cost of £1,250, from designs by Mr. Henry Stone. It contains a public clock, made by Messrs. John Smith and Son, of the Midland Clock Works, Derby, to the general designs of Lord Grimthorpe. The clock has four large dials, chimes the quarters, and strikes the hours.

The examiners, Clement Dunscombe, M.A., M.Inst.C.E., Spencer Harty, M.Inst.C.E., city engineer, Dublin, and Jos. C. Bretland, M.I.C.E., city engineer of Belfast, have issued their report on the examination held in Dublin on the 23rd, 24th, and 25th ult., for the city surveyorship of Cork. The Cork Corporation decided to elect the candidate placed first. On opening the sealed envelopes the successful candidate was found to be Mr. H. A. Cutler, C.E., borough engineer, Rawtenstall, Lancs., who thus becomes city engineer. The second and third in order of merit were Mr. Frank Wood, A.M.I.C.E., F.G.S., assistant and resident engineer, Wakefield Sewerage Works, and Mr. W. Fitzgerald Barry, C.E., 13, Patrick-street, Kilkenny.

Building Intelligence.

GARWAY, HEREFORDSHIRE.—The ancient parish church of St. Michael's, Garway (A.D. 1061), was last week reopened by the Archdeacon of Hereford (the Hon. and Ven. B. L. Scudamore Stanhope), after a complete restoration of nave, chancel, and Knight Templars' chapel. The work has been chiefly the repairs, repointing of all the walls, and new roofing throughout. The old semicircular plaster ceiling, a portion of had already fallen, has been entirely removed and a boarded one substituted divided into squares, with beadings, and Knight Templars' and Knight Hospitallers' coats of arms, and afterwards stained and varnished. The inside walls have been entirely renovated with Duresco paint and petrifying liquid. The old detached tower still remains to be done, and requires immediate attention. The masonry work has been entrusted to Mr. Chas. Tilley, and the joinery work to Mr. M. Colley, both local men. The whole of the work has been carried out under the directions of Mr. Ernest G. Davies, M.S.A., architect, of Hereford.

ISLINGTON.—The vestry of St. Mary, Islington, is at present extremely busy with building projects throughout its parish. The Caledonian-road baths and washhouses are in course of having its accommodation practically doubled by the addition of a swimming-bath for women, the reconstruction and enlargement of the whole of its slipper-baths, and by largely increasing the size of its public washhouses. This scheme of enlargement has necessitated the purchase of additional land, and the new work will practically add another story to the present buildings. The estimated cost of the new work is about £13,000. The vestry is also proposing to make two separate sets of additions to the Hornsey-road Baths. The first consist in doubling the size of the present public washhouses and the establishment laundry to an estimated cost of some £5,000. These additions are to be made on the front vacant plots facing the Hornsey-road, adjoining the central entrance block. The remainder of this vacant frontage land will form the site for the second set of additions—viz., Turkish baths, additional slipper-bath accommodation, and a refreshment-room for the general establishment. It is also in contemplation to make some additions to the Tibberton-square Baths and Washhouses, Essex-road, N., rendered necessary by the acquisition by purchase by the vestry of one side of Green Man-street (from which these buildings are entered), and by some slight alterations rendered necessary in order to obtain the L.C.C. license for music and dancing. The vestry is also making (at a very early date after its opening in March last) the first addition to its central electrical lighting station at Eden-grove, Holloway. This consists of the enlargement of the engine and boiler-houses in continuation of the present one. The amount of the contract for this is £7,500. The architect for the whole of the foregoing works is Mr. A. Hessel Tiltman, F.R.I.B.A., 6, John-street, Bedford-row, who was in every instance the architect of the original building.

KENNINGTON-ROAD, S.E.—Mr. Alderman N. W. Hubbard, L.C.C. (chairman of the Lambeth Baths and Wash-houses Committee), on Saturday laid the foundation-stone of the new public baths and wash-houses which are being erected at the junction of Kennington-road and Lambeth-road, by the Lambeth Vestry. The building, when finished, will be the largest establishment of its kind in England, and will be the chief of the series proposed to be erected by the commissioners and vestry in various parts of their extensive parish. The superficial area of the site amounts to 33,330 ft., and the total estimated cost is £55,000. The building itself will cost £33,747, and the general accommodation will be a first-class men's swimming-bath, 142 ft. by 56 ft.; men's second-class swimming-bath, 98 ft. by 42 ft.; women's swimming-bath, 64 ft. by 40 ft.; 65 men's private baths, 30 women's private baths, and public wash-houses for 64 washers. The first-class swimming-bath has been specially arranged to adapt it for letting during the winter months for purposes of entertainment, and the hall when thus arranged will be entirely shut off from every other portion of the establishment, affording seating accommodation for 1,522 persons. The first-class swimming-bath will be the largest tank in use in Europe, requiring some 250,000 gallons of water to fill it. The architect is Mr.

A. Hessel Tiltman, whose original design we illustrated in our pages on December 20, 1895, and whose amended designs for the exterior we shall shortly publish. Mr. Walter Wallis, of Balham, is the contractor.

NEWCASTLE-ON-TYNE.—The foundation-stones of Beech-grove Congregational Church were laid on Wednesday. The church is being built for a congregation now worshipping in a chapel in West Clayton-street, and will occupy the corner of Beech-grove-road and Westmoreland-road. The trustees invited competitive designs, and the plan of Mr. Stephen Piper, M.S.A., County Chambers, Westgate-road, Newcastle, was chosen, subject to his obtaining a tender for £8,000, including all details. Mr. G. H. Mauchlin, contractor, undertook the building at £6,950, exclusive of heating, lighting, &c., which bring the total up to the stipulated amount, and his tender was accepted. The hall was begun first, and is now nearly completed. The church itself consists of a wide nave, with transepts and passage aisles, and is provided with four entrances and exits from both the ground and gallery floors. There are ladies' and gentlemen's cloak-rooms at the main entrance, leading out of a vestibule, and a deacons' vestry. The minister's vestry, with lavatory attached, is on the north-east side of the church, and near the pulpit. The choir and organ are arranged together at the north end of the church, the latter being placed at one side, in order that windows may be introduced in the north gable. The accommodation is for 700 adults, allowing 20 in. in width for each person, and the bulk of the congregation will be seated on the ground floor. The school or hall is on the north end of the site, with two main entrances and staircases leading up to classrooms on galleries. At the back of the school, near the platform, are cloakrooms, a kitchen, and an infants' classroom, with a separate entrance. A church parlour is placed on the first floor, overlooking Elswick Park, and adjoining is a large room to accommodate 100 adults, which can be divided by a movable screen. The caretaker's rooms are partially in the roof. A simple treatment of 15th-century style is adopted. There are two spirelets flanking the front, and above the staircases to galleries and over the crossing is a flèche. In the interior there is a roof groining at the crossing of the transepts. The buildings are proposed to be lighted by electricity.

STRATFORD, E.—The foundation-stone of offices about to be provided for the West Ham School Board was laid in the Grove, Stratford, on Wednesday week. The half-basement will contain the heating and ventilating apparatus and electric-lighting plant. On the ground floor will be an office for the architect, pay-office, and porter's lodge, room for school attendance committees, board inspectors' and school attendance offices, separate accommodation being provided for female members of the staff. The first floor is occupied by the clerk to the Board and his staff with waiting-rooms, two committee-rooms, and the board-room (40 ft. by 35 ft. in width, with octagonal dome ceiling). The incandescent electric light will be used, current being obtained from a engine and generators in the basement. The gas-contract for the erection of the offices, amounting to £13,964, is being carried out by Messrs. W. Gregar and Son, of Stratford, from the design, and under the supervision of, Mr. W. Jacques, architect to the Board.

TAVISTOCK.—The new Constitutional Club, erected in Bedford-square, Tavistock, has been recently opened. The cost of the new premises, of which Mr. B. H. Pethick was the architect, has been £3,000. The structure is in the Gothic style, and comprises a shop, billiard, reading and tea-rooms, and three large offices. The building is faced with Hardwick stone, with Bath stone dressings. Two of the gables are executed in oak half-timber work, with oak barge boards. On the first floor are the reading-room and the billiard-room, the former being 42 ft. by 24 ft. 6 in., and 18 ft. high, and the latter about 36 ft. 6 in. by 24 ft., and also 18 ft. in height. The reading-room opens on to a balcony facing Bedford-square, and another in Drake-road, from which open-air gatherings can be addressed. The roof of the billiard-room is an open-timbered Gothic roof with pannelled soffits, and the principals rest on carved corbels. There is also a pannelled dado and an oriel window. The roofs are covered with red tiles. The woodwork is of pitch-pine, varnished. Between the reading and billiard-rooms are a lavatory and other offices. There is a room on

the top floor, in which the directors of the Club Company will hold their meetings. Every room is lighted by mullion windows, in keeping with the other architectural features of the building.

YEovil.—The new church of St. Michael, built through the generosity of the late Mr. H. Cole, of Yeovil, at Pen Mill, a growing suburb of that town, is practically complete, but suffered severely during the great gale last week. It stands upon high and exposed ground, and has a western tower with an octagonal turret on its south western angle. Tower and turret were crowned by a score of lofty crocketed pinnacles. In the midst of the storm two of these blew down, one striking the roof of the nave and crashing through slates and timber alike, caused much serious damage to the fabric. The new church, which was illustrated by a perspective and plan in our issue of May 10, 1895, has been designed by Mr. J. Nicholson Johnson, F.R.I.B.A., of Yeovil, in the Perpendicular style, and is built entirely of Ham Hill stone, all the internal walls being of ashlar in that material. There are nave, north and south aisles divided by arcades of five and four bays respectively, and chancel. The organ-chamber is east of the north aisle. The nave and the chancel roofs are of waggon shape, and those of the aisles are lean-to ones. Unlike ancient country churches in the West of England, it has a chancel arch. The roofs are covered-in with blue slates, and crowned by red ridge tiles. The aisles are embattled and buttressed. The whole is surrounded by a graveyard wall. The edifice, within and without, contains much stone carving and sculpture, the handiwork of Messrs. Harry Hems and Sons, of Exeter. Mr. H. W. Pollard, the present mayor of Bridgwater, is the general contractor. Since the accident, the remaining eighteen pinnacles have been removed from the embattled parapets: it is not likely they will be re-erected.

CHIPS.

The new town hall for the urban district council of Holywell has been completed. Mr. Lloyd Williams, of Denbigh, was the architect, and Mr. Abel Jones the contractor.

Messrs. Swaine Bourne and Son, King Edward's-road, Birmingham, and Aldersgate-street, London, have the commission for a stained-glass window for Skirbeck Church, North Lincolnshire, in memory of the two sons of Mr. W. H. Wheeler, of Boston, who were drowned whilst yachting in June last, William Herbert and Ralph Wheeler, aged respectively 21 and 29, subject, "Christ Stilling the Tempest." The window will shortly be erected.

The obelisk which is to be placed at the junction of the Hinckley and Coventry roads at Lutterworth, as a memorial to John Wycliffe, is being prepared at Aberdeen by Messrs. Garden and Co., and will be of polished granite. Its height will be 30 ft., rising from a spacious base.

A fatal accident occurred on Wednesday upon the works of the Central London Railway at the Holborn end of Chancery-lane. The wire rope of a steam derrick gave way, and the iron skip, weighing seven hundredweight, fell into the midst of a group of men who were at work excavating. The foreman, William Craydon, was instantly killed, and William Silks was badly injured.

In making borings to determine the character of the ground at the sites of the piers of the proposed new bridge over the East River, New York, a 6 in. pipe was first sunk by means of the water-jet as far as it would go. If boulders were met they were pierced by means of drop drills, and the hole continued with smaller pipes until bedrock was reached. A platform was then clamped round the top of the 6 in. pipe above water-level, on which was mounted a small prospector's diamond drill. With this drill 2 in. holes were bored into the bedrock for a depth of 10 ft. to 20 ft., the cores obtained giving definite information as to the character of the rock.

At the meeting on Wednesday of the city council for Exeter, a recommendation, made by the special sewage committee that the necessary loan be obtained for putting into effect for the whole of Exeter the septic system of sewage treatment devised by Mr. D. Cameron, city surveyor, was adopted, and it was agreed that application be made to the Local Government Board for sanction to borrow the money.

Colonel C. H. Luard, R.E., held an inquiry at the Council Chamber, Taunton, on Friday, with reference to an application by the Taunton Town Council for permission to borrow £3,000 for purposes of electric lighting, £1,500 for works of sewerage and sewage disposal, £300 for the provision of public conveniences in Castle Green, and £217 for works of street improvement.

Engineering Notes.

GLASGOW.—The finance committee of the Glasgow Corporation, in whose charge the re-erection of the Weir on the Clyde at Glasgow Green has been placed, have unanimously recommended that the tender of Messrs. Morrison and Mason, of that city, being the lowest, should be accepted for the execution of the steel caisson foundation, masonry, abutments, piers, and sill of the weir. The amount of the tender is the lump sum of £36,267 2s. 10d. The tender provides for the lower parts of the piers being of granite and the other stonework of freestone. Messrs. Morrison and Mason, who recently completed their contract for the construction of Craigmaddie Reservoir, are at present erecting Ruchill Hospital and building the new Glasgow Bridge for the corporation.

HULL.—The directors of the North-Eastern Railway Company met the Parliamentary Committee of the Hull Corporation and Humber Conservancy Commissioners last week, and laid before them the plans of the proposed dock works, which are estimated to cost half a million sterling, and have been prepared by Mr. H. Copperthwaite, their engineer, in conjunction with Mr. J. Wolfe Barry, C.E. The company's proposals are to provide a deep-water dock by making a new river line; the existing narrow quays of the Albert and Sir William Wright Docks to be widened; the entrance to the Albert Dock to be made suitable for the largest modern ships; and a basin, nine acres in extent, to be provided. Special provision will be made for a daily Continental line of steamers. The Mayor of Hull on behalf of the corporation promised the most favourable consideration to the proposals.

Rev. R. Medley Fulford, formerly an architect in extensive church practice in Exeter, and who for some years has been curate of Woodbury, leaves at Christmas for work in the West Indies.

Canon Atkinson, rector of Gedney, Lincolnshire, is taking steps for the restoration of the parish church of Gedney, the estimate being over £2,000. In the neighbouring parish of Fleet, the rector and the parishioners have decided to carry out restoration works in memory of the recently-deceased wife of the rector.

A new chapel at Cheltenham College was dedicated on Tuesday by the Bishop of Gloucester. The chapel commemorates the jubilee of the college celebrated in 1891, and the idea of building it originated with the Rev. H. A. James, then principal of the college and now Head Master of Rugby. Subscriptions came in freely, and by 1893 £10,000 had been subscribed or promised. Mr. Prothero, of Cheltenham, an old boy, was selected as the architect. The chapel is a good example of modern Gothic architecture. The total cost up to the present time has been £12,230.

The health committee of Glasgow Town Council considered on Monday the new Improvement Trust scheme. It was stated that property to the value of about one million and a half sterling, situated in various parts of the city, was to be scheduled in the new bill. As much of this property has already been put into a sanitary state through the efforts of the health committee, there is likely to be considerable discussion when the bill is submitted to the council for approval.

The public hall at Wigan has been reopened on the completion of extensive internal improvements and decoration, carried out from designs by Mr. R. T. Johnson, M.S.A., of that town, who personally superintended the execution of the works. The joinery was done by Mr. D. A. Ablett, of Wigan; the ante-room has been constructed and the floor laid by Mr. H. L. Gee, of Wigan; Messrs. Livesey and Parkinson, also of Wigan, have been responsible for the plaster-work; Messrs. Lea and Son, Rodney-street, Wigan, have executed the painting decorations; and Mr. W. Mackenzie, of Ince, was the contractor for the mosaic and masonry work.

For many years past one of the most frequented streets in Dewsbury has been a thoroughfare barely five yards wide, named Bridge-street. It is practically a continuation of Bond-street, and a direct connection between Northgate and the bottom of Crackenedge-lane. After several years' negotiations with the owners of the property on the Northgate side of the street, the corporation were at last able to come to terms for the purchase of the necessary land required for widening the thoroughfare, and in July they commenced the work of demolishing the old buildings that stood upon the land. Kerbs are being laid for a street 42ft. wide in its narrowest part. The corporation will pave the street with wood.

COMPETITIONS.

CUTSYKE.—In a limited competition for new board schools at Cutsyke, for the Glasshoughton School Board, plans and designs by Mr. George F. Pennington, M.S.A., architect, Castleford, have been accepted. The plans provide accommodation for 230 children in the mixed school, and for 120 infants, with a future extension of 230. The exterior of the building is in brick and stone.

LONGTON (STAFFS).—In a competition for a block of business premises, situate in Stafford-street, Longton, for Messrs. Herbert and Harry Aynsley, the designs by Messrs. Taylor and Burgess, A.R.I.B.A., of Longton, have been accepted.

SUNDERLAND TECHNICAL COLLEGE.—At a meeting of the corporation committee in charge of this scheme, it has been decided to offer premiums of £100, £50, and £25 to architects in respect of plans for the proposed college. The cost of the building is not to exceed £18,000, and preference will be given to any competitor who can provide plans of a college giving all the requirements for a less sum.

TORQUAY.—At the last meeting of the town council of Torquay, the sealed award of the assessor was read on the competitive designs for the proposed pavilion at the Princess Pier, the cost of which is not to exceed £5,000. The town clerk stated that in July the series of conditions were passed, and Mr. Alexander Graham, F.S.A., V.P.R.I.B.A., of 4, Carlton Chambers, London, S.W., was appointed as the assessor to advise the council on the merits of the respective designs, the three premiums offered for which were 50 guineas, 20 guineas, and 10 guineas. Twenty-eight sets of drawings were sent in, and, as desired by the assessor, they were set out at the Bath Saloons on Thursday, Sept. 17th. On Friday, the 18th, Mr. Graham attended there and inspected the various designs and the accompanying reports, and on the 21st he received from Mr. Graham a sealed packet addressed to the Mayor, together with a note that he (Mr. Graham) was prepared to furnish any further information concerning the designs, but that such information must be regarded as strictly confidential. Opening the sealed letters, the Mayor read Mr. Graham's report, which stated that he accorded the first place to the design marked "Utility," and the second to "Pleasure and Profit," and the third to that bearing the motto "Plain." Mr. Graham stated that all the competitors had complied with the conditions, and added:—"With regard to the designs generally, there is a considerable variety of treatment in respect of arrangement as well as in the use of materials. Greater uniformity would have resulted if the approximate floor area of the concert-hall had been given. The positions also of the entrances and refreshment-rooms not having been stated, many of the competitors have followed their own devices, and in too many instances have failed to grasp the nature of the requirements of a pier pavilion, which should be equally serviceable for external as well as internal traffic. The design to which I have accorded the first place in order of merit seems to meet all reasonable requirements. The several entrances have been well considered; the refreshment and reading-rooms are well placed and of ample dimensions; the general construction, so far as it is indicated on the drawings, is sound, and the elevations may be regarded as satisfactory and appropriate. The cost of maintenance, which is a consideration in relation to all buildings in exposed positions, ought not to exceed the average, mainly because all parts are equally accessible. There are several matters of detail in this design which need further consideration." The report was adopted, and on opening the letters it was found that the first premium had been awarded to Mr. Edward Richards, manor architect, Torquay; and the second to Messrs. Goss and Smith, of Bedford-road, London, and Bridgman and Bridgman, of Torquay and Paignton, acting conjointly. The selected design shows a concert-room 80ft. by 60ft., accommodating 850 persons on the ground floor and 350 in the galleries. At the west end of the concert-room is a stage 20ft. by 32ft., a green-room, and two dressing-rooms with lavatories. Extra lavatories are provided for the public. The building will be constructed of local brick, with local limestone base, and the dressings will be of Hamhill stone and Bracknell bricks. The inner and outer promenades will be con-

structed with light iron columns, with wood and cement floors. It is proposed to form the roof with curved iron ribs and beams, covered with either stamped copper or zinc.

CHIPS.

The new higher grade schools of St. Mary Magdalene, Ashton-on-Mersey, were dedicated and opened on Saturday by the Bishop of Chester (Dr. Jayne). They have cost £3,000.

A mason named Francis Webb committed suicide at the Bourton-on-the-Hill quarries on Friday by cutting his throat with a penknife.

The Swansea Harbour Trustees have decided not to proceed with the scheme for docks in the river Tawe, which was estimated to cost £500,000, and which is considered to be unremunerative without levying higher rates on the trade of the harbour.

The local authorities of Blaenau Ffestiniog propose to borrow £1,200 for the conversion of an existing building into a public library, and £1,400 for cemetery extension purposes. An inspector of the Local Government Board held an inquiry into both matters on Friday.

The fire which occurred on Tuesday in the four-story corner block situated in Commerce and Nelson streets, Glasgow, is estimated to have caused damage to the extent of £20,000. The names of the principal firms burned out are Messrs. Morrison and Mason, the well-known contractors, and Messrs. Paterson and Son, also large contractors.

On Friday evening a public meeting of the inhabitants was called by the Mayor of South Molton, at the Town-hall, for the purpose of considering the advisability of acquiring a site for the erection of houses for artisans and others. It was stated that Sir T. D. Acland was willing to sell land at a reasonable price, and it was decided to form a syndicate for the purpose of securing the ground and building dwellings, the Mayor being requested to act as chairman.

The fifteenth annual exhibition in connection with the Belfast Art Society was opened on Wednesday week in the Free Public Library by the Rev. Dr. Hamilton, president of the Belfast Queen's College. Mr. William Gray, M.R.I.A., president of the Society, occupied the chair.

In the Queen's Bench Division, Mr. Justice Cave has ordered Mr. Basset, the defendant in the action "Graydon v. Basset," to pay into Court within ten days £3,500, awarded by Sir Thomas Tancred, the arbitrator, on August 31st, as damages for constructing the Blackpool gigantic wheel. The award was made in lieu of the injunction and subsequent attachment issued against the defendant.

The parish church of Threlkingham, near Billingham, was reopened by the Bishop of Lincoln on Wednesday week, after undergoing restoration in the chancel. The work has been carried out by Messrs. Wadley and Co., of Horbling.

The dedication of another stained-glass window, placed in the south aisle of St. Paul's Episcopal Church, Edinburgh, took place on Sunday. The window consists of two tiers of three lights each, surmounted by tracery. The subject chosen for illustration in the upper tier represents Christ as "The Light of the World"; that of the lower, Christ giving sight to the blind. The glass is carried out in the style of the 15th century, in harmony with the other windows in the church. The window was executed at the studios of Messrs. Ballantine and Gardiner, 42, George-street, Edinburgh.

At Tuesday's meeting of the London County Council, a discussion arose on the adjourned report of the Improvements Committee recommending that the committee should be authorised, at a cost of £1,760, to acquire the land required to widen the Strand on the south side at its junction with Wellington-street to 80ft. wide at Nos. 138 and 138A, and that in the event of the National Telephone Co. being unwilling to sell at a reasonable sum, the Strand District Board should be asked to acquire the land compulsorily under the powers conferred by Michael Angelo Taylor's Act on behalf of, and at the cost of, the Council. The Council has already acquired one strip of land for widening the Strand at this point. Sir John Hutton opposed the adoption of the report, which was supported by Mr. Walter Emden, and carried by a large majority.

The question of the pollution of the River Tame was discussed at a meeting of the Tamworth Rural District Council on Saturday. Correspondence with the Staffordshire County Council and the Corporation of Birmingham having been read, it was resolved that a meeting be arranged between the Tamworth Urban and Rural Authorities, at the earliest possible date, to take further action in the matter—the county council and the corporation having declined to accept Mr. Clarkson, the surveyor to the rural district council, as one of the joint committee appointed to inquire into the causes of the pollution.

TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. All communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondents.]

It is particularly requested that all drawings and all communications respecting illustrations or literary matter should be addressed to the EDITOR of the BUILDING NEWS, 332, Strand, W.C., and not to members of the staff by name. Delay is not unfrequently otherwise caused. All drawings and other communications are sent at contributors' risks, and the Editor will not undertake to pay for, or be liable for, unsought contributions.

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Advertisements for the current week must reach the office not later than 3 p.m. on Thursday. Front-page Advertisements and alterations in serial advertisements must reach the office by Tuesday morning to secure insertion.

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The charge for advertisements for "Situations Vacant" or "Situations Wanted" is ONE SHILLING for TWENTY-FOUR WORDS, and Sixpence for every eight words after. All Situation Advertisements must be prepaid.

NOTICE.

Bound copies of Vol. LXIX. are now ready, and should be ordered early (price Twelve Shillings each), as only a limited number are done up. A few bound volumes of Vols. XXXIX., XL., XLI., XLVI., XLIX., LI., LIII., LIV., LVIII., LIX., LX., LXI., LXII., LXIII., LXIV., LXV., LXVI., LXVII., LXVIII. may still be had, price Twelve Shillings; all the other bound volumes are out of print. Most of the back numbers of former volumes are, however, to be had singly. Subscribers requiring any back numbers to complete volume just ended should order at once, as many of them soon run out of print.

J. H. SWAINSON. (We have no other indexes than those published half-yearly, and these are our own only means of reference.)

JUNIOR. (Send to Batsford, 94, High Holborn. For history, you can hardly beat Ferguson's; for construction, Rivington's; while as regards design, a good deal depends on what you are doing.)

RECEIVED.—F. C. Brayhead.—D. B. and Co.—Ajax.—W. Farley.—E. C. R.—A Resident.—F. J. and Co.

Correspondence.

A CURIOUS COMPETITION.

To the Editor of the BUILDING NEWS.

SIR,—I think the climax in competitions has now been reached by an auctioneer dating from Darlington. He advertised for designs for "laying out an estate" in that town, the premiums being £35 and £15, and a deposit of £1 being required for plan of ground and instructions.

I sent my sovereign, thinking that, though the premiums were small, the work in making one plan for laying out ground would not be great. Judge of my surprise, however, when, on receiving a plan (to the Ordnance scale of 25in. to the mile) and the instructions, I found that, besides the plan for laying out the ground as advertised, the auctioneer requires plans and elevations for at least four classes of houses. "All the houses are to be attractive and up-to-date, with bath-rooms, lavatories, and all modern improvements"; but though the amounts named as selling values for the four classes of houses are quite inadequate, reckoning the commission at only 1½ per cent. on the sums named for plans and elevations, and nothing for plan of laying out, the fee which each competitor ought to receive is less than the amount of premium which the successful (?) man is to have.

I consider it unfair for a man to advertise for

plans for "laying out" an estate," and then, having received £1 deposits, to demand plans and elevations for four classes of houses as well, before such deposit is returnable.—I am, &c.,

A VICTIM.

A.A. SCHOOL OF DESIGN.

SIR,—Permit me to correct a wrong impression conveyed by the remarks in your last issue *re* the A.A. School of Design. The medals were awarded, not for one particular subject, but on the results of the session's work, comprising the several subjects you mention. Further, may I be permitted to doubt the accuracy of your description of my warehouse design as "Late Gothic"?—I am, &c., WILLIAM J. DEVLIN.
59, Sydney-street, S.W., Oct. 13.

CAB SHELTERS.

SIR,—Permit me to make the following suggestion in the interests of the poor horses who have so patiently to stand out in the open under the most Tropical sun, or, on the other hand, when the thermometer is at its lowest point of freezing, namely, whether covered ways could not be erected, say, at all the railway stations, of which now in these days there are so many, and so entirely do away with the present open stands, which, apart from the philanthropic idea above suggested, have been so long an eyesore and disfigurement to our public thoroughfares. If the above stations were not sufficiently conveniently placed, as an alternative then I would suggest in between houses or any other place.—I am, &c., H. B.

The directors of the Ivergarry and Fort-Augustus Railway Company have resolved to promote a Bill in the next session of Parliament for the extension of their line from Fort-Augustus to Inverness.

The Coach Makers' and Coach Harness Makers' Company offer a number of prizes, in money and the company's medals, for working drawings, designs, and models in connection with the trade of coach-making.

At the Town Hall, St. Marychurch, on Wednesday week, Col. Luard, R.E., inspector under the Local Government Board, held an inquiry into the application of the St. Marychurch District Council for sanction to borrow £1,300 for the purchase of Lummaton Quarry, St. Marychurch, and for fencing and improving the same. The clerk to the council (Mr. J. Grant Wollen) showed the necessity for purchasing the quarry with which to supply the council with stone. The quarry was, he stated, inexhaustible.

An appeal is being made by the Wakefield Free Press to the West Riding County Council to reconsider their refusal to allow the central domical tower of the County Council offices, now in course of completion in Wakefield, from the designs of Messrs. Gibson and Russell, of London, to be raised by about 10ft. or 15ft. The dome, if finished in accordance with original designs, will be almost concealed by the gables of the building, and will also be dominated by the slated tower of Mr. T. E. Collett's Town Hall, which rises nearly 40ft. higher. It is pointed out that, once built, there will be no possibility, owing to its domical construction, for the mistake of insufficient height to be retrieved, and the W. R. County Council are urged not to spoil the whole effect of the building by a cheeseparing policy.

A new Congregational Church at Heaton Moor, Manchester, was opened on Friday. The building, which is of stone and cruciform on plan, stands at the corner of Heaton Moor and Broomfield-roads. It consists of transepts, choir, and nave. To prevent obstruction of view, the stone columns are placed in the side aisles. The vestries are behind the choir, and are in connection with the school and classrooms, which were opened in November last. The church contains accommodation for about 500 people. The tower and spire rise to a height of 110ft. The building has been erected by Messrs. Fairborough, jun., and Co., of Hyde, from the designs and under the superintendence of Messrs. Darbyshire and Smith, architects, of Manchester.

A new Roman Catholic church is in course of erection at Lynn. The style is Curvilinear Decorated Gothic. The building will comprise a chancel and nave with a total interior length of 72ft., the nave being 22ft. wide, and an aisle on one side 7ft. wide, and at the west end of this will be the baptistery. The Lady-chapel will be a reproduction of the shrine of Our Lady which formerly existed at Walsingham. The area of this chapel will be 7ft. by 18ft., and in extension of the length of it will be an ante-chapel 10ft. long. The building is expected to cost about £2,000. The designs are by Mr. W. Lunu, of Great Malvern (formerly of Lynn), and Mr. W. Hubbard, jun., of Dereham, is the builder.

Intercommunication.

QUESTIONS.

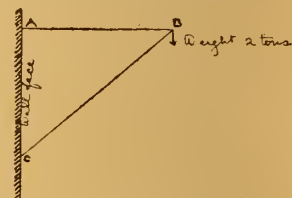
[11568].—Iron Railings or Cramps let into Stone Exposed Surfaces.—Ironwork run in with lead, being a bad method of securing the former to stonework, as lead and iron are said to form a "galvanic couple," and one of the metals in course of time gradually disappears; will sulphur sufficiently hold and form a protection to ironwork imbedded in exposed stone surfaces?—TIMM.

[11569].—Copper and Iron Vessels.—Having water boiled therein for drinking purposes, are they wholesome, or fit for the purpose? If not, why, and the best method of getting over the defects?—HEALTH.

[11570].—Natural Bed.—What is the best way of telling the natural bed of Portland stone?—PORTLAND.

[11571].—Stone Cornice Lead Weathering Covering.—Why should the weatherings of cornices and projecting sills have their weathering or upper faces covered with sheet-lead? Is not this a needless expense, whether channelled or otherwise?—SCEPTICAL.

[11572].—Strains.—Would any reader kindly give me formula and working for the following? And also what



is the strain on AB and BC respectively?—ANXIOUS.

[11573].—Breeze or Concrete Lintels.—Are said to be recommended by "Seddon"—composed of 6 of breeze to 1 of Portland cement—as not being subject to shrinkage, or destruction by rot or fire. What is to be understood by "breeze," and is there more than one kind? Where is it to be obtained, and what kind of moulds should be used for casting the concrete?—BETTERMENT.

[11574].—Centre of Gravity.—I shall be glad if any of your readers would kindly inform me as to how the centre of gravity of a bar of iron of uniform section, and in the form of a portion of the arc of a circle, can be found, by graphic construction or by calculation?—AVOCH.

CHIPS.

The City Corporation, through one of its committees, is now considering in what way it shall celebrate, next summer, the celebration of the sixtieth year of Her Majesty's reign. The schemes and considerations include the erection of an art gallery more worthy of London, to be placed on a new site on the Embankment, and the completion of the frescoes decorating the interior of the Royal Exchange.

The disastrous fire at Guayaquil, by its destruction of the principal church, has wiped out two of the most striking works of art in South America. These were two large frescoes flanking the altar. On one side was depicted the "Return of the Prodigal Son" and on the other "The Sacrifice of Isaac," all the personages in both paintings being attired in 18th century Spanish costumes.

New board schools in Cleveland-road, Ilford, are on the eve of completion, and will be opened on Saturday, the 24th inst. Messrs. Kirk and Randall, of Woolwich, are the contractors.

At the last meeting of the Dewsbury and District Joint-Hospital Board, it was resolved to advertise for plans by architects of a suitable pile of buildings to be erected in Chickenley Wood, Soothill Nether.

A women's shelter home is being erected in Manor-road, Hifield, Bristol. It is Late Gothic in style, and is built of local brickwork, and is four stories in height. Messrs. Moncrieff and Rowley, of Bristol, are the architects, and Messrs. Hughes and Weekes the contractors. The main building includes a partially-separated dwelling for the superintendent, apartments for the matrons, the necessary domestic offices, kitchens and stores, bathroom and lavatories, entrance hall, two rooms for the use of inmates when not at work, and a dining-room and sleeping accommodation for 20 women.

New artisans' dwellings in St. Joseph's-place, Dublin, were opened last week. They have been built by Messrs Connolly and Son, of Dominic-street, Dublin, from plans by Mr. C. J. McCarthy, city architect, and Mr. Spencer Harty, city engineer.

The annual conversazione of the Sheffield Society of Architects and Surveyors was held at the Cutlers' Hall on Wednesday week. The proceedings took the form of a musical evening and exhibition of the work of the late Alfred Stevens, sculptor, painter, and architect, and an exhibition of drawings by the Sheffield Society of Artists. The president (Mr. R. Hadfield) delivered an address on "The Transformation of Sheffield, and the influence of Stevens on Art."

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NORTH BRIDGE STREET IMPROVEMENT, EDINBURGH.—PORTRAIT OF A WOMAN, BY VAN RAVESTEYN (A.D. 1580).—THE PASSMORE EDWARDS CONVALESCENT HOME, STAPLEHURST.—SKETCHES AT THE ARTS AND CRAFTS EXHIBITION.—THE OLD WEST CHURCH, BOSTON, MASS.

Our Illustrations.

RECONSTRUCTION OF NORTH BRIDGE STREET, EDINBURGH.

(SEE DESCRIPTION ON p. 550.)

OLD MASTERS ON THE CONTINENT, NO. XL.—PORTRAIT OF A WOMAN.

JOHN VAN RAVESTEYN is by no means so well-known as some other painters of the Dutch school who flourished in the 17th century, and there were then several artists of the same name, for example, Hubert van Ravestejn, Arnold van Ravestejn, and Nicholas van Ravestejn. Not one of these masters obtains a place in our own National Gallery. John van Ravestejn deservedly won a wide reputation as a portrait painter, and he was the contemporary of Sir Peter Lely, and of Franz Hals, who was one of the greatest masters in portraiture of his own or of any time. Ravestejn and he were born in the same year (1580), though some authorities suggest that both these painters were born a year later. It is not known by whom Ravestejn was instructed. He died in 1657. The exquisite painting which we illustrate to-day is in the Royal Gallery at Brussels. The lady's lace collar is splendidly rendered, and the jewelled brooch and gold chain round her neck show this master's love of detail. The face, for force and expression, leaves nothing to be desired.

THE "PASSMORE EDWARDS" CONVALESCENT HOME NEAR STAPLEHURST, KENT.

This building is being erected by the generosity of Mr. Passmore Edwards to provide a convalescent home in connection with the Metropolitan Hospital, Kingsland-road, London, N.E. It is designed to accommodate 18 patients, six male, six female, and six children, allowance being made for future extension. The plan shows the general arrangement of the ground floor. On the upper floor, over the principal entrance, are the matron's and nurse's bedrooms, with inspection windows looking into the men's and women's wards respectively. There is also a private bath-room, &c., for the matron and nurse. The children's dormitory is over the dining-hall, with a nurse's bedroom adjoining. The back stairs lead to a mending and ironing room and servants' bedrooms. At the end there is a male attendant's bedroom, reached by a private stair over the outer offices. The building will be faced with hard local red bricks. The walls of upper floor will be covered with hanging tiles, and the roofs with red roofing tiles. The exterior is homely and simple in design, greater attention being given to internal comfort rather than to external effect. The site is sheltered from the North and N.W. by the rising land at the back and the wood at the side. The total cost of the building is to be within £3,000. The builders are Messrs. Jas.

Wood and Son, Boughton Monchelsea, near Maidstone, Kent.

SKETCHES AT THE ARTS AND CRAFTS EXHIBITION.

FOLLOWING up our remarks last week on the above exhibition at the New Gallery, Regent-street, we give herewith, sketches of some of the exhibits. The great Fireplace, which occupies a central position on one of the walls of the north gallery, was designed by Mr. Chas. Harrison Townsend, F.R.I.B.A., for a house in Germany, of which he is the architect, and is an example of the interest that the Germans are showing in our English arts. When so much work which is "made in Germany" floods the English market, it is quite refreshing to find our own country sending its productions there by way of exchange. American walnut is the wood in which this mantelpiece is executed, and it is left unpainted. The leading dimensions are: total width, 12ft. 2in.; height to shelf, 9ft.; total height, 12ft.; and projection about 4ft. 6in. The German inscription on overmantel is painted in copper, and may be thus translated: "Liberty and one's own hearth I hold to be worth all else." The carving (executed by Mr. George Frampton, A.R.A.) to the square caps, set angle-wise, which surmount the two octagonal posts, and the carved foliage, which is brought forward from a single stem, and fills the circular heads of the niches, is effective. We can hardly say the same of the very delicate tree-work in the frieze over the fireplace, which, what with the grain of the wood, and the deep shadow cast by the top-light, is hardly discernible, though we understand that when fixed in its destined position, an adequate sidelight will reveal this more clearly. Mr. W. S. Walker constructed this chimney-piece, and H. S. Pepper did the hammered copperwork and the fire-irons, while the embossed paper is by Messrs. Rottman and Company. The Bedroom Chair exhibits Mr. C. F. A. Voysey's usual skill in imparting originality and individuality by the simplest means. It all seems so easy and natural that what effort there may have been, is quite concealed—surely an admirable quality in all design. The woodwork is enamelled pale green, and the swing canvas back and cushion match it in colour. The back, top, and sides being filled in would effectually exclude draughts, and make this chair a grateful addition to a bedroom, especially in times of sickness. The chief dimensions are: Height 5ft. 1in., width 2ft. 2in., depth 2ft. 1in., and 1ft. 3in. to top of seat-rail. Mr. Wm. Simpson executed this piece, which runs easily on castors. The Dining-Room Chair designed by Mr. Walter Cave is likewise an honest and original attempt at departure from ordinary forms for ordinary purposes. There is nothing vexatious about this chair, and those who possess it would find that they had something far above the padded atrocities which content the multitude, and yet which fulfilled the necessary qualifications of comfort and portability at, we trust, no extravagant figure. Mr. Wm. Burdon is responsible for the make of it, which is of oak, with rush seat and semi-back. The width of back is 1ft. 9in.; the depth is 1ft. 5in.; the upright "splads" in back are 1½in., with the exception of the centre one, which is 1½in.

THE OLD WEST CHURCH, BOSTON, MASS.

This building is believed to be the work of Asher Benjamin, a well-known architect at the beginning of this century. It was until recently a Unitarian church, and his name appears in the parish rolls as a member of the society. During last year internal alterations have been made to render the building suitable for the purposes of a branch of the Boston Public Library, the adaptation having been carried out under the care of Messrs. Fox and Jenney. The nice proportions of the old building are shown in the careful view and geometrical drawing made by Mr. A. C. Fernald, of Boston, which were illustrated in the *American Architect*, from which our plate was taken.

Lady Burton will lay the foundation-stone of a new church, to be dedicated to St. Augustine, in the New Normanton district of Derby, to-morrow (Saturday) afternoon.

After being under repair for more than thirty years, the historical church of St. Bartholomew the Great, West Smithfield, is now at last restored to its original condition, and on Saturday the Lady-chapel, crypt, and triforia were opened to the public. The later works of restoration have been carried out under the direction of Mr. Aston Webb.

ARCHITECTURAL & ARCHÆOLOGICAL SOCIETIES.

BIRMINGHAM ARCHITECTURAL ASSOCIATION.—A conversazione was held at the rooms of the Royal Society of Artists on Friday night to inaugurate the Birmingham Architectural Association session for 1896 and 1897. The president, Mr. William Henman, received some 200 guests in the large circular room. A collection of architectural drawings was arranged in the small circular room, contributed by Birmingham and London architects, many of which had been hung in the late Academy exhibition. There were also some of the designs prepared at Mr. Bidlake's class at the School of Art. The musical programme included solos and quartettes, violin solos, and selections on the violoncello.

LEEDS AND YORKSHIRE ARCHITECTURAL SOCIETY.—Mr. R. A. Easdale, A.R.I.B.A. (head assistant to Mr. Arthur Hartley, C.C., architect, Carlton Chambers, Castleford), has gained the silver medal and a prize of five guineas offered by the Leeds and Yorkshire Architectural Society for the best set of measured drawings of any building erected anterior to the 17th century. Mr. Easdale selected the Norman church at Birkin, three miles east of Ferrybridge. Mr. Easdale has also carried off the prize of five guineas offered by the president of the same society for "a set of architectural sketches done during the summer months of 1896." The subjects of these sketches are as follows:—Selby Abbey (east end) and Campsall (these sketches were reproduced in our pages on Oct. 5 and Nov. 9, 1894, respectively), Ledsham, Kippax, Darrington, Pontefract (All Saints'), and Methley Churches; also old houses at Oulton and Methley, Pontefract Old Hall, and iron gates at Kirkthorpe.

CHIPS.

The Pontypool Union Infirmary, Pontypool, is being warmed and ventilated by means of Shorland's patent Manchester stoves with descending smoke flues, and Shorland's patent Manchester grates, the same being supplied by Messrs. E. H. Shorland and Brother, of Manchester.

The new school-chapel built by the Roman Catholics of Grangemouth was formally opened on Friday by Archbishop McDonald, of St. Andrew's and Edinburgh. The chapel is dedicated to the Sacred Heart. The building will accommodate about 300.

The urban district council of Ilford have received 109 applications for the vacant post of surveyor. A committee has examined the testimonials, and winnowed the number of candidates down to nine.

The members of the Edinburgh Architectural Society visited the electric-lighting station in Dewar-place on Saturday afternoon. Councillor Mackenzie, Convener of the Electric Lighting Committee, and Mr. Newington, the engineer, conducted the members over the building.

The foundation-stone of the new college chapel at Mill Hill School will be laid on Saturday, the 31st inst., by Sir William Henry Wills, M.P., Chairman of the Court of Governors. The chapel will cost between £4,000 and £5,000, of which more than £3,000 has been already promised by Old Mill-hillians and friends of the school.

The West Riding County Council accepted, on Wednesday, the tender of Mr. Isaac Gould, of Hartshead Works, Hunslet, Leeds, for the whole of the works in connection with the proposed new asylum at Wakefield. The cost of the proposed works is said to be about £80,000.

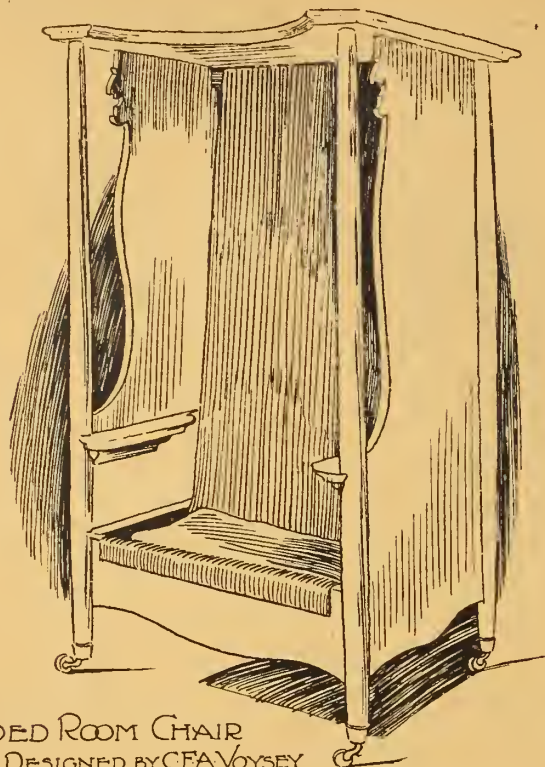
At Peterhead, N.B., a new parish hall adjoining the church, and harmonising with it in character, will be opened to-day (Friday). It has been built from designs by Mr. Alexander Webster, and has cost £900. On the first floor is the main room, 55ft. by 21ft., and 16ft. in height to wall-plate.

A new wing of the Derbyshire Royal Infirmary, containing 42 beds, was opened on Monday for the reception of patients. The whole cost of the erection has been borne by Mr. Walter Evans, and amounted to £12,000, it being intended as a memorial of his late wife.

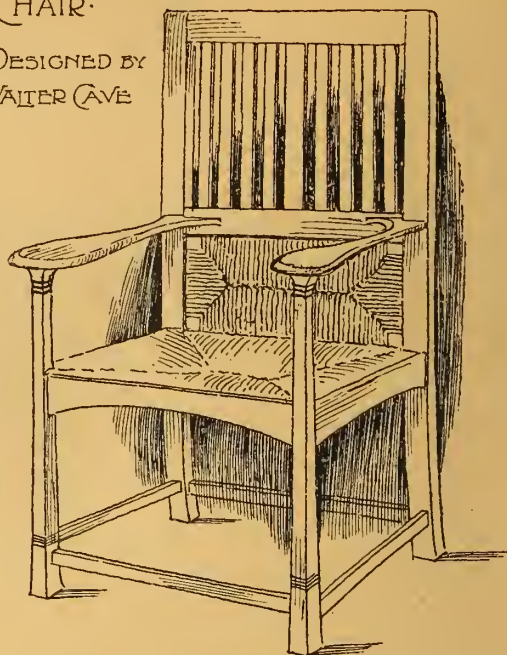
Mr. R. Steele writes suggesting that the unique collection of books and illuminated MSS. gathered together by the late Mr. William Morris should be kept together as a whole and presented to one of our national libraries or to some great provincial centre, as a worthy tribute to his memory and an absolutely unparalleled education in taste.

We see that the corporation of Calcutta are taking steps in connection with their intention to erect a new municipal building. Preliminary tenders for various classes of work have been called for and received.

MADE BY WM SIMPSON



BED ROOM CHAIR
DESIGNED BY CFA VOYSEY

DINING ROOM
CHAIRDESIGNED BY
WALTER CAVE

EXECUTED WILLIAM BURDON

CARVING BY
GEORGE FRAMPTON
ARA.WOODWORK BY
W D WALKER

MANTELPIECE

DESIGNED BY
HARRISON TOWNSEND FRIBA ARCHT

SKETCHES FROM THE ARTS & CRAFTS EXHIBITION

A Smith & Chancellor Del

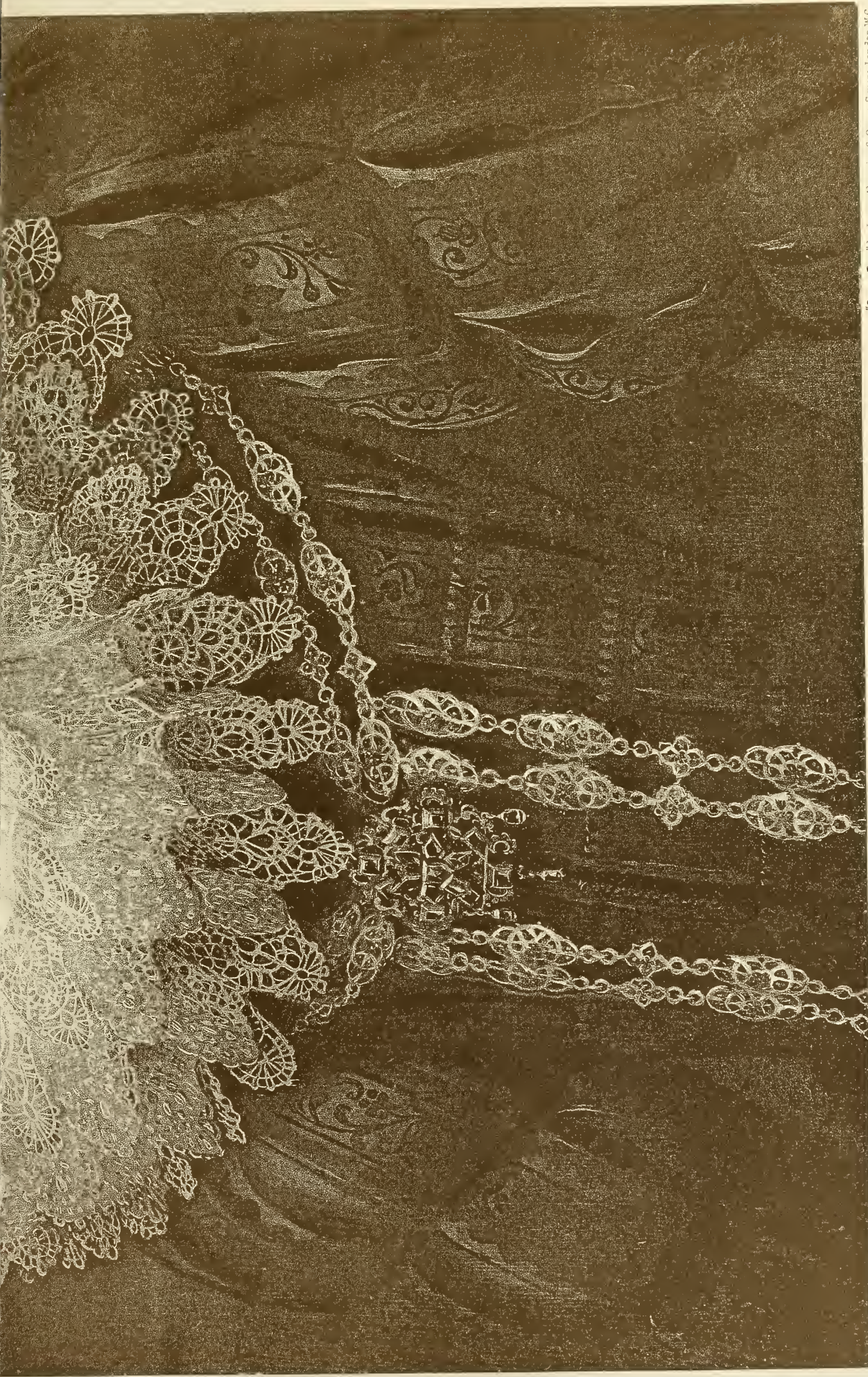


Charles Grieve Archt. :



Photo. Librgraphed & Printed by James Ackman, 6 Queen Square, W.C.





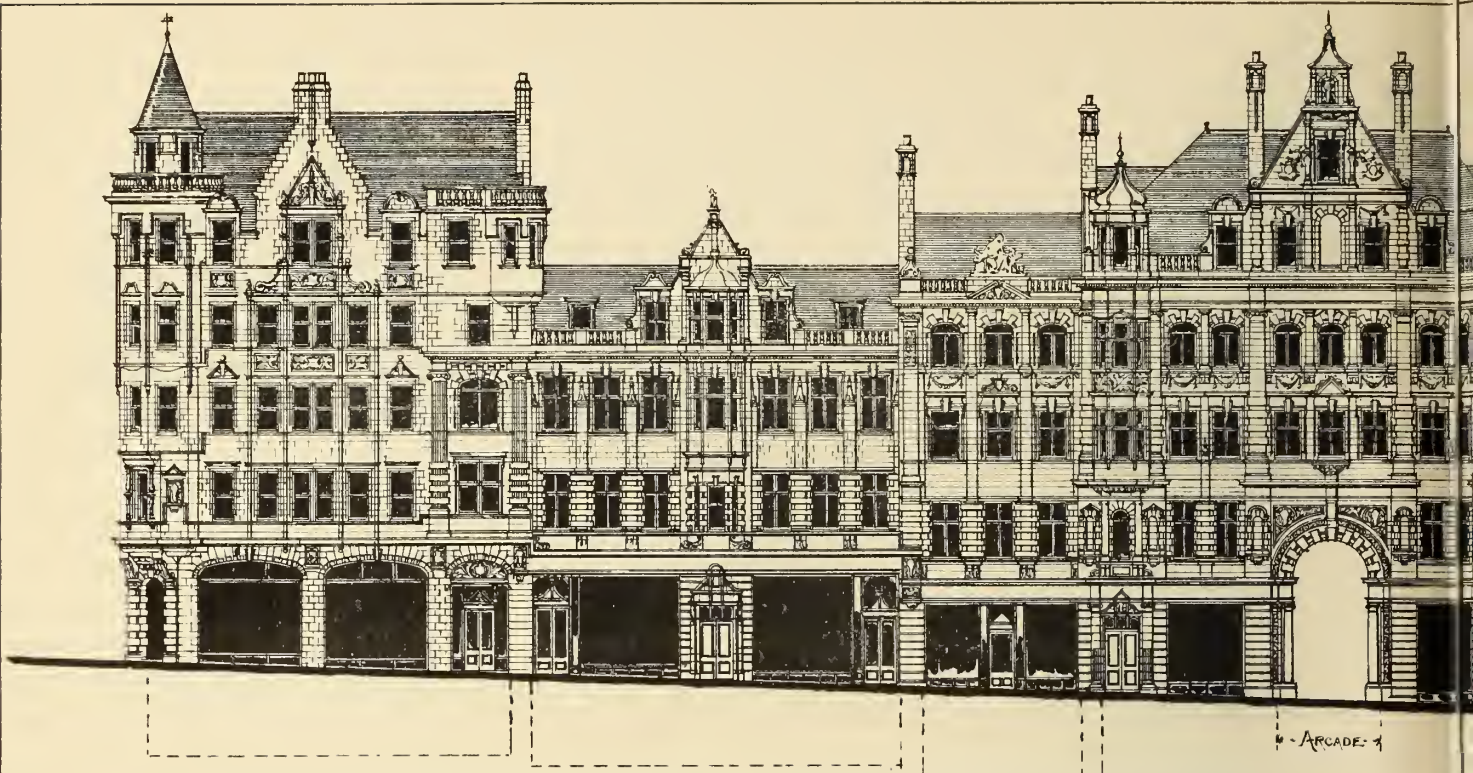
FROM A PHOTO BY FRANZ HANFSTAENGL

OLD MASTERS · ON THE · CONTINENT · N° 40 ·

PORTRAIT OF A WOMAN (BRUSSELS) BY · J. VAN RAVESTEYN · (B 1580? D 1657) DUTCH SCHOOL

"PHOTO-TINT" by James Akerman, 6, Queen Square, London W.C.

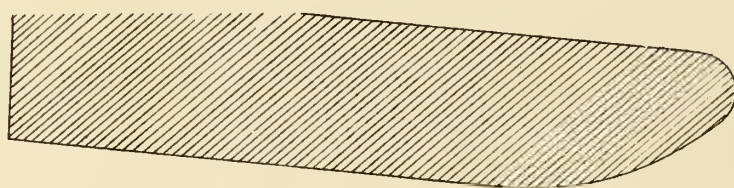




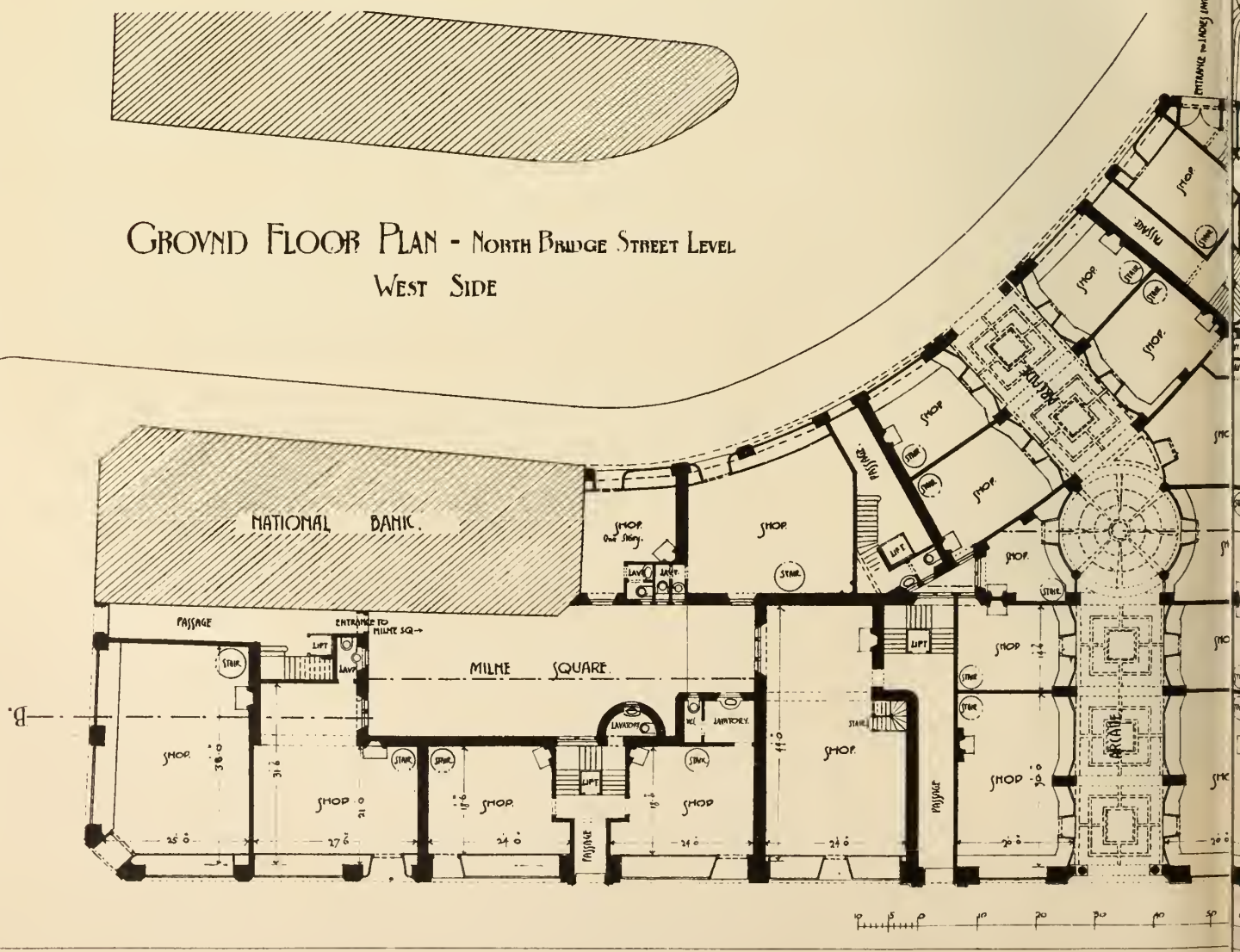
NORTH BRIDGE STREET · EDINBURGH
 RECONSTRUCTION OF BUILDINGS
 SELECTED DESIGN.

NORTH BRIDGE STREET
 EAST SIDE

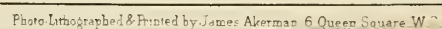
BY MESS^{RS} J.N. SCOTT & J.A. WILLIAMSON, JOINT ARCHITECTS.



GROUND FLOOR PLAN - NORTH BRIDGE STREET LEVEL
 WEST SIDE



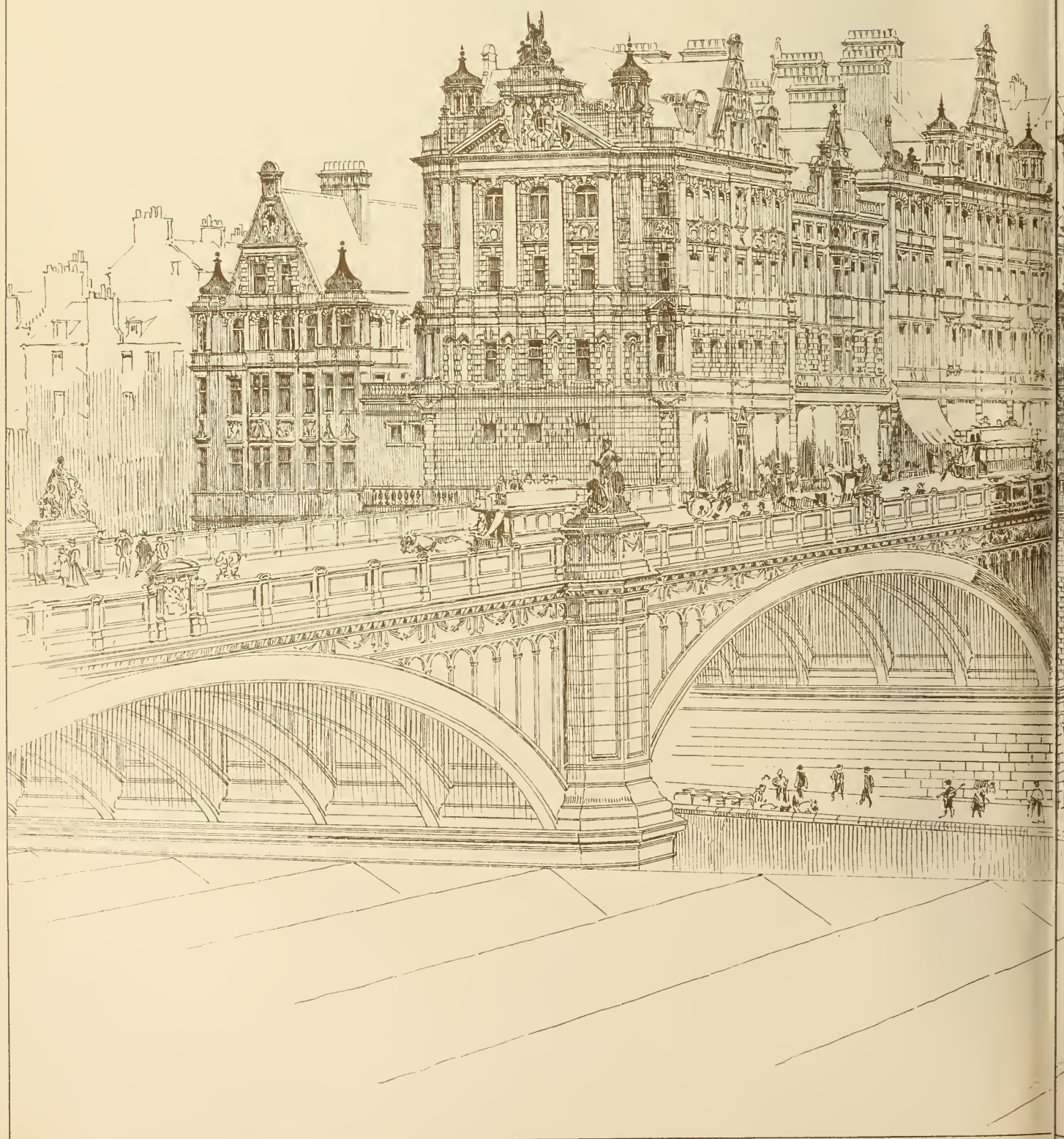
SIMILAR



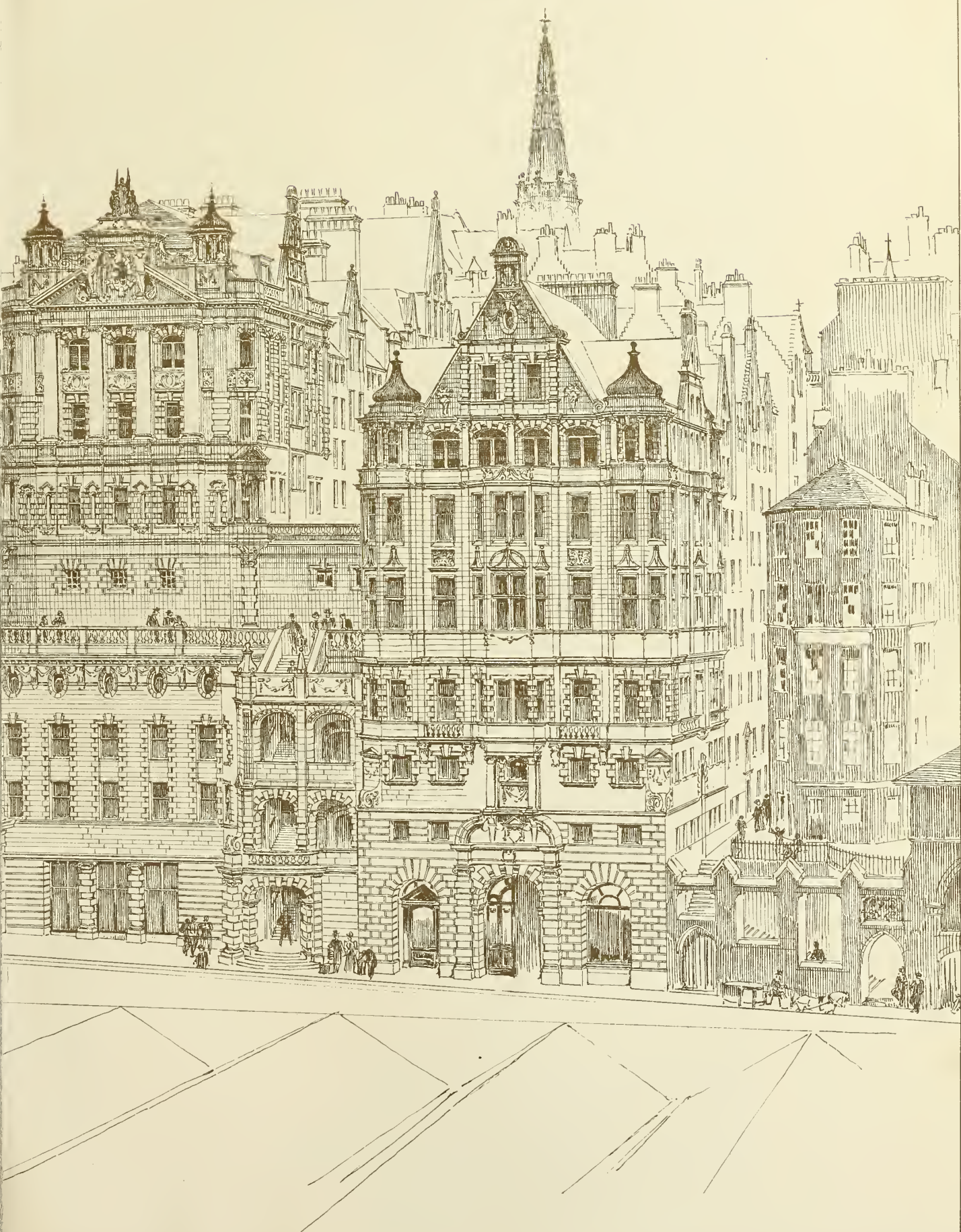
NORTH BRIDGE STREET · EDINBURGH
RECONSTRUCTION OF BUILDINGS

SELECTED DESIGN.

BY MESS^{RS} J. N. SCOTT & J. A. WILLIAMSON, JOINT ARCHITECTS.



OCT 16. 1896.



SELECTED DESIGN.

BY MESS^{RS} J. N. SCOTT & J. A. WILLIAMSON, JOINT ARCHITECTS.



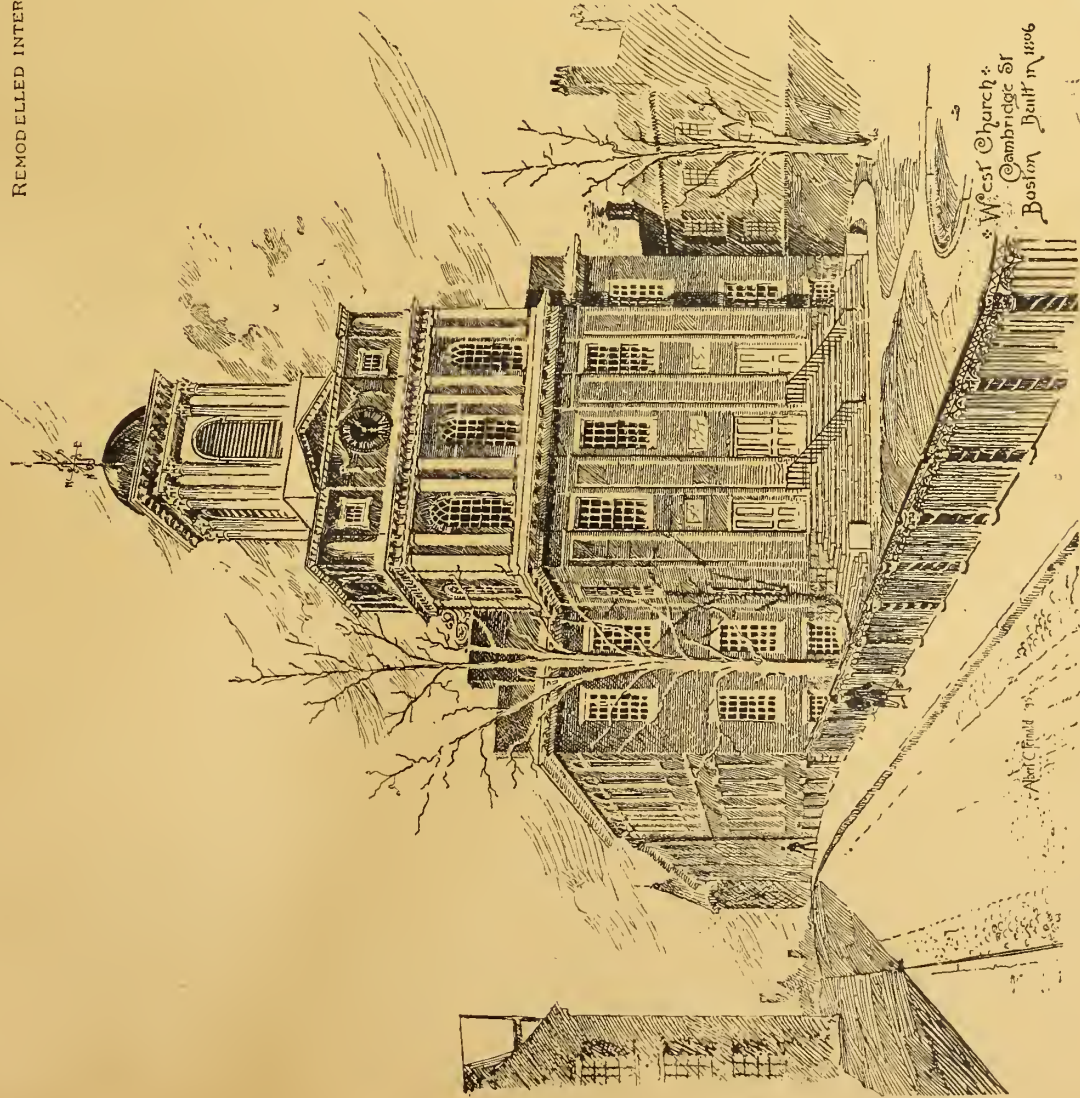
NORTH ELEVATION



REMODELLED INTERNALLY IN 1895 AND NOW USED AS A BRANCH OF THE BOSTON PUBLIC LIBRARY.

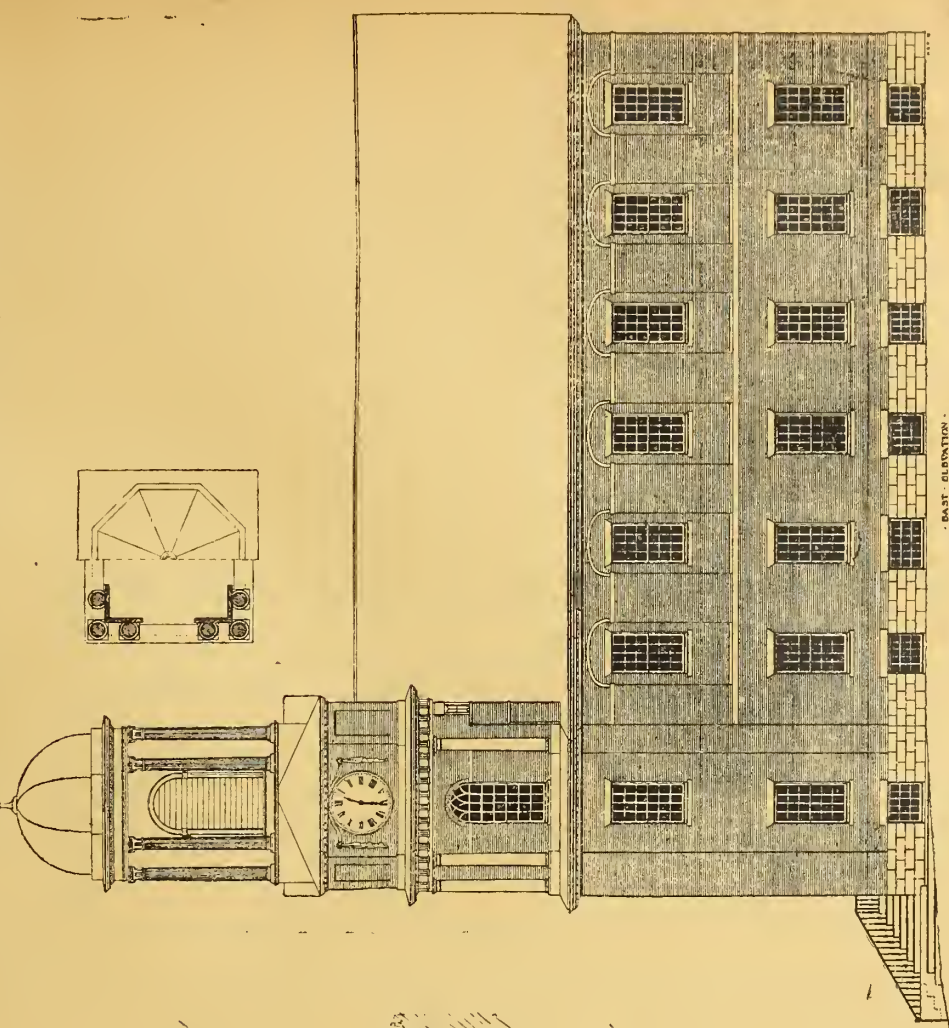
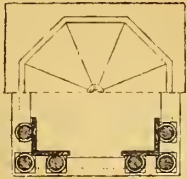
MEASURED AND DRAWN BY MR. A. C. FERNALD

PROBABLE ARCHITECT, ASHER BENJAMIN.



West Church
Cambridge St
Boston Built 1806

THE OLD WEST CHURCH, CAMBRIDGE STREET, BOSTON, MASS.



EAST ELEVATION

LEGAL INTELLIGENCE.

DISTRICT SURVEYOR'S FEES FOR SURVEYING RAILWAY ARCHES.—Mr. Corser gave judgment at the Worship-street Police Court on Monday in a case affecting Messrs. Allsopp, the brewers, who were summoned in respect of certain fees claimed by Henry Lovegrove, district surveyor for Shore-ditch and South Islington, for surveying premises at Maria-street, Kingsland-road. The premises in question are arches under the London and North-Western Railway, used by Messrs. Allsopp as stores for their ales, which are there racked off from barrels, which barrels are brought over the London and North-Western Railway from Messrs. Allsopp's breweries. The claim for fees was in respect of an addition to one of these arches, but Mr. Lovegrove had not discovered the new work until after the work was completed, and then, on claiming from the builder, he found the latter had ceased his connection with the work. The claim upon Messrs. Allsopp was as occupiers under Section 154 of the London Building Act, 1894, Mr. Lovegrove admitting that he had not claimed from the owners, the Railway Company. The claim was resisted on two grounds: that the premises were part of the railway system and exempt, as being "used for the purposes of or in connection with the traffic of the Company"; and that the occupier was not liable after the completion of the work. The magistrate, in a lengthy judgment, pointed out that the London Buildings Act, unlike the Metropolitan Local Management Act, did not declare that any "future" owner or occupier should be liable for building fees, and said if he were to decide—for that was what was asked by Mr. Lovegrove—that a "future" owner or occupier was liable, it would render a new purchaser liable for payment of fees incurred perhaps ten years before. With respect to the contention that the premises were "used for the purposes of, or in connection with," the traffic of the London and North-Western Railway, he decided that they were not. The Acts of Parliament made the difficulties in the way of giving the surveyor the fees for which he had worked; and, having waded through the ill-digested Acts, he could only hope that, if ever their consolidation was taken in hand, the assistance of Metropolitan magistrates and some of the clerks would be asked to explain how they worked. The summons was dismissed.

RAILWAY ARBITRATION AS TO THE PORTMAN ESTATE.—At the Westminster Palace Hotel, last week, Mr. Ralph Clutton, surveyor, began the hearing of an arbitration between Lord Portman and the Manchester, Sheffield, and Lincolnshire Railway Company to determine the amount of compensation to be paid to Lord Portman in respect of a portion of the Portman estate which is required by the railway company for the purposes of the extension of their railway to London. Mr. Dugdale, Q.C., in opening the case for Lord Portman, said that the land taken by the railway company amounted to 14 acres, one portion being required for the station and hotel, and another for coal sidings. The land was held on leases which had from five to 51 years to run. The claim for compensation was divided into three heads. First, the value of the present ground-rents, and in order to obtain an equivalent security, the amount of the ground-rents must be capitalised on the 2½ per cent. table. Secondly, the rental value of the land at the expiration of the leases must be ascertained and capitalised, and the sum thus obtained must then be reduced to present value. Thirdly, there was a claim for damage to the adjacent parts of the estate resulting from the stopping up of streets and from the company's works. Mr. Frederick William Hunt, F.R.I.B.A., F.S.I., the first witness, said he had been for 32 years surveyor to the Portman estate, which consisted of 265 acres lying to the north of Oxford-street. The estate was a good residential property. With regard to the portions of the estate required by the railway company, he estimated the capitalised value of the existing ground-rents at £74,739; the present value of the reversionary interest, excluding publichouses, at £217,078; the present value of reversionary interest in the publichouses at £42,204. He added 10 per cent. for compulsory sale, and £27,618 for depreciation to the adjacent property. The total claim thus arrived at amounted to £395,041. In dealing with the reversionary value of the property, he had treated part of the property as cleared land because the buildings thereon would be of no value at the expiration of the existing leases. On the other parts, however, the present buildings would still be in good condition when the leases fell in. Mr. Hunt, on being cross-examined, put the total depreciation of the station property at £36,988, and for that he asked £24,152 in present money for Lord Portman. He also asked £1,646 for a depreciation of £4,264 upon the coal depot, and £1,820 for depreciation of £3,777 by loss of access to the coal depot. The depreciation represented calculated money payable in various years between 1901 and 1957. Re-examined: If the railway had let him alone, Lord Portman, in 1901, would have had 20 years' purchase of the agreed net rental in his

pocket. He would not advise Lord Portman to sell his property. Mr. Arthur Garrard, surveyor, considered that the proposed railway would damage the private residences on Lord Portman's estate, and Lord Portman ought to have a sum in the funds that would produce him the same income. Mr. Oakley, surveyor of 40 years' standing, said his total valuation of the property was £375,184. Mr. Galsworthy, land agent and surveyor; Mr. J. G. Head, surveyor, of Upper Baker-street; Mr. James Chisholm, chief actuary to the Imperial Life Insurance Company; and Mr. George King, actuary to the London Assurance Corporation, were also called in support of Lord Portman's claim. Mr. A. R. Stenning, surveyor, was the first witness examined on behalf of the railway company. In Harewood-square and Blandford-square there were a great many lodging-houses. The houses were going down in value, and in 1891 there were 12 vacant houses in Blandford-square. In a great many cases in Harewood-square the sanitary condition was very unsatisfactory. Mr. Stenning, further examined on Friday, said that there might be some depreciation during the construction of the works; but Lord Portman's reversion would not be injured. The presence of the station would eventually add to the value of the surrounding property. The witness's estimate of the amount which ought to be paid for the property taken was £193,382. Cross-examined: He had added 10 per cent. for compulsory purchase, as was usual. He had capitalised the rentals on the 4 per cent. table. Mr. Robert Vigers, surveyor, said that when dealing with ground-rents such as these, subject to a reversion, he employed the 4 per cent. table. The ground-rents were not a 2½ per cent. security. His valuation amounted to almost the same figure as Mr. Stenning's. Mr. W. H. Warner, of Messrs. Lofts and Warner, surveyors, and Mr. Daniel Watney, president of the Surveyors' Institution, also gave evidence in support of the Company's case. This concluded the evidence, and on Saturday counsel addressed the arbitrator on behalf of their respective clients. The arbitrator has reserved his award.

A LEEDS ARBITRATION.—Arbitration proceedings are being held at the Leeds Town Hall to assess the amount of purchase-money to be paid by the corporation to Mr. Charles H. Wales, in respect of the compulsory acquisition of his shop and premises, 58, North-street, which are required for the widening of that thoroughfare. Mr. Wales also seeks compensation for trade disturbance, on the ground that he is both owner and occupier of the premises. The inquiry was conducted by Mr. Eli Milnes, architect and surveyor, of Bradford, the umpire appointed by the arbitrators—Mr. John Hepper, auctioneer and valuer, Leeds, for the claimant, and Mr. John Mortimer Fawcett, land agent and surveyor, the arbitrator for the corporation. On behalf of the claimant, evidence was given by Mr. Thomas Winn, architect and surveyor, whose valuation of the freehold was £1,755 12s., and by Mr. Thomas Fenwick, C.E., who valued the property at £1,659. For the corporation, Mr. Thomas Ambler, architect, Leeds, and Mr. Charles Myers, contractor and valuer, Leeds, estimated the value of the property to be £1,298. Mr. W. D. Hollis, auctioneer and valuer, Leeds, valued it at £1,293 12s. In addition to this, £36 was agreed upon by the parties as the value of claimant's fixtures.

A new Cambridge quarter clock has been erected at Otten church, Westmoreland, by Messrs. W. Potts and Sons, of Leeds, and Newcastle-on-Tyne.

A number of alterations and improvements at the old town hall have just been carried out at Weymouth for the corporation. The work, which has cost £730, has been executed by Mr. J. Albron Bartlett, under the direction of the borough surveyor, Mr. W. B. Morgan.

Colonel C. H. Luard, C.E., an Inspector of the Local Government Board, held an inquiry at Princetown, Dartmoor, on the 2nd inst., in connection with an application by the Rural District Council of Tavistock for sanction to borrow £1,400 for the sewerage of Princetown. The question of how best to drain Princetown has occupied the attention of various authorities for more than a decade, the peculiar position caused by the different requirements of the Prison Authorities, the Duchy, and of the District Council (and their predecessors), rendering almost every scheme submitted a futile one. The present scheme has been prepared by Mr. G. D. Bellamy, C.E., who produced and explained the plans.

At the parish church of Sutton, in the Isle of Ely, the Bishop of that diocese dedicated last week a new east window filled with stained glass in water-colours, and illustrating the Crucifixion; a reredos of Caen stone measuring 10ft. by 13ft.; and the filling of the large niches on each side of the window, with nearly life-size figures of St. Etheldreda and St. Andrew. All these works were carried out by Messrs. Jones and Willis, of Bloomsbury and Birmingham.

WATER SUPPLY AND SANITARY MATTERS.

LEEDS.—The Parliamentary Committee of the Leeds Corporation met on Friday for the purpose of making arrangements for the inclusion of the tramways and waterworks extension schemes which were adopted at the last meeting of the City Council in a Bill to be promoted in Parliament next session. It was decided to engage Mr. H. E. Price to do the necessary referencing work connected therewith. It was also resolved that Mr. Simons, of London, and Mr. Hill, of Manchester, should be requested to give evidence.

CHIPS.

Following the example of Bangor City, North Wales, the watering-place of Bangor, Co. Down, is providing itself with a new pier which will be opened in 1897. The contractors are Messrs. H. and J. Martin, of Belfast.

The Old Chain Pier at Brighton suffered such damage during the recent gales as will necessitate immediate demolition. Mr. May, the borough surveyor, who examined it, reported that part of the structure was 7ft. out of the perpendicular, and many piles were broken. The pier was, in any case, to have been removed at the completion of the undertaking of the New Palace Pier Company.

The Manchester City Council have accepted the offer of an anonymous donor to place a fountain in Albert-square. A design of the proposed fountain was on view in the Council Chamber. The donor stipulates that the erection of the fountain shall be under the superintendence of Messrs. Worthington and Son, architects, of Manchester.

The Metropolitan District Railway Shareholders' Association definitely announce that a scheme has been approved by the directors for the construction of two deep-level tunnels for up and down service of express electric trains between Earl's Court and the Mansion House, with an intermediate station at Charing Cross. The estimated cost is £800,000.

Sir Edmund and Lady Clarke, who gave a few years since the new church of St. Peter to Staines, have now given instruction to Messrs. Hele and Co., of Plymouth, to build for the church an organ of the value of £1,000.

Mr. H. Foster Newey, one of the assistant-masters of the Birmingham School of Art, has been appointed as art master of the Tunstall Schools, in place of Mr. Herbert Brampton, who recently resigned owing to ill-health.

The order of the Local Government Board constituting Connah's Quay an urban district has been finally confirmed by that authority, and came into force on the 1st inst. Hitherto the sanitary arrangements of the place have been in the hands of the rural district council of Holywell, with the result that a great dissatisfaction has been felt, it being an anomaly that a place of the size of Connah's Quay should be controlled by a body sitting at Holywell, eight miles distant. One of the first matters which will engage the attention of the Connah's Quay urban district council when elected will be the drainage of the town. Plans for this work were prepared some time ago for the Holywell urban council, the estimated cost being £3,000, and the outlet being into the Dee. The extensive iron-works erected by Messrs. Summers on the Cheshire side of the river, about a mile from Connah's Quay, are now completed, and very shortly some four or five hundred men will be working there.

The Wesleyan chapel at Kilburn, near Thirsk, built in 1836, was reopened after restoration on Wednesday week. The front wall has been rebuilt, and a large entrance porch built in front. The interior of the chapel has been replastered, a new wood floor has been laid, and new seatings fixed in pitch-pine and varnished. New windows have been fixed throughout, and glazed in tinted glass. The building is heated by hot water. The works have been carried out by the following:—Mr. J. C. Cornforth, Coxwold, mason and plastering work; R. Lumley and Sons, Helperby, joiners' work; John Baynes, Ripon, slating; T. Amos, Thirsk, plumbing, glazing, and heating; H. Savage, Coxwold, painting; under the superintendence of Mr. T. Stokes, architect, of Thirsk. The outlay has been about £500.

The music-hall at Ashington, Northumberland, will be opened to-morrow (Saturday) by Mr. Thos. Burt, M.P. The hall, which has cost £6,000, is of stone and brick. One of the prominent internal features is a theatre for the production of stage plays. The dimensions of the stage show a platform 33ft. wide and 43ft. from front to back, with dressing-rooms attached. This portion of the building will also be utilised as a lecture-hall. There is seating accommodation for 2,000 persons. The section immediately above the main entrance is apportioned for the transaction of routine business in connection with the local branch of the Miners' Association. The hall has been built from plans by Messrs. Boulds and Hardy, of Morpeth.

Our Office Table.

THE voting list for the election of officers and members of council of the Society of Architects for the thirteenth session, 1896-7, has just been published. Mr. Robert Walker, J.P., of Cork, who served as president a few years since, is again nominated to that office in succession to Mr. Edwin J. Hamilton, who retires after two years' occupancy of the chair. Three nominations are made for the two vice-presidencies—Messrs. T. Walter L. *Emden, J.P., London; Henry Lovegrove, A.R.I.B.A., London; and Silvanus *Trevail, J.P., F.R.I.B.A., Truro. As honorary secretary, Mr. Ellis *Marsland is again asked to serve, and Major F. Seymour *Leslie, R.E., of the War Office, Whitehall, is re-nominated as hon. corresponding secretary, Mr. H. Goodall *Quartermain as treasurer, and Mr. W. R. *Mallett as hon. auditor. For the twelve seats on the council thirteen names are proposed: Messrs. R. W. Coventry Dich, London; Edgar *Farman, London; Arthur R. *Finch, London; J. W. *Fraser, A.R.I.B.A., Newcastle-on-Tyne; Herbert J. Jones, Bristol; Robert *Keith, President of the Dundee Institute of Architecture; A. J. Lacy, Norwich; Henry *Lovegrove, A.R.I.B.A., London; George Henry Phillott, B.A., Cheltenham; Thomas R. Richards, London; Alfred M. *Ridge, London; George *Thomas, hon. local secretary, Cardiff; and J. W. *Walmisley, F.R.I.B.A., Southsea. An asterisk denotes that the officer or member served last session. The election will take place at the Annual Meeting of the Society, to be held on Tuesday evening, the 27th inst., at St. James's Hall, Piccadilly.

A PICTURE by Giovanni Mansueti, a painter of the Early Venetian school, representing the Trinity, with Mary Magdalen at the foot of the Cross, and six other saints, which was bought for the National Gallery at a sale at Christie's on July 18, was placed on Saturday in the gallery in the Central Octagon Room of that institution. It is No. 1478. Mr. Charles Butler has presented to the National Gallery a large picture by W. Hilton, R.A., which represents an allegorical subject—"Nature Blowing Bubbles for her Children." This picture Mr. Butler bought at the sale of Sir Julian Goldsmid's pictures expressly to present to the national collection; it is reserved for the present, with his permission, until Mr. Tate's Gallery at Millbank, now approaching completion from Mr. Sidney R. J. Smith's designs, is opened, as there is no room to place it in the galleries at Trafalgar-square.

JUDGING from the tenor of Dr. Ryle's charge at his sixth triennial visitation of his diocese on Tuesday, it is extremely unlikely that any efforts will be made to provide Liverpool with a worthy cathedral building while this pious octogenarian bishop occupies the see. In his address Dr. Ryle admitted that a cathedral was wanted, but said he had grave doubts if Liverpool would ever get it, a great difficulty being that the site, the fabric, and the endowment would cost at least half a million of money—a sum they could not expect to get while Disestablishment was "dangling in the air." After all, he philosophically concluded, a cathedral was a luxury, and not a necessity, and it was a waste of time to fret over things they could not get.

A LOCAL GOVERNMENT BOARD inquiry was held at Harrogate, on Friday, before Major-Gen. H. D. Crozier, as to an application from the town council for leave to borrow a further sum of £34,000, for the Montpelier Baths, now in course of erection from plans by Mr. F. T. Baggallay, of London. The town clerk explained that in 1891 the original estimate for the erection of the baths submitted to the Local Government Board put the total cost at £45,678, and sanction was obtained for the borrowing of £50,000. Between 1891 and 1894, however, when the contracts were let, a good deal of trouble was experienced in connection with the foundations. It was found that the strata in which the mineral water was to be had underlay the foundations, and it was consequently decided to raise the building in consequence some 2ft. It was estimated that the extra cost of that work would be about £3,000. The extras on the building contract were estimated at £1,325; but that, it was considered, was more than balanced by an anticipated saving from the contingent allowance. On the smith's, plumber's, and glazier's work—the contract for

which was £14,500—the extras would be about £2,036. This increase was mainly due to the provision of further bath-rooms. Other items were increased as follows:—Joiners' and carpenters', £1,618; slating, £180; plastering, £289; painting, £50; steam boiler, £310. In all, the cost was now estimated at about £70,000, while fees, law charges, commissions, and various incidental expenses were estimated at about £12,000. The total amount which it was proposed to borrow was £34,000, of which £32,000 would be required for the purpose of completing the baths. Mr. Baggallay, F.R.I.B.A., stated that the estimate in 1891 was made up as follows: Main building, £31,429; winter garden, £9,191; pump-room, £2,058; total, £45,678. This had been altered, so that the winter garden was estimated to cost £26,380, while the cost of the pump-room was reckoned as a saving, inasmuch as it had been omitted as a separate building. The excess over the original estimate was due to three principal causes:—(1) the unusual character of the building; (2) difficulties with the site and foundation; (3) important alterations of the plans.

THE first annual dinner and meeting of the Bury and District Master Builders' Association were held at the Grey Marc Hotel, Bury, on Thursday evening in last week. There were 27 persons present, the president, Mr. James Byrom, occupying the chair. The secretary, Mr. J. H. Thompson (Messrs. Thompson and Brierley), presented the report and statement of accounts (showing a balance in hand on the year's working), which were unanimously adopted. The retiring officers were re-elected. A discussion took place as to the advisability of joining the Lancashire Federation of Building Trade Employers' Association, and both Mr. W. Cunliffe, of Bolton, the president, and Mr. Tomlinson, the secretary of the Federation, addressed the meeting on the advantages to be derived from so doing. Eventually it was decided to affiliate with the Federation, and the president and secretary were elected to represent the Bury branch.

A COMMISSION appointed by the Hamburg Senate to examine and report upon the resistance to fire offered by wrought-iron pillars used in construction has just issued a report. Such columns withstand fire very imperfectly, their stability being quite destroyed at a temperature of about 600°C., and the advantage of filling them with concrete is so slight as to be scarcely worthy of consideration. The case is, however, far different with outer coatings of refractory or non-conducting materials, which have proved capable of protecting the metal from a dangerously high temperature during a certain space of time, and, consequently, of affording effective protection against fire. The substances which appear to have exerted the best effect are the cork composition of Herren T. Ganzweig und Hartmann, and xylotile incased in sheet iron, which substances give out inflammable gases for two hours and a half, leaving a carbonaceous residue that is not destroyed by the steam from the fire-hose. A pillar thus coated only gives way after being exposed to the fire for four hours, while 17 minutes suffice to destroy it if uncoated when similarly heated. Next to the above-named substances comes the Monier concrete, laid on in a coat of 1½ in. thickness, which preserves iron for nearly two hours and a half, while plaster of Paris and asbestos cement only gave poor results.

A new Congregational church is being erected at Harpenden. Special consideration has been given to the ventilation, which will be carried out on the Boyle system.

The day and Sunday schools in connection with St. Mary's Church, Ashton-upon-Mersey, were opened on Saturday last by the Bishop of Chester. These schools have been built from the designs and under the superintendence of Messrs Whitelegg and Whittaker, architects, 16, Albert-square, Manchester, by Mr. John E. Dear, of Ashton-upon-Mersey, the general contractor. These schools accommodate 300 children, and the whole has been arranged so as to make the building particularly suitable for parochial purposes. The rooms are divided into classrooms by movable screens.

The repair of the 14th-century clergy or church house at Alfriston has now been commenced by the National Trust for Places of Historic Interest, 1, Great College-street, Westminster. The architect entrusted with the work of repair is Mr. A. Powell, who is acting under the immediate supervision of the Society for the Protection of Ancient Buildings.

MEETINGS FOR THE ENSUING WEEK.

FRIDAY.—Architectural Association. Conversazione at the Church House, Westminster. 8 p.m.

CHIPS.

Arbroath has now adopted the Frec Libraries Act, and it will come into operation on 15th May next.

The first meeting of the winter session of the Edinburgh Architectural Society was held in Dowell's Rooms on Thursday in last week. The president, Mr. R. A. Scott, was in the chair, and there was a large attendance. Mr. J. A. Morris, F.R.I.B.A., Ayr, delivered a lecture entitled, "History and Art"—a Florentine outline—illustrated by a series of limelight views. Mr. Morris, who was cordially thanked, was elected the first honorary member of the society.

At Holy Trinity Church, Southall, on Wednesday, a new organ, built by Messrs. Gray and Davison at a cost of £570, was dedicated by the Bishop of Marlborough. The organ is the gift of Mr. W. W. Deloite, of Southall, who has previously contributed over £3,000 to the building and beautifying of the church.

A new wing has recently been added to the public school at Bonnyrigg, N.B., containing additional accommodation for nearly 200 scholars. The old portion of the school has undergone alterations. The work was carried out under the superintendence of Mr. Edward C. H. Maidman, architect, Edinburgh.

In the Estate Market there has again been a dull week at the Mart, with the poor aggregate of £36,144, which compares unfavourably with that of the corresponding week of 1895, £50,100. Residential properties, with one exception, failed to sell, and the market for even more favourable investments was somewhat weaker in tone.

The waterworks, sewerage, and sewage disposal works of Leighton Buzzard have just been completed at a cost of £21,240, from the plans and under the supervision of Mr. H. Bertram Nichols, C.E., of Grosvenor Chambers, Corporation-street, Birmingham, whose schemes were adjudged the best out of an open competition a few years ago.

At a meeting of the Carlisle Town Council on Tuesday, Mr. Henry C. Marks, borough surveyor and water engineer, of Dewsbury, and water engineer to Dewsbury and Heckmondwike Waterworks Board, was appointed city surveyor, at a salary of £450 per annum, to be raised to £500 at the end of the first year in the event of his giving satisfaction. There were 57 applicants.

The first ordinary general meeting of the Surveyors' Institution for the session 1896-97 will be held at the temporary premises in Savoy-street, Victoria Embankment, on Monday, November 9th, when the president, Mr. Daniel Watney, will deliver an opening address. The chair will be taken at eight o'clock. Members attending the meeting will enter by the main door of the Medical Examination Hall fronting the Embankment. The temporary premises of the Institution are equi-distant from the Charing Cross and Temple Stations of the District Railway, and immediately join the west side of Waterloo Bridge.

On October 1st, Mr. J. W. Logan, M.P., opened new public baths at Market Harborough, completed at a cost of £2,100. Mr. Herbert G. Coales, A.M.I.C.E., F.S.I., the town surveyor (of the firm of Messrs. Coales and Johnson, architects, Market Harborough), was the architect, the builder being Mr. E. Fox, of Leicester.

To-morrow (Saturday) Sir Arthur Arnold, chairman of the London County Council, will open the Passmore Edwards Public Library in Kingsland-road, Shoreditch. The building has been completed at the cost of the donor by Messrs. H. Jarvis and Sons, the builders, from the designs of the architect, Mr. Maurice B. Adams, F.R.I.B.A. The façade is executed in Portland stone. We illustrated the building on June 12th last.

Mr. W. Manning, the owner of a house in Alexandra-road, St. John's Wood, was summoned to the Marylebone Police-court by the Hampstead Vestry on Wednesday for permitting a drain under his house to be defective and untrapped. The defendant was willing to do the work, but the drain passed under an adjoining house, the occupant of which refused an entrance. The magistrate said he could only make an order against the defendant, and leave him to find out how to obey it.

The monthly report of the Labour Department for September states that little change has arisen in the building trades, which continue busy, the percentage of unemployed in unions making returns being 1·3 compared with 1·1 in August. In September, 1895, the percentage was 1·6. The furnishing trades remain busy. The percentage of unemployed union members at the end of September was only 1·2, compared with 2·1 in August, and also in September of last year.

LIST OF COMPETITIONS OPEN.

Ireland—Labourers' Cottages, Dromore West		M. Doudican, Board Room, Dromore West	Oct. 20
Gorton—Laying Out Cemetery		R. T. Holland, Clerk, Town Hall, Gorton	" 24
Belfast—New City Hall (Assessors, A. Waterhouse, R.A., and J. C. Bretland) (limit of cost, £125,000)	30gs.		
Poplar—Coroner's Court, Mortuary	£300 divided	S. Black, Clerk to Corporation, Belfast	" 25
Malmö, Sweden—New Gasworks	£30, £20	W. H. Farnfield, Clerk, 117, High-street, Poplar	" 26
Bootle—North Board School for 1,000 children (local architects only)	3,000, 2,000, & 1,500 Swedish crowns	Corporation Gas Works Offices, Malmö, Sweden	Nov. 1
Sunderland Corporation—Artisans' Dwellings (for 450 persons)	No premium	F. K. Wilson, Clerk, Balliol-road, Bootle	" 11
Stamfordham and Hawkwell Drainage Plan	£50, £30, £20	Fras. M. Bowey, Town Clerk, Sunderland	" 14
Sunderland—Workmen's Dwellings	£10	Geo. Wilkinson, Clerk, 27, Mosley-street, Newcastle-on-Tyne	" 14
Darlington—Laying-out Southend Estate	£50, £30, £20	Fras. M. Bowey, Town Clerk, Sunderland	" 14
Douglas, I.M.—Municipal Buildings (£10,000 limit of cost)	£35, £15	R. C. Pearce, Estate Agent, Darlington	" 20
Shotley Bridge, Co. Durham—Cottage Homes for Children	£10, £20, £10	T. H. Nesbitt, Town Clerk, Douglas	" 21
Peel, Isle of Man—Approach Road to Shore-road	No premium	Geo. Craighill, Clerk to Guardians, Gateshead	" 23
Newport, Mon.—Hospital (£16,000 limit of cost)	£20, £10, £5	Geo. Cannell, Town Commissioners' Office, Peel	" 30
Rhos-on-Sea, Colwyn Bay—Laying-out Building Estate	£100, £50	J. K. Stone, Secy., 39, High-street, Newport	Dec. 1
Kieff, Russia—Theatre (£45,000 limit, 1500 seats)	£100, £30, £10	Philip J. Kent, Rhos Abbey, North Wales	" 5
Osordby, Lincolnshire—Wesleyan Chapel & Schools (cost £600)	£280, £160, £120, £76, £32	Imperial Society of Architects, 83, Quai de la Moika, St. Petersburg	" 15
Kirkcubright, N.B., Parish Church Hall	£160 and two lesser premiums	Communal Authority, St. Gilles, Belgium	Feb. 1
Kesteven District Lunatic Asylum (C. H. Howell, Assessor)	No premium	E. H. Davy, Secretary to Trustees, Kirkley, Market Rasen	" —
Eccleshill, Bradford—Sewage Disposal	£20, £10	Jos. Richardson, Clerk, U.C., 4, Town Hall-square, Bradford	" —
Barry, Glam.—Municipal Buildings (£10,000 limit)	£100, £50	Clerk to Urban District Council, Barry	" —
Chapel, Cropton, near Pickering	£100, £50, £25	Robert Harland and T. Pickering	" —
Sunderland—Technical College (£18,000 limit of cost)		Fras. M. Bowey, Town Clerk, Sunderland	" —

LIST OF TENDERS OPEN.

BUILDINGS.

Newcastle-on-Tyne—Shop and Warehouse, Bigg Market		Wm. Hope, Architect, 40, Westgate-road, Newcastle	Oct. 19
Shoreditch—Underground Transformer Sub-Station	Vestry	H. Mansfield Robinson, Vestry Clerk, Old-street, E.	" 19
Preston—China Clay Show (150ft. by 110ft.)	Corporation	H. Hamer, Town Clerk, Preston	" 19
Derby—Pear Tree School	School Board	Wm. Cooper, Clerk, Becket-street, Derby	" 19
Bedding—School Extension	Gelligarr School Board	F. T. James, Clerk, 131, High-street, Merthyr Tydfil	" 19
Bradford—Two Shops, Leeds-road	Bradford Prov. Industrial Society	Ryeroft and Firth, Architects, Bank Buildings, Bradford	" 19
Burghhead, N.B.—Semi-Detached Houses, Grant-street	Asylums Commissioners	Jas. Jamieson, Architect, Elgin	" 19
Limerick—Additions, Lunatic Asylum	Bromley-by-Bow Vestry	J. F. Tuohy, Secretary, Customs House, Dublin	" 19
Bow, E.—Repairs to Vestry Hall	School Board	W. M. Mead, Clerk, Bow-road, E.	" 19
Southey—Vestry, All Saints' Church	Mrs. Lawson	Davies and Moss, Architects, 59, High-street, Wrexham	" 19
Bradford—Additions, Carlton-street, School	School Board	Jno. A. Palmer, Clerk, Bradford	" 19
Bridlington Quay—Four Houses, Marshall-street	Committee	J. Earnshaw, M.S.A., Wellington-road, Bridlington Quay	" 20
Wellington, Co. Hereford—Alterations to School	H.M. Office of Works	Ernest G. Davies, 6, St. John-street, Hereford	" 20
Stroud—Completion, School of Science and Art	School Board	W. H. C. Fisher, 6, Roweroft, Stroud	" 20
London—West Central District Post-Office	School Board	Hon. Reginald B. Brett, Secretary, Whitehall, S.W.	" 20
Barnsley—Alterations to Premises, Mark-street	Board of Guardians	E. and W. Dixon, Architects, 5, Eastgate, Barnsley	" 21
Stroud—Parliament-street School	School Board	F. Winterthorn, Clerk, 5, Roweroft, Stroud	" 21
Dover—Laundries and Kitchen at Workhouse	School Board	Cresswell and Newman, Architects, 14, Castle-street, Dover	" 21
Burnley—Rosegrove Schools	Corporation	E. Jones, Clerk, Burnley	" 21
Burnley—New Schools	Finance Committee	W. A. Quarmby, Imperial Chambers, Grimshaw-street, Burnley	" 21
Hyde—Technical School and Free Library	Sanitary Committee	G. Stevens, Town Clerk, Hyde	" 22
Newcastle-on-Tyne—Shed (200ft. by 60ft.)	Haslingden Brewery Co.	W. G. Laws, City Engineer, Newcastle	" 22
Leicester—Wheelwrights' Shops and Sheds	H.M. Office of Public Works	Jas. Bell, Town Clerk, Leicester	" 22
Church, Lancs.—Alterations, Railway Inn	School Board	Jno. Booth, Architect, Haslingden	" 22
Keswick—Crosthwaite High School	Aston Board of Guardians	Austin and Paley, Architects, Lancaster	" 23
Portmagee, Kerry—Coastguard Station	London County Council	P. J. Tuohy, Secretary, Dublin	" 23
Stourton, Leeds—New Church	Committee	C. H. Fowler, F.S.A., The College, Durham	" 23
Accrington—Extension of Paradise Works	A. Tolhurst	J. Bridge, Paradise Works, Accrington	" 23
Keswick—New School	Forfar District Committee	J. Broatch, Court Buildings, Keswick	" 23
Southend-on-Sea—Bank Extension, High-street	Vicar	Jas. Thompson and Greenhalgh, Archts, Bank Chambers, Southend	" 24
Glenhucklet, Aberdeenshire—Farmhouse	Batley Corporate Society	Jno. P. Anderson, Clerk, Municipal Buildings, Forfar	" 24
Camerton—School and Teachers' House	H.M. Office of Works	Jenkins and Marr, Architects, Aberdeen	" 24
Batley—Terrace of Fourteen Houses, Mount Pleasant	Glamorgan County Council	G. D. Oliver, A.R.I.B.A., 5, Lowther-street, Carlisle	" 24
Perth—Post Office	Corporation	H. B. Buckley, Architect, 8, East Parade, Leeds	" 26
Parc Gwyllt—Asylum Block, 120 patients	Aston Board of Guardians	Hon. Reginald B. Brett, Secretary, Whitehall, S.W.	" 27
Hunslet, Leeds—Public Baths	London County Council	T. T. Lewis, Solicitor, Bridgend	" 27
Erdington—Vagrant Wards	Committee	J. Harrison, Town Clerk, Leeds	" 27
Stratford—Movable Floor and Platform at St. Mary's	Brain and Co.	Jno. North, Clerk, Vauxhall-road, Birmingham	" 27
Holborn—Working-Class Dwellings, Brooke's-market	Committee	E. Harro and Pinches, 5, John-street, Adelphi, W.C.	" 29
Stanningley—Four Houses and Shop	Ryder and Leyland	C. J. Stewart, Clerk, Spring-gardens, S.W.	Nov. 3
Keswick—Rebuilding Stahling, Duke of Wellington	Corporation	Ryeroft and Firth, Architects, Bank-buildings, Bradford	" —
Exmouth—Wesleyan Chapel and Schools	Trustees	A. D. Kaye, Architect, 4, Albion-place, Leeds	" —
Buttershaw, West Riding—Two Houses	Female Orphan Asylum	W. J. Morley, Architect, 269, Swan-arcade, Bradford	" —
Belfast—Two Houses, University-avenue	School Board	Brayshaw and Dixon, Architects, Bowling Old-lane, Bradford	" —
Oven, Yorks—Farmhouse	Governors	J. G. Lindsay, Architect, 6, Chichester-street, Belfast	" —
Gateshead—Thirty Dwellings in Flats, Saltwell-lane	Hartington School Board	J. Robert Shaw and Son, Architects, 55, Tyrral-street, Bradford	" —
Nuneaton—Galley Common National Schools	W. J. Martin	E. Bowman, 52, Westgate-road, Newcastle	" —
Cardiff—Additions, Halfway House Hotel	Burgon and Co.	J. R. Veall and Son, Architects, Wolverhampton	" —
Sheerness—Conservative Club	Nottingham Turkish Bath Co.	Jones, Richards, and Budgen, Architects, Cardiff	" —
Harrogate—Two Houses	Marston and Son	Wm. J. Shearburn, Architect, Dorking	" —
Hull—Repairs 23 Houses	A. Longmuir, Walkley Bank, Salford	W. Lupton, North Lodge, New Park, Harrogate	" —
Newland—Alterations Property	W. Hodgskin	75, Charles-street, Hull	" —
Leeds—Pulling down House		N. Swindle, Chemist, Keswick	" —
Harrogate—House		J. W. Watson, 21, New Station-street, Leeds	" —
Towyn—House		J. M. Fawcett and Sons, 26, Albion-street, Leeds	" —
Bury (Lancs)—Stables, Butcher-lane		Hipkiss and Basset, Architects, Aberdovey	" —
Sheerness—Club		F. Cartwright, C.E., Phoenix-yard, Bury	" —
Bristol—Alterations to Fish Market		E. Pover, Architect, Faversham	" —
Leeds—Two Houses and Shops, Dewsbury-road		J. Thomas, City Surveyor, 51, Prince-street, Bristol	" —
Kirkby Overblow—Additions to School		Percy Robinson, Architect, 72, Albion-street, Leeds	" —
Belfast—Business Premises, St. Peter's Hill		T. E. Marshall, Architect, Harrogate	" —
Chopwell—Two Houses and Shops		J. Armstrong, 16, Shankhill-road, Belfast	" —
Harrogate—House in Duchy-road		T. Atkinson, 6, South-avenue, Ryton-on-Tyne	" —
Devonport—Block Floor to School		J. M. Fawcett and Son, Architects, 96, Albion-street, Leeds	" —
Aldershot—Queen's-road School		G. Luff, Architect, 64, Chapel-street, Devonport	" —
Standish, Wigan—Additions to Grammar School		H. Lord, Architect, 47, John Dalton-street, Manchester	" —
Leeds—Shed, Park-lane (3,000 square yards in area)		J. J. Mosley, 6, Wormald-road, Leeds	" —
Tonbridge—Business Premises, High-street		W. H. Cuthbert, 192, Upper Grosvenor-road, Tunbridge Wells	" —
Buxton—Additions, Harper's Hill Schools		W. R. Bryden, Architect, 1, George-street, Buxton	" —
Coventry—Additions, Earlsdon School		G. and I. Steane, Architects, 22, Little Park-street, Coventry	" —
Aberthaw—Mission Room		Seddon and Carter, Architects, St. Mary-street, Cardiff	" —
Stofield, Elgin—Villa		Roid and Wittet, Architects, Elgin	" —
Belfast—Extension, &c., of Licensed Premises		W. J. Moore, Architect, Ann-street, Belfast	" —
Kegworth—Erection of Inn		W. T. Hampton, Brook House, Loughborough	" —
Leeds—Two Houses		Percy Robinson, Architect, 72, Albion-street, Leeds	" —
New Leeds—Four Houses		J. Chas. Spivey, Dagmar House, Roundhay	" —
Leeds—New Stables		Walter A. Hobson, Architect, 82, Albion-street, Leeds	" —
Nottingham—Pulling Down and Erection of Turkish Baths		Brevell and Bailey, Architects, Angel-row, Nottingham	" —
Overseal, Leicester—Erection of an Hotel		W. T. Hampton, Brook House, Loughborough	" —
Sheffield—Erection of Houses		James C. Haller, Savile Town, Dewsbury	" —
Tonbridge—Business Premises		W. T. Cuthbert, 192, Upper Grosvenor-road, Tunbridge Wells	" —
West Cross, Swansea—Currant Tree Inn		T. P. Martin, Architect, Northampton Chambers, Swansea	" —
Woodlesford—Houses		W. Simpkins, Swan Junction, Hunslet	" —

BUILDINGS—continued.

Bristol—Alterations to Fish Market	Corporation	J. Thomas, 51, Prince-street, Bristol	—
Norwich—Caretaker's Cottage at Shire Hall	Norfolk County Council	Chas. Foster, Clerk, Shire Hall, Norwich	—
Morley—Six Houses	Board of Guardians	H. Pearson, Brittainia-road, Morley	—
Market Harborough—Board-room	Harbour Board	R. and J. Goodacre, Architects, 5, Friar-lane, Leicester	—
Londonderry—Shed Extension, Prince's Quay	Harbour Board	E. A. Hamilton, Secretary, Londonderry	—
Smithston, Greenock—Gatehouse	Ayr County Council	Boston and Menzies, Architects, 11, William-street, Greenock	—
Sheffield—Corner Shops, Pinsbone-street	W. B. Skinner	Holmes and Watson, Architects, St. James's-road, Sheffield	—
New Mills, N.B.—Police Station	Committee	Shaw, County Buildings, Ayr	—
Leeds—Wesleyan Sunday Schools, Cardigan-lane	Sir J. W. Ramsden, Bt.	G. F. Danby, Architect, 46, Great George-street, Leeds	—
Higham Ferrars—Four Houses	L. H. Hatting	A. Skinner, A.R.I.B.A., 45, Finsbury-pavement, E.C.	—
Exmouth—St. John's Church, Restoration	Fairbank Wood Rim Co., Limited	Kerby and Ellis, Architects, Exmouth	—
Bridford, Devon—Rebuilding Harriers' Inn	—	J. Sherman, Bridford	—
Byram, Yorks—Range, Glass Houses	—	E. Bernard Wilson, Estate Office, Sutton, Ferrybridge	—
Hornchurch, Romford—Two Houses	—	F. C. Tyas, 162, Brixton-hill, S.W.	—
Leeds—Four Houses in Harehills-lane	—	Geldard and Ward, Leeds	—
Kirkstall, Leeds—Two Brick Houses, Vesper-lane	—	Robshaw and Son, 7, Upper Fountains-street, Leeds	—
Llandrindod Wells—Additions to Hotel	—	A. B. and W. Son Deakin, Shrewsbury	—
Nechells—Erection of Works	—	Henry Hendriks, 43, Waterloo-street, Birmingham	—

ENGINEERING.

Warrington—Subway	Water Committee	James Deas, Water Engineer, Bank House, Warrington	Oct. 19
Shrewsbury—Main Drainage Engines and Crane	Corporation	H. C. Clarke, Town Clerk, Shrewsbury	" 22
Ellesmere—Waterworks	Urban District Council	R. E. Lloyd, Clerk, Ellesmere	" 23
Sulcoates, Hull—Waterworks	Rural District Council	W. H. Wellsted, C.E., Prince's Dock Chambers, Hull	" 24
Tranwell, Northumberland—Reservoirs and Filters	Morpeth Corporation	F. Brumell, Town Clerk, Morpeth	" 24
Islington—Heating Machinery, Caledonian-road Baths	Islington Vestry	Wm. F. Dewey, Vestry Clerk, Upper-street, W.	" 29
Naj Hamadi, Kinch Line, Upper Egypt, Metallic Bridges	Official	Colonel Weston, Broadway Chambers, Westminster, S.W.	" 30
Sheffield—Enlarging Gasholder	Sheffield Gas Co.	Hanbury Thomas, Secretary, Commercial-street, Sheffield	" 31
Leigh, Essex—Engine House, Reservoir, and Pipes	Rochford Rural District Council	J. Mansergh, M.I.C.E., 5, Victoria-street, S.W.	Nov. 2
Livourne, Italy—Dredging Harbour (about £23,000)	Official	The Préfecture, Livourne	" 3
Ja Ssy, Roumania—Baths Installations	Municipal Council	N. A. Bogodan, Secretary, Jassy	" 5
Manchester—Railway (15½ chains in length)	Great Northern Railway Company	Wm. Latta, Secretary, King's Cross Station, N.W.	" 5
Heyst-sur-Mer, Belgium—Pumps for Waterworks and Sewers	Official	L'Administration Communale, Heyst-sur-Mer	" 9
Mexico City—Pumping Machinery and Boilers	Official	City Sanitation Board, Mexico	" 14
Alexandria—Landing Stage	Harbour Board	President, Administrative Council, Cairo	" 15
St. Malo—Waterworks	Municipal	Hôtel de Ville, Ile-et-Vilaine, France	Dec. 31
Wellington, Salop—Deepening 4in. Bore from 140ft. in Bunter Beds	—	Grooms and Sons, Wellington, Salop	—
Chelsham—Driving Headings in Well	Waterworks Co.	Wm. Fox, M.I.C.E., 5, Victoria-street, S.W.	—
Wellington—Deepening Borehole	—	R. Groom, Sons, and Company, Ltd., Wellington, Salop	—

FURNITURE AND FITTINGS.

Hull—Borough Asylum	Committee of Visitors	H. Hill Dawe, Clerk, Hull	Oct. 21
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PAINTING.

Manchester—Painting, &c., at Workhouse	Guardians	Poor Law Offices, New Bridge-street, Manchester	Oct. 21
Painting of Iron Bridges, L.D. and E.C. Railway	Clowns Branch	S. Pearson and Son, Clowns, near Chesterfield	—

ROADS AND STREETS.

South Hornsey—Materials to Sept. 29, 1896	Urban District Council	E. R. Bennett, Clerk, Milton-road, S. Hornsey	Oct. 14
Halifax—Road Works	Jackson and Fox, 32, George-street, Halifax	—	" 14
Braintree—Broken Granite (200 tons)	Rural District Council	F. Smoothy, Clerk, Braintree	" 19
Bootle—Improvements, Hertford-road	Corporation	Borough Surveyor, Town Hall, Bootle	" 19
Hanley—Making-up Portland-street	Corporation	J. Lobley, Borough Engineer, Town Hall, Hanley	" 19
Guildford—Guernsey Granite (600 tons)	Corporation	F. Smallpiece, Town Clerk, Guildford	" 19
Halifax—Road Works	Shircoat Green Estate	Jackson and Fox, 22, George-street, Halifax	" 20
Abram—Road Works	Urban District Council	Heaton, Ralph, and Heaton, Wigan	" 20
Watford—Permanent Paving Slabs	Urban District Council	H. M. Turner, Clerk, 14, High-street, Watford	" 20
Edmonton—Guernsey Granite Spalls (500 tons)	Board of Guardians	F. Shelton, Clerk, Lower Edmonton	" 20
Mill-end Old Town—Granite Pitching (900 tons)	Vestry	Millner Jutsum, Clerk, Bancroft-road, E.	" 21
Mill-end Old Town—York Paving (50,000ft.)	Vestry	Millner Jutsum, Clerk, Bancroft-road, E.	" 21
Mill-end Old Town—Lime and Cement for One Year	Vestry	Millner Jutsum, Clerk, Bancroft-road, E.	" 21
Fulham—Making-up and Paving Roads	Vestry	W. J. H. Denslow, Clerk, Walham-green	" 21
Ramsgate—York Paving (800 yards)	Corporation	W. A. Hubbard, Town Clerk, Ramsgate	" 21
Grays Thurrock—Broken Granite (1,000 tons)	Urban District Council	C. E. Hatten, Clerk, 33, High-street, Grays	" 22
Hinckley—Sewers and New Roads	Rural District Council	W. T. Howse, Surveyor, Hinckley	" 24
Carlisle—Walls (4ft. high, 85 yards long)	Asylum Visiting Committee	Clerk, 25, Lowther-street, Carlisle	" 23
Denbigh—Additions and Alterations	Owners of Estate	W. Baker, Clerk, Denbigh	" 26
Newmarket—Roadings off Bury-road	Urban District Council	W. C. and A. S. Manning, Architects, Rotheay House, Newmarket	" 27
Harrowdene, Wembley—Road and Footpath	Urban District Council	Walton and Lee, Surveyors, 10, Mount-street, W.	Nov. 4
Berkhamstead—Widening Road	Urban District Council	Chas. H. Rew, 87, High-street, Berkhamstead	—
Woodhall Spa, Lincolnshire—Road	Urban District Council	—, Hucksall, Secretary, Woodhall Spa	—
Withington—Draining and Flagging Passages	Urban District Council	A. Roberts, Clerk, Town Hall, Withington	—
Willenhall—Steam Road Roller	Urban District Council	R. Tildesley, Clerk, Willenhall	—
Wealdstone—Granite Slag and Gravel	Urban District Council	Kirby G. Bailey, Clerk, Peel-road, Wealdstone	—
Berkhamstead—Widening Road	Urban District Council	Chas. H. Rew, 87, High-street, Berkhamstead	—
Woodhall Spa, Lincolnshire—Road	Corporation	—, Hucksall, Secretary, Woodhall Spa	—
Southampton—Road Works	Corporation	W. B. G. Bennett, Borough Engineer, Southampton	—

SANITARY.

Cullompton and Uffculme—Sewerage	Tiverton Rural District Council	C. M. Hole, Clerk, Tiverton	Oct. 19
Bermondsey—500 Galvanised Iron Pails	St. Mary's Vestry	F. Ryall, Vestry Clerk, Spa-road, S.E.	" 19
Paddington—Brick Sewers (1,720ft., 3ft. 9in. by 2ft. 6in.)	Vestry	F. Dethridge, Vestry Clerk, Harrow-road, W.	" 19
Wembley—Drains and Inspection Chambers	Urban District Council	Geo. Hurn, Clerk, Wembley	" 19
Basford, Notts—Removal of Night-soil	Rural District Council	C. J. Spencer, Public Offices, Basford	" 19
East Grinstead—Sewerage at Turner's Hill	Rural District Council	W. Alston Head, Clerk, East Grinstead	" 21
Poole, Dorset—Stoneware Sewers (22 miles)	Urban District Council	H. S. Dickinson, Clerk to Council, Town Hall, Poole	" 22
Rugby—Urinal	Urban District Council	T. M. Wrattislaw, Clerk, Rugby	" 24
Brentwood—Works to Workhouse Schools	Hackney Board of Guardians	Frank R. Coles, Clerk, Homerton, N.E.	" 28
Ludworth—Pipe Sewers	Glossop Dale Rural District Council	Wm. Spinks, 20, Park-row, Leeds	" 30
Eccles, Lancs—Brick Culvert (745yds., 3ft. by 2ft.)	Corporation	A. C. Turley, Borough Engineer, Eccles	—
Burnley—Sewage Outfall Plant	Corporation	W. T. Fullalove, Clerk, Burnley	—
Paisley—Drainage at Poorhouse and Asylum	Parish Council	J. M. Campbell, Paisley	—
Eccles, Lancs.—Brick Culvert	Corporation	A. C. Tarley, Borough Engineer, Town Hall, Eccles	—

STEAMBOAT.

Manchester—Sewage Sludge Steamer (1,000 tons)	Corporation	W. H. Talbot, Town Clerk, Manchester	Oct. 19
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STEEL AND IRON.

London, S.E.—500 Galvanised Iron Pails	Vest. of St. Mary Magdalen, Brmndsy	Frederick Ryall, Town Hall, Spa-road, S.E.	Oct. 19
India—Steel Girders and Gutters	East Indian Railway Co.	A. P. Dunstan, Secretary, Nicholas-lane, E.C.	" 27
Alexandria—Bridge Works (Iron)	Administration of Railways	Chief Engineer to Administration, Alexandria	" 30
New South Wales, Australia—Steel Rails (150,000 tons)	Government of New South Wales	Hon. Sir Saul Samuel, 9, Victoria-street, S.W.	Dec. 30
Sweden—Rails (13 miles 1,180 yards) for Christiania-Kolner	Official	Electric Tram Co., 47, Kirkeveir, Christiania	Jan. 1
Kollen Electric Tram	Gasworks	Manager	—

STORES.

India—Plates, Bars, Chain, &c.	Assam-Bengal Railway Co.	F. A. Lyall, Secretary, Bishopsgate House, E.C.	Oct. 20
India—Steel, Wrought Iron, and Lead	Southern Mahratta Railway Co.	Edwd. L. Thornton, Secretary, 44, Finsbury-circus, E.C.	" 20
India—Carriage Fittings, &c.	Madras Railway Co.	Julian Byrne, Secretary, 61, New Broad-street, E.C.	" 21
Swindon—Railway Stores	Great Western Railway Co.	G. K. Mills, Secretary, Paddington Station, W.	" 26
London—Red Fir Telegraph Poles	General Post Office	Chas. E. Stuart, Controller of Stores, G.P.O., E.C.	" 29

Trade News.

WAGES MOVEMENTS.

NORTH WALES SLATE QUARRIES.—Lord Penrhyn issued on Monday a statement of his reasons for the suspension of the 71 men which led to the general strike at the Penrhyn quarries. His lordship resents the interference of the committee, whose authority he does not recognise. Twelve years ago he declined to sanction the interference of anybody between himself and his workmen, and in the evidence given before the Labour Commission in 1892 one of the representatives of the men stated that the quarry committee had ceased to exist by order of the employer. Since then it had been secretly reconstituted, and had interfered with the management of the quarries in a manner which proved intolerable. The authority of the manager had been defied, and on May 4 last 2,500 men absented themselves from work in defiance of the manager and were suspended for so doing. Other cases of insubordination had occurred at the instigation of the committee. Lord Penrhyn adds that he does not object to any legitimate combination amongst the workmen, but he will continue to resist a form of combination which forbids the workmen to obey the orders of the master or his officials; and he is firmly resolved not to allow a body of that nature to assume a tone of superior dictation either to master or man in the Penrhyn quarries.

At the last meeting, the Salford Town Council agreed to rescind the resolution passed on 5th August last in favour of advertising for competitive designs for artisans' dwellings on land abutting on Queen-street and King-street, Salford. In lieu thereof the council adopted plans prepared by the borough engineer for the buildings, the estimated cost being about £11,000.

PILKINGTON & CO.

(ESTABLISHED 1838),

MONUMENT CHAMBERS,
KING WILLIAM STREET, LONDON, E.C.

Registered Trade Mark:

POLONCEAU ASPHALTE

Patent Asphalte and Felt Roofing.

ACID-RESISTING ASPHALTE.

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SEYSSSEL ASPHALTE.

COUNTRY HOUSE ELECTRIC LIGHTING. DRAKE and GORHAM,

SPECIALISTS FOR COUNTRY HOUSE LIGHTING.
66, Victoria St., Westminster, London, S.W.
And at MANCHESTER and GLASGOW.

FAMBRINI & DANIELS,

MANUFACTURERS OF IMPERISHABLE CONCRETE
MASONRY FOR

CORNICES, STRING-COURSES,
MODELLED PANELS, AND EVERY
STONE-WORK REQUISITE.

LANDINGS and Plain or Moulded and Mitred
STEPS, durable throughout.

WORKS AND OFFICES: LINCOLN.

HAM HILL STONE. DOULTING STONE. THE HAM HILL & DOULTING STONE CO.

Incorporating THE HAM HILL STONE CO. and C. TRASK and
SONS (THE DOULTING STONE CO.)

Chief Office: NORTON, STOKES-UNDER-HAM, SOMERSET.
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WM. OLIVER & SONS, MAHOGANY, WAINSCOT, WALNUT, TEAK, VENEER, and FANCYWOOD MERCHANTS,

120, BUNHILL ROW, LONDON, E.C.

The most extensive Stock of every kind of
Wood in Planks and Boards, dry and fit for
immediate use.

LATEST PRICES.

IRON, &c.

	Per ton.	Per ton.
Rolled-Iron Joists, Belgian.....	£5 5 0 to	—
Rolled-Steel Joists, English	6 0 0 "	—
Wrought-Iron Girder Plates	6 15 0 "	—
Bar Iron, good Flats.....	7 0 0 "	£7 5 0
Do., Lowmoor, Flat, Round, or		
Square	17 0 0 "	17 10 0
Do., Welsh	5 15 0 "	5 17 6

Boiler Plates, Iron—

South Staffs.....	7 10 0 "	7 16 0
Best Snedshill	9 0 0 "	—
Angles 10s., Tees 20s. per ton extra.		

Builders' Hoop Iron, for bonding, &c., £6 10s. 0d. per ton.
Builders' Hoop Iron, galvanised, £13 10s. 0d. per ton.
Galvanised Corrugated Sheet Iron—

	No. 18 to 20.	No. 22 to 24.
6ft. to 8ft. long, inclusive	Per ton.	Per ton.
gauge	£10 15 0	£11 0 0
Best ditto	11 5 0	11 10 0

Cast-Iron Columns..... £5 10 0 to £8 10 0

Cast-Iron Stanchions..... 5 10 0 " 8 10 0

Cast-Iron Sash Weights..... — " 4 2 6

Cast-Iron Socket Pipes—

3in. diameter..... 4 10 0 " 4 15 0

4in. to 6in..... 4 5 0 " 4 10 6

7in. to 24in. (all sizes)..... 4 0 0 " 4 2 6

[Coated with composition, 2s. 6d. per ton extra; turned

and bored joints, 5s. per ton extra.]

Pig Iron—

Cold Blast, Lilleshall..... 105s. to 110s.

Hot Blast, ditto..... 57s. 6d. to 62s. 6d.

Wrought-Iron Tubes—Discount off Standard Lists f.o.b.

Gas-Tubes..... 75p.c. Fittings 77p.c.

Water-Tubes..... 70 " 72

Steam-Tubes..... 62½ " 65

Galvanised Gas-Tubes..... 60 " 62½

Galvanised Water-Tubes..... 55 " 57½

Galvanised Steam-Tubes..... 45 " 47½

10cwt. casks. 5cwt. casks.

Sheet Zinc, for roofing and work- Per ton. Per ton.

ing up..... £20 0 0 to —

Sheet Lead, 3lb. per sq. ft. super. 12 5 0

Lead Shot, in 25lb. bags..... 15 0 0

Pig Lead, in lewt. pigs..... 11 0 0

Copper Sheets, sheathing and rods..... 55 0 0

Copper, British Cake and Ingot..... 49 0 0

Tin, Straits..... 59 0 0

Do., English Ingots..... 63 10 0

Per ton. Per ton.

Cut Clasp Nails, 3in. to 6in. 8 5 0 "

Cut Floor Brads..... 8 0 0 "

Wire Nails (Points de Paris)—

0 to 7 8 9 10 11 12 13 14 15 B.W.G.

8/6 9/0 9/6 10/3 11/0 12/0 13/0 14/3 16/3 per cwt.

TIMBER.

Teak..... per load £11 0 0 to £16 0 0

Quebec pine, red..... — " —

" yellow..... 2 0 0 " 4 5 0

" pitch..... — " —

" Oak..... 5 0 0 " 6 10 0

" Birch..... 3 5 0 " 5 0 0

" Elm..... 3 10 0 " 4 15 0

" Ash..... 2 15 0 " 4 0 0

Dantsic and Memel Oak..... 2 10 0 " 3 10 0

" Fir..... 1 15 0 " 3 15 0

Wainscot, Riga p. lg. 2 0 0 " 4 5 0

Lath, Dantsic, p.f. 4 10 0 " 5 10 0

St. Petersburg..... 5 0 0 " 6 10 0

Greenheart..... 8 5 0 " 8 15 0

Deals, per Petersburg Standard, 120—12ft. by 1½in.

by 1½in.:

Quebec, Pine, 1st..... £22 0 0 to £22 10 0

" 2nd..... 15 0 0 " 16 0 0

" 3rd..... 7 10 0 " 10 0 0

Canada Spruce, 1st..... 8 0 0 " 9 10 0

" 3rd and 2nd..... 6 10 0 " 7 10 0

New Brunswick..... 6 0 0 " 7 0 0

Riga..... 7 0 0 " 8 0 0

St. Petersburg..... 8 10 0 " 13 0 0

Swedish..... 7 10 0 " 16 0 0

Finland..... 7 10 0 " 9 0 0

White Sea..... 8 10 0 " 15 10 0

Battens, all sorts..... 5 0 0 " 20 0 0

Flooring Boards, per square of 1in :—

1st prepared..... 0 9 6 " 0 14 6

2nd ditto..... 0 5 0 " 0 11 6

Other qualities..... 0 4 6 " 0 6 0

Staves, per standard M :—

Quebec pipe..... — " —

U.S. ditto..... 35 0 0 " 42 10 0

Memel, cr. pipe..... 210 0 0 " 220 0 0

Memel, brack..... 175 0 0 " 185 0 0

OILS.

Linseed..... per ton £16 15 0 to £17 10 0

Rapeseed, English pale..... " 26 10 0 " 28 0 0

Do., brown..... " 24 0 0 " 24 10 0

Cottonseed ref..... " 15 10 0 " 16 10 0

Olive, Spanish..... " 29 0 0 " 29 10 0

Cocunut, Cochinchina..... " 27 0 0 " —

Do., Ceylon..... " 23 10 0 " —

Palm, Lagos..... " 23 10 0 " —

Oil, Olean..... " 19 0 0 " 20 0 0

Lubricating U.S..... per gal. 0 6 0 " 0 7 3

Do., black..... " 0 4 9 " 0 6 6

Tar, Stockholm..... per barrel 0 19 6 " —

Archangel..... " 0 12 6 " —

Turpentine, American..... per ton 18 15 0 " 19 10 0

TENDERS.

* Correspondents would in all cases oblige by giving the addresses of the parties tendering—at any rate, of the accepted tender: it adds to the value of the information.

ABERDEEN.—For the following works, for the town council: North district—macadamising and laying granite kerbs, channels, &c., in Blenheim-place; south district—causingway and carriageways of Schoolhill-viaduct and the Spur-road leading to Union-terrace. Mr. Wm. Dyack, burgh surveyor. Accepted tenders:—

Schoolhill-viaduct:—
Tawse, P., Birchfield, Kemnay ... £1,754 0 10
Blenheim-place:—
Fyfe, J., Aberdeen ... 315 5 10

ALDERSHOT.—For supply of 1,500 tons of granite (more or less) of approved quality at per ton, delivered at Aldershot Station, for the Aldershot Urban District Council. Accepted tenders:—

500 Tons macadam:—
Mountsorrel Granite Co., Mountsorrel, near Loughboro', 12s. 9d. per ton.

500 Tons Guernsey granite:—
Manuelle, A. & F., Leadenhall-street, E.C., 2in., 13s. 7d., 1in. at 14s. 1d.

500 Tons Guernsey granite:—
Mowlem and Co., Millbank, Westminster, S.W., 14s.

AYLESBURY.—For erection of a detached residence, Walton. Mr. W. F. Taylor, Aylesbury, architect:—

Mayne and Son ... £620 0 0
Stule ... 615 3 0
Crook ... 604 7 7
Rickard ... 604 0 0
Grimsdale, Aylesbury (accepted) ... 590 0 0

BAKEWELL.—For erection of certain buildings to provide additional accommodation for the clerk and master at the workhouse, Bakewell, for the guardians. Mr. E. M. Longson, Town Hall, Bakewell, architect:—

Wildgoose, L. T., Matlock ... £389 0 0
Groom and Co., Bakewell ... 368 14 0
Toft, G. and W., Bakewell ... 339 17 6
Allsop, T., and Son, Bakewell ... 339 0 0
Bramwell, W., Bakewell ... 337 0 0

Note.—No tender was accepted, as only £300 was allowed for this work.

BALLYHACK.—For the construction of a reservoir, laying down of water-pipes, erecting fountains, &c., at Ballyhack, for the guardians of New Ross Union:—

Harney, P., Waterford ... £250 0 0
Stephens, A. J., Duncannon* ... 197 5 0
* Accepted.

BARNET.—For the construction of a stone landing at the infirmary, for the guardians of Barnet Union:—
Hall, J., jun., New Barnet ... £38 10 0
(Accepted.)

BATH.—For erection of a brewery, Weston, Bath, for the Bath Brewery, Ltd. Messrs. G. Adlam and Sons, Bristol, architects:—

Stokes, W. ... £10,788 16 0
Forse, H. A. ... 9,899 0 0
Church, W. ... 9,798 0 0
Long and Sons ... 9,763 0 0
Bentfield and Loxley ... 9,618 12 0
Hayward and Wooster ... 9,389 0 0
Hirst, C. H. ... 9,155 0 0
Downes, G. ... 9,035 0 0
Gibson, W. ... 8,982 0 0
Roach and Sons ... 8,940 3 0
Hughes and Weeks ... 8,699 0 0
Martin, H., Northampton ... 8,383 0 0
* Accepted.

BIRMINGHAM.—For erecting a factory in Livery-street and Ludgate Hill-passage, Birmingham. Mr. Wm. F. Edwards, 174, Corporation-street, Birmingham, architect:—

Smith, J., and Sons (accepted) ... £2,939 0 0

BRAMPTON, HANTS.—For the drainage of Brampton village, for the Huntingdon Rural Sanitary Authority:—
Allen, J., Brampton ... £189 10 0
Giddings, F., St. Ives (accepted) ... 181 0 0

BRISTOL.—For the alterations necessitated by the setting back of the Baldwin-street frontage of the fish market, for the city council:—

Chard ... £3,729 0 0
Love and Wait ... 3,459 0 0
Hayes, C. A. ... 3,377 0 0
Davies, J. E. ... 3,345 0 0
Humphreys ... 3,330 0 0
Perkins ... 3,264 0 0
Wilkins and Gosling ... 3,110 0 0
Cowlin and Sons ... 3,075 0 0
Forse, H. A. ... 3,060 0 0
Perrott ... 2,993 0 0
Walters (accepted) ... 2,990 0 0
Hughes and Weeks ... 2,877 0 0

BURY, LANCs.—For the supply of 4in. iron pipes, for the water committee of the town council:—
Staveley Iron Co. (accepted).

BURY, LANCs.—For the supply of iron water main, for the extension of water supply to Bamford:—
Stanton Ironworks Co. (accepted).

CANTERBURY.—For additions and improvements to the superintendent's house, police-station, Canterbury. Mr. A. H. Campbell, city surveyor:—

Bateman, H. W. ... £245 0 0
Brewster, J. J. ... 236 0 0
Adcock, W. J. ... 226 0 0
Cozens, W., 5, Dover-st. (accepted) ... 197 0 0

CATERHAM VALLEY, SURREY.—For the erection of a detached residence, for Mr. R. G. P. Firmin. Mr. Hugh S. Cregeen, jun., P.A.S.I., Bromley, Kent, architect:—

Ward Brothers ... £715 0 0
Page, S. ... 690 0 0
Axell and Hicks, Caterham Valley* ... 500 0 0
* Accepted.

CREWE.—For constructing a walk from the north end of Market-street to the cemetery, for the town council:—
Lunt, F. (accepted) ... £95 2 3

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MODERN OBSTACLES.

IN these days the practice of architecture is beset with many obstacles which may well serve to distract and deter the more single-minded of its disciples. On every side the claims of stern uncompromising utility discourage the followers of the art, and these demands seem to grow in intensity and number every day. Science, trade, luxurious living, sanitary needs compose the hydra-headed monster which the modern architect has to combat, and constitute at least some Herculean exploits. Commercial demands for space, mechanical appliances and devices, the use of iron construction, increased lighting, warming, and ventilation have to be met and faced with unflinching boldness. No one will say they are not hostile to that repose and harmony which the architect desires to impart to his work. Have not Messrs. Driver, Showgoods, and Co. made it an express condition that their new premises must have an uninterrupted area for their shop and upper floors, be lighted by large windows, and have lifts and other latest improvements in lighting and ventilation? Mr. Holdforth has discarded a design for his new chapel because it does not give him an auditory worthy of his powers as a preacher; and the instructions of Mr. Fastliver are imperative upon the requirements of large rooms, very complete cuisine, and a style of decoration that precludes all attempts at quiet or homely character. In vain the architect attempts to make his design artistic in any sense, or to apply those principles of design which he has been taught to observe in the arrangement of plan or elevation. He cannot assimilate these obviously prosaic wants; they will not yield to the influences of the artistic mind or the functions of the imagination; they obstinately refuse to be reconciled, and must either be accepted whole, to be regarded as plague-spots on the design, or else be smothered over with dishonest decoration, just as we gild the nauseous pill. To the sensitive and cultured man they will ever remain "bugbears" to distress his better feelings, and as objects of his constant warfare. It is easy, of course, to make compromises, to agree to do just what these representatives of trade and public utility demand—to sacrifice one's better art instincts to meet the engineer or ironfounder's wishes about a girder or a column, and of this class of men there are plenty and to spare. Their art is not above their pockets or their business. In a far different class are those who have entered the profession as enthusiasts, who find themselves surrounded by restrictions and practical suggestions, and who have to fight the hybrid monster tooth and nail, little by little. They have to take in the almost ironical remarks of the apostles of "high art" who are ever and anon declaiming on the happiness of those who are in the service of art, and the wondrous world of beauty which lies open at their feet; on the other hand, they must be on good terms with the large commercial firm, the sanitarian, and the plumbing expert, make friends with builders and manufacturers and surveyors. The votary of the latter class naturally gets impatient whenever he hears Mr. Haven expatiate on the monstrosities of modern furniture, and the presidents of societies rhapsodise on education and on the progress of architecture. These utterances sound very inconsistent and unreal. Now and again we hear a wiser counsel, as that of the President of the Association, who suggested

that the "term 'education' in connection with architecture in its current use does not apply to the art of architecture at all, but to those subjects upon which reading and lecturing are required," those which have relation to public health and order. The young architect has, in fact, to come into the arena equipped for his professional contests with commonplace utility and commercial requirements—to learn what the present age demands and his clients ask for, and to buckle on his armour to obtain them on the least objectionable terms. Badly equipped for his work is the man who reposes on a knowledge of mere style, so-called, who desires to make everything agree with his notions of Italian or Flemish Renaissance, "Queen Anne," Gothic, or any other school of design. Such a one must soon see disaster before him, and he had much better forget all about styles as impediments to a free conception of the problems he has to face. Equally liable to come to grief on the shoals and quicksands of his own imagination is the man who thinks that every modern want or mechanical exigency must give way before his notion of what is right in design. He soon discovers he has a formidable adversary in the shape of public opinion. Right or wrong, "private judgment" of one kind and another asserts its right to form its own opinion of the "newest invention" or the "most approved" arrangement. It is used by everybody, it is advertised largely, and, therefore, it must be a good thing. An artistically and sensibly treated shop-front is set aside by the tradesman, who wishes for an open and very commonplace arrangement in which there is plenty of glass with few supports; he pays for it, and has a right to demand it. Iron and glass and cheap decoration are decidedly infectious amongst many, though hostile to all true art. The architect who is intent on broad, plain brickwork, who has a *penchant* for what we may term the "archaic," the quaintly vernacular style of the 17th and 18th centuries, and who is inspired with the idea of reviving "bits" of Old Bloomsbury or the old manor house, has a formidable task. The particular cult he wishes to form is seriously affected by the crazes of modern society and the manufacturer. A man trained, for instance, in the County Council School of Arts and Crafts, and who has been instructed by craftsmen in designing and modelling in stained glass, textiles, furniture, and wall-papers, has a hard fight to convince his clients that Messrs. Smith and Jones' work is really bad, and contradictory to the true spirit of art. Take, again, the shop-window. The owner insists on it being made to rise above the ceiling, to give an imposing height outside. What can the designer do to mitigate the disagreeableness of seeing the ceiling stopping right against the glass, or an ugly girder or beam cutting off the light? Any kind of architectural treatment in which pillars or arches are introduced would be instantly dismissed as reducing the space for display of goods. Or take that uncouth modern introduction, a passenger-lift. The owner has his way. It can be half-concealed by metal grille-work or a casing of mirrors, and the more ornamental it can be made, or the more unlike a lift, the better! A staircase to the modern residence—a very fond subject for the architect on which to exercise his taste and some of the best traditions of art. But, oh! that ogre of fashion! It must be prim, "spick and span," new, and have the latest Americanised turned balusters, or a wrought-iron scrollwork, a continuous flight, or broken up into short, fussy flights, to show its importance, its rich carpet, and brass stair-rod. Once more, it is hard to persuade many people that the old-fashioned fireplace, with its canopied head and side settles, is more comfortable and becoming for a sitting-room or parlour than

the modern new-fangled grato and overmantel of the furniture or ironmonger's catalogue. The demands for space and acoustic considerations have to be fought out or met by the modern church, theatre, and assembly-hall architect. On a committee, he is always afraid of being influenced or hoodwinked into doing something contrary to his convictions, to give his new church a "railway station" character, or to make it a "hall" or huge auditorium in which every vestige of architecture will be eliminated—a sort of Westbourne Chapel interior, but without its purpose. It is bad enough to have to plan his seating in curved lines, and to make his pillars, iron posts, and his roofs of open iron. All these possibilities he has to face. Space and acoustics are inexorable demands on the architect of concert-rooms and theatres. How can he meet them, and yet be true to his art? He must give up all his architectural traditions to design a theatre auditorium; he has to wage war with curved or horseshoe dress-circles, upper circles, boxes, and galleries; to arrange for sloping floors, seats, and ceilings; to plan gangways and stairs, carry out the latest modes of steel and concrete construction, and the most recent plastic decorations, as well as master the Regulations of the L.C.C. Only in the sense of applying architectural principles to modern conditions can such a building be consistently conceived. Nor has the architect any precedent for those utilitarian buildings which are now springing up on all sides—the modern hotel, hospitals, workhouses, baths, wash-houses, libraries, technical schools, laboratories, on all of which other sciences and professions have to be consulted. The medical practitioner, hygienist, engineer, literary man, and science teacher and physicist have all and each a voice in these buildings; their plan and classification have to be primarily considered in their construction. The architect who is well "read up" in subjects, who has learned how to turn his adversary's weapons, and can beat on his own ground the engineer, medical expert, or scientist, is he who has the best opportunity of overcoming the obstacles which beset his path. The man who knows what is wanted, and how it can be best supplied, is the man who has the ear and patronage of the public, though he may be incapable of presenting his ideas in the most artistic manner. Here we have the explanation of the reason why the architect is so often disheartened, and why he is so baffled in his well-meant crusade against the modern and the ugly. In most cases he has the victory in his own hands; he may have to wage a battle with his employer, or the manufacturer, or the expert. Prove to him that he understands the problem, that he knows what he wants, and can embody it, economically and sensibly, though it may be unconventionally, and it will not be long before his object is attained, and he is able to throw off that despairing mood which so often cripples the unprepared designer. Yes, it is only in making the ground sure, understanding the problem, that the battle is to be won. No amount of talking and influence—though they go often a long way—no cajoling or captivating by attractive drawing, can help a man who is devoid of this knowledge. At all times the conflict is sharp between absolute utility and art, therefore it is well if the designer can profitably forestall his opponents by utilising their weapons and in making himself a master of those potentialities which now so hamper his work. Unlike his compeers in art, the sculptor, painter, and decorative artist, the architect has to contend also with the economic element. The cost of his design is ever before him in a more or less practical form, limiting his resources just where he looked for freedom, or closing the avenues of generous impulse. Considerations of accommodation, return for capital expended, and other questions are matters

which weigh heavily on the architect, and often impose a formidable barrier to his conceptions.

THE PAINTER'S CRAFT.

THE question of apprenticeship has been more than once discussed of late in connection with the building trades, and its far-reaching influence has begun to be felt among those engaged in building operations. We reported last week a conference held in Birmingham by the Master House-Painters of England and Wales, attended by no fewer than 200 delegates, representing Manchester, Liverpool, Newcastle-on-Tyne, Edinburgh, Burnley, Blackburn, Sheffield, and other large centres of industry, and under the auspices of the Lord Mayor of Birmingham. Mr. John Taylor presided over the meeting at the Technical School, and delivered an address on education in colour. He spoke of the decline in the trade of house-painting—a matter which all those interested in decoration must have experienced. Mr. Taylor very truly said: "A really good house-painter was a rarity." During the conference several practical papers were read and discussed, all of them directed to means for elevating the character of the trade and improving its condition. One of the readers, the head master of the Municipal School of Art (Mr. E. R. Taylor), who dealt with the "Art and Craft of the House-Painter," touched a weak point in the modern training: the want of the apprenticeship system, or something analogous to it. He rightly argued that if the profession was to be maintained, "masters and workmen must become teachers and artists." Apprenticeship in Birmingham and other places had ceased, and the craft was suffering in consequence, a tale which has reached us from other trades as well which are now recruited from the ranks of men who have found themselves in the trade by "hook or by crook," but who have had no efficient instruction or training for the work whatever. Take, for example, bricklayers, carpenters and joiners, masons or plasterers, the most important crafts which are engaged in building. In all of them we have practical evidence that apprenticeship is practically dead, that these trades are recruited from the ranks of journeymen, learners, adult labourers, and "improvers." No doubt a few amongst them are men who have a natural aptitude for the work and who get on, but the larger number are quite incompetent. The bricklayer used to be taught, when he was apprenticed to a good firm, how to do gauge work, cut and set out arches, cut and rub mouldings; but the modern "learner" or "improver," as he is called, is generally a raw lad or labourer employed by speculative builders who has "picked up" the trade, and who does, in addition, odd jobs, tiling, rough stonework. And the carpenter. He was at one time capable of undertaking any kind of work in which timber was used; but now he can only do the rougher sorts of his trade; cut moulds and centres for bricklayers or masons, lay joists, and frame ordinary roofs and do various things for other trades. The joiner has also lost his original skill. In his apprenticeship days he was instructed to do many things which are now left to the shop foreman, and he is now largely a "wood fitter," since machinery has been introduced. As for plastering, we find the same decline—the best work goes to the manufacturer of fibrous plaster or the modeller; and the ordinary plasterer is now largely recruited from the classes of "learners" and journeymen, and is employed in doing work of a very ordinary kind in indoor tiling, and other trades which are also done by bricklayers. The house-painter has taken his vocation up not a week too soon. He has now to compete with decorators, manufacturers of fabrics of various kinds. The plain-painting hand

generally is recruited from the ranks of learners and journeymen, and he is more likely to suffer, because his work calls for little technical skill, and is so easily learned. We know that the small builder, or carpenter, or plumber often undertakes the work of painting small houses. Well may the properly-apprenticed painter seek redress when his trade is practised by a variety of men, even cabdrivers and soldiers, who seek extra employment.

These evils are attributable largely to the falling-off of teachers and the decline of apprenticeship. How can the small master painter instruct apprentices, when he has not been adequately instructed himself? His business depends on taking contracts and general repairs, and he requires the cheapest labour he can obtain, so the demand for the youth who can use a brush and use the pigments mixed to his hand is large. The "painter" knows little or nothing of colour, the mixing of pigments or of technique. To stem this condition of things, the Master House Painters are doing their best. They begin to see the absolute importance of teaching the craftsman the elements of his art, and of equipping him with such knowledge as will entitle him to command a fair wage. We quite agree with Mr. Taylor's remark: "The endeavour to inspire their workmen with that art feeling and to guide them in its expression is the main object of our organisation. If the workmen can gain a little art training which included individual observation and expression, then their commonest work will no longer be a monotonous slavery, but a handicraft, and all they do will be permeated with art-feeling." If the apprenticeship system cannot be re-established, the alternative ought to be to require the learner to go to an art school where the principles and technique of his trade are properly taught in their various applications, and to require each pupil to obtain some recognition or test of his skill before he is employed. What the necessary instruction should be may be open to question. The pupil should at least be taught workshop practice, the names and uses of his tools; how they should be used; a knowledge of colours, their properties; how to mix them to obtain different tints and shades; the use of the stencil-plate, &c. Of course, there is a difference between an ordinary house-painter and a decorator: for both the workshop practice, freehand, model, and geometrical drawing, and colour are necessary, also the properties and use of pigments. For the latter, decorative design, stencilling, paper-hanging, gilding, and other branches are necessary, and a higher degree of attainment may be demanded. But for the house-painter we should not advise any mere school or class training. The learner of this kind should rather begin in the workshop, and his attention should be directed to only practical methods of executing designs. He should be required to prepare and knot and stop wooden surfaces, or framed work, and apply the requisite number of coats; to learn to paint, under proper practical supervision, doors, windows and sashes, walls and ceilings, balusters, and every class of work which is required in house painting, according to specifications. Those who instruct ought to be practical and competent painters and teachers, not merely certificated masters of an art school, who have only learned the principles of colour and painting. The higher branches of painting or decoration may be acquired afterwards; the first object should be to instruct the crude learner to direct his abilities to practical house painting, so that he may be able to enter into the trade as quickly as possible, and to be taken on by a firm. The theorist is not the kind of teacher the craftsman wants at the beginning; he wants to be taught how to do a certain thing in the ordinary accepted method,

and not to find afterwards, when he gets on a building, that his method is not recognised by the other workmen, however correct it may be. Nothing is more disheartening for a beginner in a trade than to discover that he has to unlearn something, and to find out that the recognised trade way is as good or a quicker method. Such a discovery has no doubt been made by many who have attended technical school classes, and their opinions of their value have been rudely shaken. The suggestion made by the lecturer that the "artistic posters" might be done by the house-painter is a good one; but we believe this artistic development of the trade will be better left for future consideration.

TESTS OF SANDS FOR MAKING MORTARS.*

GRANULOMETRIC COMPOSITION.—It has been shown that in whatever manner sand is measured, by weight or by volume, the ratio of the resistances of mortars obtained by combining the same weight of cements with sands mineralogically identical may vary from one to three, according to the proportion of the different sizes of grains contained in those sands. The other properties of mortars, permeability, decomposition by salt water, &c., depend almost entirely on the granulometric composition of the sand. The most important test to which sand should be submitted will then consist in measuring the proportion of grains of each size which it contains. It is proposed to call pebbles all grains remaining on a plate perforated with circular holes 5 millimetres in diameter, and to divide the pure sand into three sizes defined according to the diameters in millimetres of the circular holes in perforated plates serving to separate them. Large grains (G): Pass five millimetres; remain on two millimetres. Medium grains (M): Pass two millimetres; remain on 0.5 millimetre. Fine grains (F): Pass 0.5 millimetres. The proportions of those three classes of grains expressed in hundredths of the weight of pure sand will make known the granulometric composition of the sand. The proportion of pebbles expressed as a function of the weight of pure sand will also be indicated. *Researches Concerning Mixtures of Mortars.*—Numerous experiments made on mortars of mixtures of 250 and 500 kilograms of the same cement to the cubic metre of sands of the same nature (ground quartz), differing only in their granulometric composition and measured always in a dry state in the same manner, have shown, as can be seen by the examination of the table below, that mortars of the same proportions can have very different properties. Hence

	250-Kilogram Mortars.	500-Kilogram Mortars.
Volume of mortar furnished by 1 cubic metre of sand (yield)	From 0.940 to 1.030m ³ .	From 0.970 to 1.180m ³ .
Weight of cement entering into 1 cubic metre of mortar	From 243 to 266kg.	From 424 to 506kg.
Absolute volume of solid materials entering into the unit of volume of the mortar (c + s)	From 0.570 to 0.737.	From 0.565 to 0.728.
Volume of voids remaining in the unit of volume after drying (porosity)	From 0.145 to 0.390.	From 0.093 to 0.210.
Decomposition by salt water after one year's continuous immersion	All degrees, including total absence of disintegration.	No disintegration.
Resistance to compression per square centimetre after one year's immersion in fresh water	From 35 to 130kg.	From 100 to 260kg.

it is evident that an indication of the proportion or composition of any mortar suitable for employment in any given work has no significance when the sand is not defined, and that according to the sand which is used in the proportion of cement to be combined with it must vary. It is important that there should be determined for each sand the proportion mixture to which any given quality of mortar corresponds. It is claimed sometimes that this can be determined by measuring the voids of a known volume of sand, and

* Abstract of a Paper by M. R. FERET, Chief of the "Laboratoire des Ponts et Chaussées" at Boulogne. Prepared from the Translation by O. M. CARTER, Captain Corps of Engineers, U.S.A., and E. A. GEISELER, U.S. Assistant Engineer.

calculating the weight of a cement capable of giving, when mixed neat with water, a volume of paste precisely equal to that of the voids. It has been shown how the determination of the weight per cubic metre, and consequently of the volume of the voids, varies. Moreover, the dispersion of the grains is completely changed by the introduction of cement. The information furnished by that method is therefore considered illusory, and it is believed that sufficient information can be obtained only by the study *à posteriori* of a series of test mortars obtained by combining in different proportions the sand and cement considered. The raw sands that can be used for mortars contain generally only such a small proportion of pebbles that they may be considered as buried in the mortar without modifying its properties; it should be understood then at the outset that the tests shall bear reference to pure sand—that is to say, separated from the pebbles remaining on a plate with holes 5 millimètres in diameter. There will be avoided thus at the same time the use of too large test pieces and the irregularities due to the unequal distribution of pebbles in those specimens. To operate thus on well-defined quantities of material exempt from all contingencies or variations, it would be well to express by weight the proportion of sand and cement employed for test mortars. It will then be convenient to define each mixture by an indication of the weight of the cement entering into the unit of weight of the mixture, cement plus sand, and to represent graphically the results of the tests, taking for abscissas on a base of unit length the mixtures thus defined, and as ordinates the numbers furnished for each mortar by tests. Connecting by a continuous curve the points corresponding to the same qualities of mortars, the deviations due to errors of test will be made to disappear, while at the same time the mean value of that quality will be determined by a simple reading of the diagram for all mortars intermediate to those on which tests have been made. For test mortars there should be chosen mixtures quite closely related to the mortars generally used, and also some extreme mixtures whose representative points will serve as guides to give more exactly the determination of the character of the curves in their interesting parts. There can be adopted, for example, the following mixtures:—

Proportion by weight:

Cement ... 0.10 0.15 0.20 0.25 0.30 0.40 0.50 (0.75) ? (1) ?
Sand 0.90 0.85 0.80 0.75 0.70 0.60 0.50 (0.25) ? (0) ?

Before proceeding to the tests, it will be well to determine by experiment, for some mortars, the weight of water necessary for tempering, expressing it, as well as the proportion of cement, as a function of the total weight of the dry mixture, and to deduce from it by graphic interpolation, as has just been explained, the proportion of water corresponding to other mixtures. There will be known then all of the elements of the mortars, and there will remain only tempering. It is difficult to define in a uniform manner what qualities of test-mortars should be studied. According to the nature of the work to be executed, more or less importance will be attached to such or such a property of mortars—cost, density, hardness, porosity, permeability, unchangeableness in certain places, &c.—and the choice of a mixture will depend especially on the variations of the desired properties. It is probable that in all cases it will be sufficient to determine the absolute volumes occupied in a unit of volume of each mortar by the cement, the sand, the water, and the voids. The relative hardness can also be determined without other special tests by an approximate formula, and from which the resistance to compression is found to be directly proportional to the absolute volume of the cement, and inversely proportional to the sum of the volumes of the water and the voids contained in the unit of volume of the mortar. In all cases it will be well, in taking account of the quantity of the cement employed, to make with the mortars studied special tests of resistance, and to compare the results obtained with those of a mortar of a normal constant and well-defined composition, and made with the same cement. As has been shown in another report, such a mortar, tempered to a plastic consistency, and introduced into moulds without hammering, could be composed by weight of one part of cement to three parts of a sandy mixture (ground quartz) containing in equal proportions the three normal subdivisions of size of grain defined above. Finally, it will always be useful, especially if a choice between several sands has to be made, to

calculate the price per cubic metre of the mortar as a function of the number which measures the principal quality demanded of it. The character of the curve expressing its law of variation will show what is, for each sand, the most suitable mixture, and even will often show entirely unexpected economic advantage resulting from the use of certain sands.* Suppose that by the aid of the tests just described a sand has been chosen and a determination has been made of the proportions, expressed by weight, according to which, for any given work, the cement at hand and the sand taken in a dry state and freed from pebbles should be combined. In workshops it would perhaps be too complicated to weigh the sand, and, moreover, the weights could be falsified by the presence in the sand of variable weights of water and pebbles. If, then, it is thought that sand should still be measured by volume, there should be determined, as has been said before (paragraph 3), the weight of the same volume of sand under the most diverse conditions possible and measured as for use, deducting the actual weight of pure sand contained each time in such measure, and calculating from that weight the weight of the cement that should be combined with that same volume of sand to obtain in all cases a mortar suitable to be adopted for the trial tests. There would result, whether the sand is employed in the natural state or whether it would be deemed useful first to separate it from its pebbles, all of the elements necessary for establishing a numerical or graphical table indicating how the practical conditions of manufacture should be modified according to the degree of humidity of the sand, in order to obtain the desired mortar. Finally, during the execution of the work there will remain only to be measured from time to time the degree of humidity of the sand, so as to make the corrections as they are necessary, verifying at the same time the constancy of its granulometric composition and of its contents of pebbles. To measure humidity, it will suffice to determine the loss of weight sustained by five kilograms of sand after sufficient drying at a temperature a little above 100° Cent.

THE ANALYSIS OF MORTAR.

THOSE who build are seldom acquainted with the chemical properties of mortar; they are satisfied if the mortar they use is compounded of the usual ingredients in the ordinary manner. The specification formula is all they regard, and they do not trouble themselves to see if the right proportions have been used, for, according to recent investigations, the mortars which are used in buildings often contain various proportions of earthy matter and dustbin refuse. The pamphlet under the above heading, by W. J. Dibdin, F.I.C., and R. Grimwood, F.I.C., reprinted from the *Analyst*, is of interest to all users of lime and cement mortars, as enabling them to judge any departures from the prescribed quantities of ingredients. The authors give the legal specification of mortar in the by-laws made by the London County Council, section 16 of the Metropolitan Management and Building Acts Amendment Act, 1878, which is well known to our readers. Analyses which have been made from time to time by the authors have shown that it is only under exceptional circumstances that mortars which come within these regulations are employed. The earthy matter was found to vary considerably, and the results obtained from a number of mortars taken from a building in course of erection indicate a great difference. The soluble silica is an important factor in estimating a cement mortar. The authors observe, "If the cement mortar is made with good Portland cement and clean well-burnt brick or sand in the proportion of 1 of cement to 4 of the grit (this being the County Council's proportion), there will be about 3½ per cent. of soluble silica. In some samples of genuine cement mortar the soluble silica was found to be 3.25, 2.5, 3.25, and 2.25 per cent.; as against these samples of genuine mortar made with lime gave soluble silica equal to 0.9, 1.0, 0.6 traces, and 1.1."

* In a general manner it seems that the best possible mortars are those which contain two absolute volumes of big grains, for one of fine grains, cement included. For such mortars, the absolute volume of solid material per unit of volume of the mortar ($c + s$) is the larger, the greater the departure between the smallest of the large grains, and the largest of the small grains, and on the other hand the hardness increases in proportion to the fine grains contained in the cement.

Turning to analyses of commercial mortars the soluble silica is found to vary as follows: 0.9, 0.7, 0.7, showing a marked difference under certain circumstances. Another factor is the quantity of carbonic acid. The authors compare the quantity found in good mortars and cement mortar with the quantity contained in commercial mortars, thus showing that this factor alone gave such marked indications of the character of the material that it is impossible that a mistake should be made in estimating the character of a given sample of mortar or cement. The commercial mortars in this case contained a much larger percentage of the acid. The tables given show the comparative analyses of a sample of mortar specially prepared, giving the lime, broken brick, representing the relation of weight to volume in lime mortar; but into these details we do not enter, nor into the analytical methods employed by the authors in making these examinations. Of practical interest are the tables giving the results of analyses of various samples of good and bad mortar. In very bad mortar the samples contain excessive quantities of earthy matter and old mortar, and are deficient in freshly-burned lime. Another table gives the results of the analyses of good mortar taken from a public building in course of erection. These analyses, when carried out on a strictly scientific basis, are valuable as enabling architects, engineers, and others to find out whether mortar and cement were made according to the required formula, and to enable disputes as to these materials to be settled scientifically. These analyses have been framed by the authors chiefly in relation to the by-laws of the London Building Act, and the paper on this account is of value, though some doubt may be expressed as to the statement that the amount of cement in a mortar could be ascertained by the proportion of soluble silica it possessed.

SUSPENSION BRIDGES—A STUDY.

By GEO. S. MORISON, Past-President Am. Soc. C. E.

(Continued from page 517.)

CAPACITY.—The bridge has been proportioned to carry a total load of 50,000lb. per lineal foot, which is equivalent to a stress 40,000,000lb. on each of the four cables at the centre of the span. The actual dead weight of the cables and suspended superstructure is about 39,000lb. per lineal foot, thus leaving 11,000lb. for moving load. The width in the clear between trusses is 92ft., which will provide for two double-track railroads, each occupying 26ft., with a space 40ft. wide between. This 40ft. can be occupied in various ways; its width is the same as the width between the curbs of Broadway at Twenty-sixth-street; it could be used for four rapid-transit tracks either for street cars or for rolling stock of the same dimensions as that used on the elevated railroads; it could be used as a street with two sidewalks and a roadway between wide enough for four carriages to pass; it could be used for two standard gauge railroad tracks, with a broad promenade for foot passengers between, or it could be used as a driveway with a street railroad track on each side. Another possible arrangement is the construction of eight parallel railroad tracks 11ft. between centres, which is admissible on perfectly straight lines, but it is not important to decide how this bridge would be used. Enough has been said to show the capacity which would be afforded, and the weights for which it should be designed.

Cables.—The cables are the fundamental feature of the design, and will therefore be described first. The design of the cables departs radically from the features hitherto followed in suspension bridges, and provides a method of constructing suspension bridge cables under which it is possible to do nearly all the work in the shops, and to diminish field work to a minimum. The bridge is designed with a versed sine of 400ft. under maximum load, this being equal to one-eighth the span. On the basis of a uniform load of 50,000lb. per lineal foot, or 12,500lb. per cable, the stress in each cable becomes 40,000,000lb. at the centre of the span, and 40,000,000lb. multiplied by $\frac{\sqrt{5}}{2}$, or 44,721,360lb. at the ends of the span, while the vertical reaction at each end is 20,000,000lb. Each cable is composed of 253 ropes of equal size arranged in the form of a hexagon with three ropes omitted from each corner; the maximum stress on each rope will therefore be 76,764lb. In

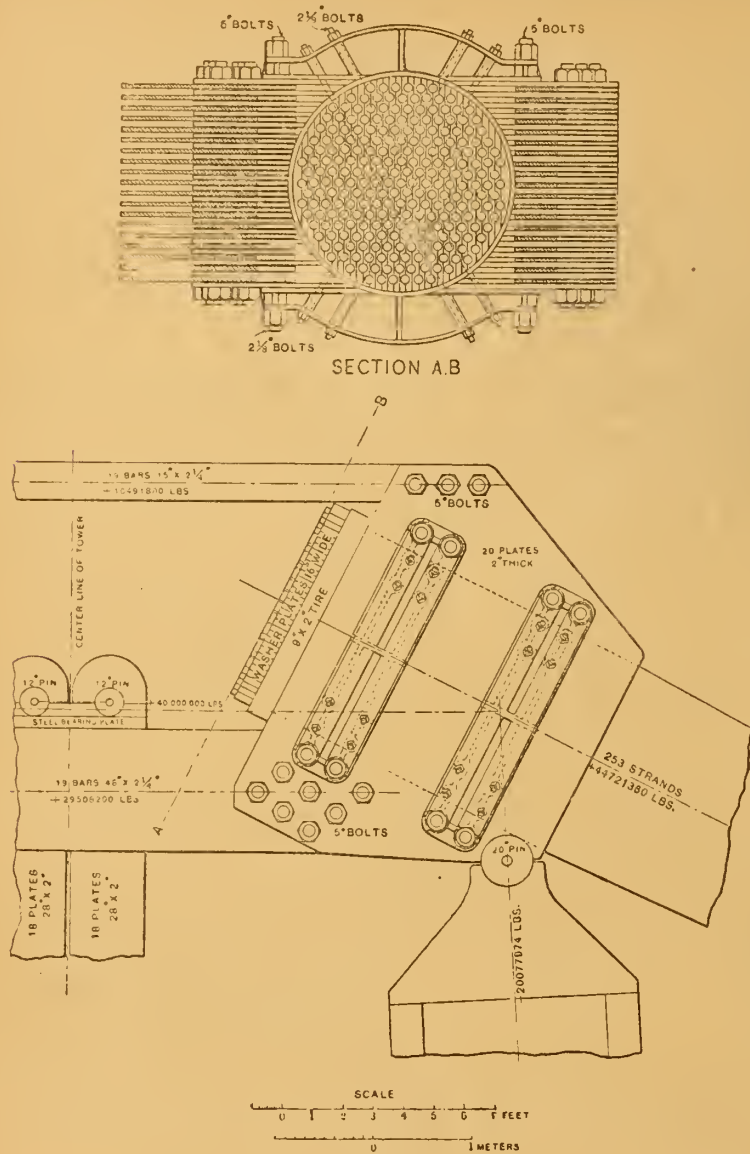


FIG. 2.

the design, the ropes are made 2½ in. diameter, each rope being assumed to have a section equivalent to 3 sq. in. of solid metal and to weigh 10 lb. per lineal foot. The stress per square inch on these ropes will, therefore, be 58,921 lb., of which 38, or 45,958 lb., will be caused by dead load, and 12,963 lb., by moving load. Each rope will be a specially laid rope formed of a single straight wire at the centre, around which are grouped successive layers of helicoidal wires, so inclined that all will be of the same length, the alternate layers being inclined in opposite directions. When put under strain all wires are equally strained, except the single central wire which acts as a core. This rope bears no resemblance to the ordinary twisted rope. If not larger than No. 8, the wires of each rope can be made continuous from end to end without splicing. A number of sample ropes were specially prepared by the Trenton Iron Company under the direction of E. G. Spilbury, M. Am. Soc. C. E., and these ropes were tested at the Watertown Arsenal. The results of these tests will be found in Appendix A. While these tests were of a preliminary character, and the ropes differed in some respects from those which would actually be used in a bridge, they established two important facts:—First, that a laid or twisted rope can be made which will develop in the actual rope a strength of more than 180,000 lb. per square inch of wire, and this with a wire which can be furnished at a reasonable cost; second, that a laid or twisted wire rope of this kind can be depended on in a structure to act uniformly and with a regular modulus of elasticity, the action of the different ropes tested in the latter respect being entirely satisfactory. Twelve ropes were tested in all, of which four were of straight round wires, four twisted round wires, and four twisted wires of the special forms used in a locked rope. The experiments showed

the decided superiority of the rope of twisted round wires in all respects except one. The wires were evidently more uniformly strained in this rope than in the straight wire rope, and gave decidedly better results than the peculiar-shaped wires in the locked rope. The only respect in which the twisted rope was inferior to the straight rope was in the modulus of elasticity, which was about 25,000,000 in the twisted rope, and 28,000,000 in the straight wire rope. The twisted rope was made with a machine already in existence, and with the twist commonly used on similar ropes. For the special use considered, it is probable that the twist could be reduced to one-half or perhaps to one-third that laid by this machine, and that the modulus of elasticity could be raised to about 27,000,000. The modulus of elasticity does not affect the strength of the structure; the only effect of a low modulus is slightly to increase the deflection. In none of the twelve tests, involving twenty-four sockets, did a rope pull out of a socket, but in nearly every instance the fractures occurred in the outer layer of wires and inside the sockets. An examination of the sockets showed a rough shoulder, which undoubtedly had something to do with this fracture. By a modification of the interior shape of the socket it is probable that this difficulty could be largely removed, and the strength of the ropes increased from 5 to 10 per cent. Each rope will be fitted into a steel socket at each end 12 in. long, the diameter of the socket to be twice the diameter of the rope. By adjusting the ropes under strain at the works, and arranging a special machine to trim the under edge of the socket after the rope is fastened into it, it is believed that the length can be so accurately fixed that no further adjustment will be required in the field. If, however, this cannot be done, the arrangement designed permits the employ-

ment of fillers under the square shoulders of the sockets, so that the ropes can be adjusted in position. There will be four cables in the main span of the bridge. There will be four cables in the backstays on each side of the river. There will, therefore, be twelve cables in all, each of which must be fastened at each end. The method of fastening the cables is shown in Fig. 2. Fifty feet from each end the several ropes, which are compressed compactly together in the body of the cable, begin to separate so that they are 4.9 in. between centres at the ends, and the successive vertical sets of ropes are 4½ in. between centres. On the top of each tower post is placed a steel

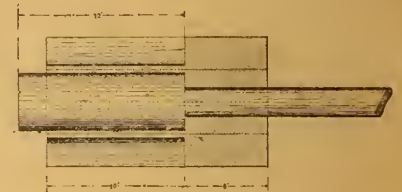
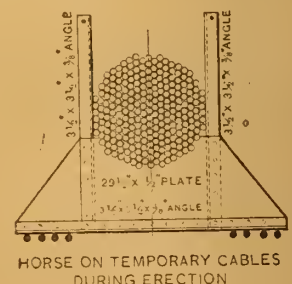


FIG. 3.

casting through which all vertical strains are transmitted, and on this casting rests a 20 in. steel pin. On this pin are set up 20 steel plates 2 in. thick, each plate measuring 10 ft. in the direction of the axis of the cable and weighing 9,255 lb. These several ropes of which the main cable is composed, when spread, pass between these several plates, being held in exact position by cheap cast-iron fillers between the ropes. These plates are machined to a true plane surface on the upper edges, and on these are placed a series of washer-plates on which the sockets at the ends of the cables bear. These washer-plates are 2½ in. thick by 16 in. deep, and the divisions come in line with the centres of the ropes. Each washer-plate is bored out for its whole depth on each side with half-holes slightly larger than the diameter of the ropes, and for a depth of 10 in. with half-holes of the diameter of the sockets (see Fig. 3). Each rope, therefore, passes through a round hole, one-half of which is bored in each adjacent washer-plate, and the socket fits into an enlargement of this round hole, bearing on the annular surfaces between the large and small cylinders. The series of washer plates are bound together by a steel tire shrunk around them. The large plates are bolted together with eight 5 in. bolts and sixteen smaller bolts inclined so as to pass between the ropes, all of these bolts screwing up against heavy cast-steel washers on the outside, the plates being kept at proper distances by cast-iron fillers. The entire strain in the cables is transmitted to the large steel plates through the washer plates which bear against them. In the large plates this strain is decomposed into a nearly vertical strain which passes through the 20 in. pin and the steel casting into the post, and a horizontal strain which is taken across the



top of the tower to the corresponding backstay connection. For convenience of construction and erection this horizontal strain is divided between two tension members, the lower one consisting of 19 bars, each 48 in. by 2½ in., and the upper of the same number of bars, each 15 in. by 2½ in., the strain being transmitted to the former by nine 5 in. pins, and to the latter by three 5 in. pins. The full details of this arrangement appear in Fig. 2. To erect the cable, carrier ropes will be placed above, on which the permanent ropes will be hauled out into place. Eight auxiliary ropes, the general position of which is shown in Fig. 4, will then be run through the unoccupied spaces outside of the

washer plates, and on these at suitable intervals a number of iron horses erected. These horses will serve to confine the cable. They are arranged in pairs and braced together, so that they will be stable and will afford room for men to stand and watch the laying of the ropes. The side washers, large plates, and the 19 lower ties will be put in position; but the spaces between the plates will be open above. The first washer plate will then be put in place and the first rope unreel and hauled across the river on the carrier ropes. As soon as it is hauled across the sockets will be dropped into their places in the washer plates. The first three ropes having been laid in this manner, the next washer plate will be put on as well as the necessary fillers; four other ropes will then be run in the same manner and the third washer plate put on. Five ropes will then be run and the fourth washer plate laid. This process will be continued until all the ropes have been laid and all the washer plates are in position, when the washer plates will be consolidated by shrinking on the steel tires. The insertion of the diagonal bolts can begin whenever all the ropes below any one of these bolts are laid. The upper 5in. bolts will be put in when the laying of the ropes is completed. When this is done the 19 upper tie-bars will be placed, bolted up, and the cables are made. By the use of the horses every rope can be put in its final position as fast as laid, and when each layer of ropes is completed men can be sent over them to make sure that they are properly laid, to paint them, and prepare everything in readiness for the next layer. The work is condensed as it goes on, and as soon as the last rope is laid each cable is practically complete.

(To be continued.)

PRESTON MASTER BUILDERS' ASSOCIATION.

THE seventh annual meeting of this Association was held at the Castle Hotel, Preston, on Wednesday in last week, when, in the unavoidable absence of Mr. John Walmsley, the president, Mr. T. H. Kellett, presided over a large attendance of members. The secretary, Mr. John Tomlinson, read the committee's report, which stated that during that time eight new members had joined, while four had been removed from the list for various reasons, so that the present membership was 69, the largest since the formation of the Association. Relations with the operatives had been very cordial on the whole. Disputes with individual employers had arisen, principally with respect to the apprentice rules, but in most cases they had been satisfactorily settled. In the bricksetters' new trade rules, which came into force in May last, some concession had been made by the operatives with reference to men employed on country work, but the restrictions were still harassing to Preston employers. The report was unanimously adopted, and the treasurer's accounts, which showed a fair balance to the credit of the Association, were approved. Mr. John Christian was elected president for the ensuing year, Messrs. T. H. Kellett and J. Cartmell vice-presidents, Mr. R. Croasdale hon. treasurer, Messrs. T. Cottam and W. Catterall hon. auditors, and a committee of two members from each branch of the trade was also appointed, with an emergency committee of five members, to deal with matters of urgency. The question of the undue limitation of apprentices in some branches was considered, and the matter referred to the employers interested to lay a proposal before the general committee. A cordial vote of thanks was passed to Mr. John Walmsley for his services as president during the last six years. After the meeting, about 40 members and friends sat down to dinner, the new president, Mr. John Christian, occupying the chair. Mr. T. H. Kellett proposed "The Town and Trade of Preston," to which Mr. J. White-side replied. In proposing "The Lancashire Federation of Building Trade Employers," Mr. W. Catterall said that a county organisation was very desirable to bring together the various local associations, and by keeping the large towns in touch with each other, enable them to adopt and carry out a more uniform policy to their mutual benefit. Mr. W. Cunliffe, of Bolton, the president of the Federation, responded. "The Preston Master Builders' Association" was proposed by Mr. Toftell, of Chorley, and was acknowledged by Mr. F. Marsden. Mr. W. Cooke, jun., proposed "The President and Officers," and Mr. John Christian, president, and Mr. R. Croasdale, hon. treasurer, returned thanks.

ADAPTABLE SPECIFICATIONS.—XIV.*

IRONFOUNDERS' AND SMITHS' WORK: FACTS AND MEMORANDA (continued).

WROUGHT IRON expands about $\frac{1}{12}$ th of its length when its temperature is raised from 32° to 212° Fahrenheit—that is, from the freezing point to the boiling point of water. Except in the case of fire, it is not often subjected to a change like this, of 180°; but it is often liable to a variation of half that amount from frost in winter and sunshine in summer. This is enough to cause a variation of $\frac{1}{4}$ in. in the length of a 20ft. rolled joist, and a repetition for years of even this amount of shrinkage and expansion will rack a building about considerably. It is not always enough, in order to counteract this, to leave a small space at the ends of a rolled joist or girder. The mere weight which rests on it may fix it down firmly enough to its bearings to insure its carrying the supporting walls with it in its movements, or, if these are too strong to be moved, then to bend the girder itself to a proportionate amount. It is desirable, therefore, that one end of a long girder should rest on small steel rollers, the other end being bedded on a level template or bearing-plate.

The safe dead load on wrought-iron rolled joists is commonly taken at one-third of the breaking weight. The makers' catalogues supply detailed information as to the estimated strength of various sections; but it may be convenient, for the purpose of preparing specifications, to give here a short table of some

cooled in water, are also required by the Admiralty to bear without injury being bent double by a press (not by hammering) to a curve of which the smallest radius is one-and-a-half times the thickness of the sample tested. Steel for rivets and bolts should not break with a tensile strain of less than 26 tons to the square inch, and should not resist more than 30 tons, and, before breaking, a sample 8in. long should elongate one-fourth—that is, 10in. The shearing strength of steel is only about three-fourths of its tensile strength, and steel rivets thus have to be made somewhat larger than iron ones. The specific gravity of steel for roof and girder purposes should be 7.9. Steel when worked at a blue heat—that is, from 600° down to 400° Fahr.—is not to be relied on, and steel rivets should by no means be allowed to cool anything between these temperatures before the work on them is complete.

The strength of mild steel rolled joists is more than 30 per cent. greater than that of rolled iron joists of the same size. The weight of steel, bulk for bulk, is about 2 per cent. greater than that of iron.

Oxidation of Iron and Steel.—Steel is more liable to corrosion than wrought iron, and wrought iron more so than cast. It has been said that the injury to them by oxidation is nearly in the ratio of 100 for cast iron to 125 for wrought iron, and 133 for steel. But this depends greatly on the position and on the galvanic action brought about by other metals in contact with the iron experimented on, as well as

SAFE DISTRIBUTED DEAD LOADS ON ROLLED-IRON JOISTS (IN TONS).

Depth in inches.	Width in inches.	Weight in pounds per footrun.	Clear Span between Supports, in Feet.							
			6ft.	8ft.	10ft.	12ft.	16ft.	20ft.	24ft.	28ft.
			tons.	tons.	tons.	tons.	tons.	tons.	tons.	tons.
3	3	10	2	1 $\frac{1}{2}$	1	1 $\frac{1}{2}$	1 $\frac{1}{2}$	2 $\frac{1}{2}$	2 $\frac{1}{2}$	2 $\frac{1}{2}$
4	3	12	3	2 $\frac{1}{2}$	2	1 $\frac{1}{2}$	1 $\frac{1}{2}$	2 $\frac{1}{2}$	2 $\frac{1}{2}$	2 $\frac{1}{2}$
5	4 $\frac{1}{2}$	23	8	6	4 $\frac{1}{2}$	4	3	2 $\frac{1}{2}$	1 $\frac{1}{2}$	1 $\frac{1}{2}$
6	5	29	12	8	7	6	4 $\frac{1}{2}$	3 $\frac{1}{2}$	2 $\frac{1}{2}$	2 $\frac{1}{2}$
7	2 $\frac{1}{2}$	14	6	4 $\frac{1}{2}$	3 $\frac{1}{2}$	3	2	1 $\frac{1}{2}$	1 $\frac{1}{2}$	1 $\frac{1}{2}$
8	4	22	13	9 $\frac{1}{2}$	8	6 $\frac{1}{2}$	5	4	3 $\frac{1}{2}$	2 $\frac{1}{2}$
8	5	29	15 $\frac{1}{2}$	11 $\frac{1}{2}$	9	8	6	4 $\frac{1}{2}$	3 $\frac{1}{2}$	3 $\frac{1}{2}$
8	6	34	18 $\frac{1}{2}$	14	11 $\frac{1}{2}$	9 $\frac{1}{2}$	7	6	5	4
9 $\frac{1}{2}$	4 $\frac{1}{2}$	29	19 $\frac{1}{2}$	14 $\frac{1}{2}$	12	10	8	6	5	4 $\frac{1}{2}$
10	4 $\frac{1}{2}$	32	21 $\frac{1}{2}$	16 $\frac{1}{2}$	13	11	8 $\frac{1}{2}$	6 $\frac{1}{2}$	5 $\frac{1}{2}$	4 $\frac{1}{2}$
10	6	56	33 $\frac{1}{2}$	25	20	16 $\frac{1}{2}$	12 $\frac{1}{2}$	10	8 $\frac{1}{2}$	7
12	5	42	36 $\frac{1}{2}$	27 $\frac{1}{2}$	21 $\frac{1}{2}$	19	13 $\frac{1}{2}$	11	9	7 $\frac{1}{2}$
12	6	56	45 $\frac{1}{2}$	33	27	22	16 $\frac{1}{2}$	13	11	9 $\frac{1}{2}$
14	6	60	51	38	30 $\frac{1}{2}$	25 $\frac{1}{2}$	19	15	13	11
16	6	62	62	46 $\frac{1}{2}$	36 $\frac{1}{2}$	31	23	18	15	13

Steel.—Steel is a compound of iron and carbon, containing much less of the latter element than cast iron does, though considerably more than is found in good wrought iron. Mild steel consists of from 150 to 300 parts of iron to one of carbon. There is some difficulty in drawing a hard-and-fast line between mild steel and wrought iron. But the characteristic properties of steel, as such, consist in the effects of heating and cooling on it. If hard steel is heated red-hot and suddenly cooled it becomes harder and very brittle, which is not the case with wrought iron similarly treated. Then, if the steel thus rendered brittle is heated to a less degree and slowly cooled, it is softened again. This process is called tempering, and it distinguishes steel from cast iron, which is hardened when heated and chilled, but is not softened again by reheating and slow cooling. How it is that steel conducts itself in this way when iron with more or with less carbon in it refuses to do so is a matter which does not seem as yet to have received a full scientific explanation.

It is easy to obtain steel with much greater tensile strength than wrought iron—say, from 25 up to 60 tons or more per square inch of section. But whereas the samples breaking with 25 tons or thereabout will withstand sudden stresses, and will elongate one-fifth before they break, those of a much higher strength will snap suddenly. They are, therefore, not so safe against unexpected shocks and jars, and for shipbuilding the Admiralty specify an ultimate strength against tension of not less than 26 tons and not more than 30 tons per square inch. It is usual to test pieces 8in. long, and to provide that these must not stretch less than 20 per cent. before giving way by direct tension. The material must stand the pull of at least 26 tons per inch, either along the grain or across it. The test strips, 8in. long and 1 $\frac{1}{2}$ in. wide, after being heated uniformly to a low cherry-red, and then

by impurities and variations in the composition of different parts of that iron itself. Before being painted, wrought ironwork should be cleared of scale by brushing and scraping. Pure red lead (which is rather difficult to obtain) used as oil-paint is recommended for the first coat. Paints composed of iron ore in the form of rust or sesquioxide are also good, but apparently not quite so good. The Barff process, by which, through the agency of heat and steam, the surface of the iron is covered with a skin of unalterable magnetic oxide with a metallic lustre, has not in practice given the complete protection which was hoped for from it. The protecting skin is liable to be cracked by the strains which affect the metal, and then rust creeps in at the hair-cracks so produced, and in time spreads below the protecting surface. Small articles of wrought iron are sometimes protected against rust by first well brushing to remove scales, then raising to a temperature rather below that of melted lead, and at once dipping in raw linseed oil, or rubbing with wax. Cast iron has by nature a partially rust-resisting surface of silicate of iron, which is better not removed.

Iron Cement.—Quick-setting iron cement is composed of 80 parts (by weight) of iron filings or borings, two parts of flowers of sulphur, and one of powdered sal ammoniac, made into a paste with water. Slow-setting iron cement is made of 200 parts of iron filings, nine parts of sal ammoniac, and one part of flowers of sulphur. For joints in iron gas-pipes, equal parts of red and white lead, made up with linseed oil, form a cement which is much in use.

SPECIFICATION, PART IX.: SMITH'S AND IRON-FOUNDER'S WORK.

IX. 1. QUALITY AND WORKMANSHIP OF CAST IRON.—The castings shall be clean, sharp, and sound, both externally and internally, and shall be carefully fettled and smoothed. They shall be free from scabs, blow-holes, honeycombing,

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twists, and all other defects. No stopping up or plugging is on any account to be permitted. The metal shall be of such a mixture that a bar 1 in. square and 4 ft. 6 in. between its supports shall not break with a less weight than 550 lb. in the centre. All joints and bearing surfaces are to be planed to an even face. The metal is to be uniformly tough and close-grained, and a bar 2 in. square must bear, without breaking, a tensile strain of 16,000 lb. to the square inch. The whole of the castings are to be of the exact forms and dimensions shown on the drawings. All columns are to be cast vertically and in dry sand, and for the purpose of ascertaining the thickness of the metal small holes shall be drilled where directed by the architect. The thickness of metal shall be uniform in all parts of the circumference.

IX.2. QUALITY OF CAST IRON (alternative).—The castings are to be made from good soft grey pig-iron of the second melting, and not run direct from the blast furnace. They are to be sound and clean and of the exact sizes and shapes shown on the drawings. The columns are to be cast upright, and will be rejected if any part of the circumference is found to be as much as 10 per cent. thinner than it should be according to the drawings or specifications. All bearings are to be planed smooth.

IX.3. QUALITY AND WORKMANSHIP OF WROUGHT IRON AND ROLLED IRON.—All structural wrought and rolled iron is to be of "best" quality, unless otherwise specified, and must bear the following strains:—Iron for plates must not break with less than 20 tons to the square inch of area, and must show a reduction of area at the place of fracture equal to at least 10 per cent. Angle iron and Γ iron must not break with less than 21 tons to the square inch, and must show a reduction at the point of fracture equal to at least 12½ per cent. Rivet iron must not break with less than 22 tons to the square inch, and must show a reduction at the point of fracture equal to at least 20 per cent., and in the form of a bar ½ in. thick it must bear crushing double when cold without cracking.

All bolt and rivet-holes must be accurately marked from templates, and all rivet-holes are to be carefully drilled. All rivet-heads to be of the proper size, and accurately shaped, with the two ends bedding truly on the plates, and their centres coinciding with the centre of the rivet.

All bolts and nuts to have strong and clean threads cut on them, of uniform pitch, and all heads exposed to be hexagonal, unless specially shown or specified to be otherwise. All screwed work to have proper internal as well as external threads.

IX.4. QUALITY OF WROUGHT-IRON WORK (Alternative).—All wrought iron is to be at least of the quality known as "best" Staffordshire, similar to the quality marked "B" by Messrs. Thornycroft. All wrought-iron work is to be clean and neatly and soundly finished and free from all defects, and is to be submitted to and approved by the architect before being fixed.

IX.5. QUALITY OF STEEL.—The steel for the rolled joists, girders, pillars, and other structural parts of the work specified to be in that metal is to be the best mild steel, capable of bearing the following tests:—When tested in a bar 8 in. long, it shall not break with a tension of less than 26 tons to the square inch, nor with more than 30; the contraction of area at the point of fracture shall be at least 40 per cent., and it must stand these tests either along the grain or across it. The strains in testing are to be gradually, and not suddenly, applied. Steel rivets, when cold, must bend double on a radius of half their diameter without cracking, and when hot must bend closely double without cracking.

IX.6. WORKMANSHIP OF STEEL.—All plates, bars, and rods required to be bent are to be bent cold if practicable. If this is impracticable in any case, as little as possible is to be heated; but no work is to be done on steel at a "blue heat"—that is, from 400° to 600° Fahr. The steel is not to be hammered cold. Steel which has been heated for the purpose of working on must be annealed over the whole piece which has been worked on. All bending required is to be effected by compression, and not by hammering.

IX.7. EAVES GUTTERS.—Put to the following roofs, namely stout, cast-iron moulded eaves gutters, . . in. deep and . . in. wide, of a stock section to be selected by the architect. Provide and fix to them all mitres, mitre-stopped ends, bends, and outlets (with sockets and galvanised-iron wire gratings over them), which are shown or implied by the drawings. The joints are to

be made perfectly watertight. Put to the following roofs, namely 4 in. by 3 in. stout, half-round, cast-iron eaves gutters, with mitres, junctions, &c., as in last item, and similarly jointed.

IX.8. RAINWATER PIPES.—Provide and fix wherever shown on the drawings, or required, stout [square, 4 in. by 3 in.] [round, 4 in.] [round, 3 in.] cast-iron rainwater pipes, strongly fixed to the walls by neat iron fastenings approved by the architect. [Provide to each an ornamental head, 8 in. by 9 in., and 15 in. deep, to detail, and provide the sum of £2 for pattern.] [Provide to each a head to be selected by the architect, value p.c.] [Provide to each, in place of a head, a cast-iron swan-neck pipe, 3 ft. 6 in. long, to detail, and of the same section as the rainwater pipe; and connect by means of it each rainwater pipe, with the eaves gutter.] Put to each rainwater pipe a neat cast-iron shoe, discharging over a gully.

IX.9. STRAPS TO EAVES GUTTERS.—To prevent the eaves gutters from being forced away by snow-slides from the fascia to which they are fixed, put round them, at an average distance of 4 ft. apart, wrought-iron straps, 1½ in. by ½ in., and 5 ft. long, with both ends strongly screwed to the spockets or common rafters, below the slates.

BUILDING CONSTRUCTION.*

OUR English books on construction scarcely keep pace with the output of architectural and building literature which comes from New York. We are content to write monographs or special treatises on some one subject; but the American author or book compiler is more ambitious, and brings out a huge volume, or series of volumes, which exhausts the whole subject. One of these comprehensive treatises on "Building Construction and Superintendence"—a wide subject certainly—is launched forth on the architectural book-market. Part I., which comprises the present volume on "Mason's Work," is intended to be a "Textbook and guide to the materials used in architectural masonry, and the most approved methods of doing the various kinds of work, and incidentally to point out some of the ways in which such work should not be done, &c." Mr. F. E. Kidder, C.E., Ph.D., architect, the author of this volume, is no doubt right in saying that there is a demand for such a work in America. The author has drawn largely on his own experience as a practising architect in the Eastern and Western States, but has also given the advice and experience of other architects. Indeed, we can hardly imagine a work of this comprehensiveness being undertaken by one person, however experienced. As far as we are able to judge from a general and hurried survey of the volume, we must speak generally in its favour. The order of the subjects, "Foundations on Compressible Soils," "Masonry Footings and Foundation Walls, Shoring and Underpinning," "Limes, Cements, and Mortars," "Building Stones," "Cut Stonework, Brickwork, Terracotta, Fireproofing, Lathing and Plastering, Concrete Construction, Specifications," &c., each chapter subdivided into sections and paragraphs, shows the scope of the book; each subject is illustrated by diagrams and sketches. One merit of Mr. Kidder's work are the remarks on superintendence, which has been neglected by most writers, and on the *modus operandi* of setting out work. Thus "Staking-out Buildings" is treated in the first chapter. Attention is also given to the foundations of high buildings, the mode of planking for platforms, grillage systems used at Chicago, and plans and sections of the foundations used at the Manhattan Insurance Building, New York, are illustrated. The methods of caissons, and of determining the size of steel beams for distributing the load of walls, &c., are described. The practical calculations for finding the sizes of cross-beams, and for steel beams, are useful in this connection. In the chapter on "Masonry Footings, Shoring and Underpinning," the various methods in use are discussed and illustrated by numerous diagrams. Area and vault walls, inverted arches, the various bonds used in stone walling, dampness, shoring and underpinning are fully treated. Building stones receive a large share of attention, also cut stonework for different purposes, arch-work, facework,

ashlar, jointing, dowelling, and the measurement of stonework. Chapter IX., on "Fireproofing," treats very fully of every method employed in protecting buildings from fire and heat. The method of floor-construction and the various patents are explained, and sections of every typical floor illustrated. One of the best forms is the "Excelsior" dense tile-arch—a floor of great strength, and largely used in Chicago. Fireproofing steel columns is illustrated by the method used in the "Fair" Building, Chicago. The "Fawcett" ventilated fireproof floor, Ransome and Smith's floor, the "Roebling" floor, the Columbian and Metropolitan systems, &c., are described and illustrated. The chapter on iron and steel skeleton construction, as used in the States, and lathing and plastering and sheet-metal laths of various kinds will be found of interest. Another volume on timber woodwork, roofing, painting, and other trades is in preparation, and in both specifications are appended. Mr. Kidder's work is a valuable handbook of the materials and methods adopted in modern building construction.

TILES AND ARCHITECTURAL FAIENCE.

MESSRS. CARTER AND CO., manufacturers of encaustic and other tiles, of Poole, Dorset, have just opened new offices and showrooms at 43, Essex-street, Strand, W.C., where they have on view a few samples of their excellent manufactures. The tiles and constructional faience of this firm are well known by our readers for their admirable quality and artistic design and colour. On our visit to the new showrooms we noticed, among other examples, some admirable dado designs in delicate tones of greys, greens, and buffs, which show a great improvement in design. The hand-painted panels representing scenes of local interest, which have been fixed by Messrs. Carter and Co., are worth notice; the subjects "Old Bartholomew Fair," "Little Dorrit," "Swearing on the Horns," an old custom preserved at Highgate, Shakespearean subjects, are well painted and executed. We notice, also, some admirable constructional faience, a design for a recessed fireplace, pilasters and capitals, and trusses in nice colours. The friezes in relief are effective, also a dado in which the tiles represent rusticated masonry. Some very decorative patterns of mosaic pavements, fireplace and hearth tiles and glazed wall tiling, enamelled, embossed, and hand-painted, some with embossed centre panels for lavatories, &c., are to be seen. The "Petrus" tiles made by this firm have been extensively used, and the prices are very moderate.

CHIPS.

About £420 has been subscribed towards placing a stained-glass window in Winchester Cathedral as a memorial of the late Bishop Thorold.

A Wesleyan Chapel is about to be built in Cardigan-lane, Leeds, from plans by Mr. G. F. Danby, of Great George-street, Leeds.

On Sunday the new steel bridge which carries the G.N.R. line across the Nene Valley at Peterborough was moved into its position.

The partnership heretofore subsisting between A. J. Gordon and D. Brown, architects, of Whitehall-court, S.W., under the style of Brown and Gordon, has been dissolved.

The Portsmouth School Board are about to erect a new board school giving accommodation for 1,300 children, according to the plans prepared by their architect, Mr. G. C. Vernon-Inkpen, F.S.I., Whittington Chambers, Southsea, and approved by the Educational Department.

St. Paul's Congregational Church, Newcastle-on-Tyne, is about to be reset, which, with other improvements and the addition of new vestries, will cost £1,000.

To facilitate the traffic arrangements in Manchester, the Great Northern Railway Company are about to construct a short link of railway in that city only 15½ chains in length, commencing by a junction with the railway of the Cheshire Lines Committee at or near Beaufort-street, and terminating on the north side of Great Bridgewater-street. The contract will be let early in November.

The clerk to the Hebden Bridge Urban District Council has received a communication from the Local Government Board sanctioning their scheme of sewerage and sewage disposal, for which application was made by the Council to borrow £17,000. The scheme included the purchase of a plot of land, at a cost of £3,600, at Rad Acre, just beyond the Council's boundary, and within the district of Mytholmroyd Urban Council, who strongly opposed.

* Building Construction and Superintendence. By F. E. KIDDER, C.E., architect. New York: W. T. Emstock. London: Gay and Bird.

OBITUARY.

MR. FREDERICK JOHN FRANCIS, F.R.I.B.A., formerly of Palmerston Buildings, Old Broad-street, E.C., and Warwick-crescent, Paddington, died on Saturday last at St. Michael's Vicarage, Sydenham, aged 78 years. In conjunction with his younger brother, Mr. Horace Francis, he carried out a large number of important works, including the original building of the Hospital for Consumptives at Brompton; the Warwickshire County Lunatic Asylum; National Discount Co.'s building in Cornhill; the City Offices Company in Clement's-lane, Bishopsgate-street, and Lombard-street; Christ Church, Lancaster-gate, W., and numerous provincial banking premises for the London and County Bank Co., including those at Romford, Croydon, Oxford, Cambridge, and Bishop's Stortford. In conjunction with Mr. Ebenezer Saunders, Messrs. Francis Brothers carried out the Hotel Metropole and the Grand Hotel in Northumberland-avenue, and other buildings. Mr. F. J. Francis was one of the senior members of the Royal Institute of British Architects, having joined as an Associate in 1841; he became a Fellow in 1857.

MR. WILLIAM H. WHITE, for the past 18 years the Secretary of the Royal Institute of British Architects, died on Tuesday at 4 a.m., aged 58 years. Mr. White was a considerable contributor to architectural literature, and in past years to our own columns. The funeral took place at Nunhead Cemetery, on Thursday, at 12.30 p.m.

MR. GEORGE ARTHUR FRIPP, the veteran water-colour landscape artist, died on Saturday at his residence in Holmedale-road, N., in the 84th year of his age. Mr. Fripp's earliest work was in oil-colours, one of his chief efforts in this medium being the large "Mont Blanc," now hung in the Walker Art Gallery at Liverpool. Mr. Fripp afterwards joined the Old Water-Colour Society, and for very many years contributed regularly to the exhibition in Pall-Mall delicate and refined examples of British scenery executed in permanent and quiet-toned pigments. A number of his drawings are hung on a screen in the Prescott-Hewitt bequest at South Kensington Museum. Mr. Fripp may be said to have inherited water-colour art, for he was the son of the Rev. S. C. Fripp, a member of an old Dorset family, who married a daughter of Nicholas Pocock, one of the original members of the Old Water-Colour Society at its foundation in 1804. From 1848 till 1870 Mr. Fripp acted as secretary of the Old Water-Colour Society, a post in which he was succeeded by his younger brother, Mr. Alfred D. Fripp, who retained the position until his death in March of last year.

SIR JAMES RAMSDEN, of Furness Abbey, the maker of Barrow-in-Furness, died on Monday, aged 74. He was son of the late William Ramsden, C.E., and was trained as an engineer. At 22 he was appointed locomotive superintendent to the Furness Railway Company, then in process of formation. For upwards of 50 years he was actively connected with the Furness Railway, having been a director from 1866, a position which he only resigned last year. In 1857 the deceased projected the Barrow Steel Company, for the manufacture of Bessemer steel. The design was carried into execution, the company was formed, and large works were erected for the conversion of the ore into axles, tires, and rails. In 1858, by the purchase of the mines and furnaces of Messrs. Schneider and Hannay, then being worked, smelting and mining were added, the two processes being undertaken by an amalgamation of companies under the title of the Barrow Hematite Steel Company, Mr. Ramsden being retained as managing director of the new company. The impetus given to trade by the development of the manufactures of the town led to its incorporation, and in 1867, at the first council meeting, Mr. Ramsden was elected mayor, it being due to his individual exertions that the charter of incorporation had been obtained. Prior to the change in its local government, steps had been taken for the construction of docks adapted to the growing requirements of the town. The suggestion emanated from Mr. Ramsden, and the scheme having been perfected by him, it was adopted by the Furness Railway Company. Work was commenced in 1864, and in 1867 the first portion, the Devonshire Dock, 33 acres in extent, was opened; the Buccleuch Dock, 35 acres, followed, and this was afterwards supplemented by the construction of the Ramsden Dock of 78 acres, and the Cavendish Dock of

250 acres. In 1869 Sir James brought forward a plan for the erection of flax and jute mills. A company was formed, the mills were erected, and a profitable trade was soon established. In May, 1872, a bronze statue of him by Noble was unveiled at Barrow, its cost having been borne by the townfolk.

MR. JAMES HENRY GREATHEAD, M.Inst.C.E., the inventor of the well-known shield bearing his name, which has so greatly facilitated tunneling operations, died on Wednesday last at Ravenscraig, Leigham Court, near Streatham. The shield was first used in the tunnel under the Hudson River (a work since abandoned for financial reasons), and having been improved, has since been employed in the construction of the underground works of the City and South London Railway, the Blackwall Tunnel, and the City and Waterloo Railway, both now nearly completed, and the Central City Railway, and other lines in progress.

THE sudden death is announced, at the age of 49, of Mr. RICHARD SAPIOTE, a member of a well-known firm of builders of that name in Camden-street, Birmingham. He was at business a few days before his decease; but an obstruction in the alimentary system, suddenly manifested, necessitated an operation, from which he never rallied. He was born in the city, educated at King Edward's School, afterwards entering his father's business, of which he was one of the principals for many years. The first portion of the Municipal School of Art, the Old Meeting Church in Bristol-street, the Lea Memorial Church at Summerfield, and many church buildings and extensions, were built by his firm, while the Municipal Technical School in Suffolk-street and the high school for girls in New-street, now near completion, are among the buildings on which he has recently been engaged. He leaves a widow and an infant son.

By the sudden death of Mr. BENJAMIN HOPE, of Portland Villa, Clarence-crescent, Sidcup, that now populous neighbourhood has lost one of its pioneers. The deceased, who was aged 53, and whose demise was due to *angina pectoris*, was the son of Mr. William Hope, of Frittenden, Kent, and about twenty years ago he commenced business at Sidcup as a builder, the place at that time being chiefly fields with a few old-fashioned cottages dotted here and there. Mr. Hope was soon busily engaged in connection with the erection of villas and residences, the most important work which he undertook and carried out being the Sidcup Hospital. He leaves a widow and family.

On Saturday the foundation-stone of the new church of St. Augustine, Derby, was laid by Lord Burton. The church, which is an offshoot of St. Chad's, is to cost £4,500, being of red brick with stone facings. The amount already subscribed is £1,450, and it is proposed to erect a portion of the edifice now and complete the work when funds permit.

A public meeting of ratepayers in Bournemouth authorised on Monday the promotion of a Bill to acquire two acres of common land in the centre of the town for £8,000 for the erection of new municipal buildings and a free library, and to lease several acres adjoining at a nominal rent of £5 for additional pleasure grounds.

The monument erected in a beautiful situation on the Rhine to the memory of the Empress Augusta by the city of Coblenz was unveiled on Sunday in the presence of the Empress Frederick.

No better evidence could be obtained to show the activity in the property market in the West Riding during the present year than the fact reported to the County Council of the Riding at its meeting on Wednesday week, viz., that 2,630 more deeds had been registered from January to August last than in the corresponding period of 1895. This large and sustained increase indicates a degree of movement not approached for some years, and also proves the increasing favour with which property is regarded as an investment.

Mr. Lionel Cust, the director of the National Portrait Gallery, announces that the attendance of visitors at that gallery for the first six months from the opening day has already exceeded the highest total recorded during a whole year, while the collection was at South Kensington, in spite of two days in the week being now set apart for students with a 6d. admission for the public. The number of visitors from April 4 to October 3 inclusive is 168,739. The highest total for a whole year at South Kensington was 146,187 in 1883—that being the year of the International Fisheries Exhibition in the immediate vicinity of the gallery.

COMPETITIONS.

JAMAICA (GOVERNMENT BUILDINGS).—The President of the Royal Institute of British Architects has been requested by the Secretary of State for the Colonies to nominate three or four architects of good reputation who will undertake to prepare designs, working drawings, specifications, and estimates for proposed Government Buildings at Kingston, Jamaica. The architect who may be selected will have to visit Kingston, and attend the committee there with reference to the general plans and architectural character of the designs. He will subsequently be required to furnish to the Government full and detailed working drawings and specifications for the construction of the buildings. The remuneration of the selected architect for the work will be 2½ per cent. on the estimated cost, which is not to exceed £100,000. Architects desirous of being nominated are invited to send in their names, with particulars of their work and experience, to the Acting Secretary R.I.B.A. before to-morrow (Saturday), the 24th.

CHIPS.

The Argentine Government propose to spend three millions sterling on improving the ports of Rosario and Santa Fé.

By the Staines Reservoirs Act of last session a committee was formed, composed of three representatives from the West Middlesex, the New River, and Grand Junction Water Companies, for the purpose of drawing water from the Thames at Bell Weir, above Staines, and storing it in large reservoirs for the use of the three companies. The reservoirs, when completed, will hold 2,500 million gallons of water. It is intended to push on the works with all possible expedition.

At the Auction Mart, Tokenhouse Yard, but little business was done last week, the aggregate of sales being recorded at £27,016, against £40,242 for the corresponding week last year.

A new board school is approaching completion at Llanrwst, in the Vale of Conwy. The contractors are Messrs. D. Williams and Son, of Carnarvon.

The memorial stones of a new Wesleyan chapel, which is to seat 800 persons, and cost £5,000, were laid on Wednesday at Ilkeston.

The question of workhouse accommodation in Liverpool was discussed by the select vestry on Friday, and reports by three local architects—Mr. Edmund Kirby, Mr. Henry Hartley, and Mr. W. Willink—were submitted. The estimates varied from £12,000 to £45,000, and as one report was submitted in print it was decided to have the others printed also.

Mr. Shaw, surveyor to the Todmorden Urban Council, has, out of 109 applicants, been appointed surveyor to Ilford Urban District Council, Essex, at a salary of £400 a year, with an advance of £10 per year up to £450.

The foundation-stone of a permanent Marine Biological Station at Millport, on the Island of Cumbrae was laid on Saturday. The station is within 100 yards of Keppel Pier, and has within its grounds the "Deil's Dyke," a typical example of an intrusive stratum. The building will include a museum 50ft. by 30ft., two workrooms for students, each 4ft. 6in. by 7ft., and a keeper's room. The architect is Mr. Macgregor Chalmers, of Glasgow, and the cost of building will be £1,500.

The town council of Edinburgh have formally approved of a new Parliamentary Bill to be introduced next session, in order to obtain powers to acquire Castle-terrace as a site for the Usher Hall, for the reconstruction of North Bridge-street, the transfer of Portobello Gas Works to the Edinburgh and Leith Gas Commission, the acquisition of the Northern Tramways, and the erection of a chief fire station on the site of the cattle market.

The German Emperor and Empress unveiled on Sunday a memorial to the late Emperor William I., erected at Porta Westphalica. The site is the summit of the Wittekindsberg, on the left bank of the Weser, and forming with the Jacobsberg opposite the narrow defile known as the Porta Westphalica. The memorial comprises a semi-circular terrace 130 yards in diameter, surrounded by a massive parapet. On this stands another terrace 42ft. high and 48 yards in diameter, approached by a flight of steps on either side, and bordered by two circular towers rising from the lower platform. The Emperor's statue is on this upper terrace under a stone cupola surmounted by a crown, and resting on six pillars. Emperor William is represented in cuirassier uniform, with a laurel wreath on his head, and with the right arm extended.

At a meeting held in the Liverpool Town Hall on Monday to promote the construction of new schools for the blind upon a site presented at Wavertree, donations to the extent of £12,480 were announced.

Building Intelligence.

BELFAST.—The scheme for rebuilding the old parish church of Belfast—a pseudo-Classic brick edifice, erected in 1774—so as to serve as the cathedral of the United Diocese of Down, Connor, and Dromore, is assuming practical shape. In the appeal for further help just issued, the committee state that they nominated as joint architects Mr. Thomas Drew, of Dublin, and Mr. W. C. Lynn, of Belfast. After conference and consultation, they agreed upon the general features of the proposed church. Mr. Lynn subsequently, however, while expressing his willingness to continue to advise generally in the matter, elected to leave the more responsible duty of preparing the design for the building in the hands of Mr. Drew. Having done this, he requested, as a point of professional etiquette, that Mr. Drew's name alone should appear in connection with the drawings and report. In this decision the committee had reluctantly to acquiesce. Mr. Drew's suggestions, if carried out, will give, as the first instalment of the work, the nave with north and south aisles. This, with the lower portion of the central tower, which can be roofed in so as to form a temporary chancel or choir, will serve as a commodious parish church, and also supply to a great extent the more elaborate wants of a cathedral. At a future time, when funds are available, the transepts, chancel, and other requisite buildings can be added, all which will be in accordance with the general lines indicated on the plan. Accommodation will thus be provided for a congregation of 2,500, for complete cathedral services, and a full cathedral establishment. Meanwhile, the first part of the building will be as large as the Ulster Hall, and of a character very similar to the nave and side aisles of St. Patrick's, Dublin, or of one of the smaller English cathedrals. The cost of this instalment Mr. Drew estimates at from £25,000 to £30,000, exclusive of foundations. Towards this sum £4,150 has been subscribed, and a peal of bells to cost £2,000 has also been promised to be supplied when the tower is ready to receive them. Mr. Drew's designs and plans show a cruciform church, Early Decorated in style, with a nave of seven bays, 30ft. wide, and 122ft. 6in. in length, north and south aisles, wide and short transepts, 100ft. across, and short chancel. The only tower will be a central one, 42ft. 6in. square outside measurement, and about 200ft. high to battlements. The nave and aisles will eventually be groined. The building which it is proposed to erect will be technically the parish church of Belfast; but it will be so arranged, even in its incomplete state, as to accommodate the deans and chapters of the three united dioceses.

BILSDALE, MIDGABLE.—On Monday last the Archbishop of York consecrated the new church of St. John at Bilsdale, Midgable. The style adopted for the building, which is of local stone, is Early 14th-century Gothic. The plan consists of a nave and chancel, with north aisle and sacristy and a western tower with traceried spire. The internal ceiling of the nave and chancel is of barrel form, divided into panels with ribs and bosses. The east window is filled with some very fine glass. The church is built from the designs, and under the supervision of, Mr. Temple Moore, at the sole cost of the Earl of Faversham. The contractor for the work is Mr. William Brotton, of Bilsdale.

CHESTER-LE-STREET.—The new bank which has been erected for Messrs. Lambton and Co., of Newcastle-on-Tyne, was opened for business on Thursday, the 15th inst. The buildings comprise bank, with manager's room, strong-room, &c., shop, and residence of 11 rooms for the manager. The front is faced with T.L.B. bricks from Messrs. Lawrence, of Bracknell, and the dressings are of Prudham stone. The woodwork of the bank portion is of Austrian wainscot, including the fittings. The general contractor has been Mr. Christopher Groves, of Chester-le-Street. The whole has been carried out from the designs and under the superintendence of Mr. John W. Dyson, M.S.A., architect, of Newcastle-on-Tyne.

LINCOLN.—The Dean and Chapter have just issued a statement as to the work accomplished since 1888 in the substructural repair of the Minster, and on certain internal restorations and fittings. By the generosity of Mr. Shuttleworth eight houses have been removed at the north-eastern corner of the Minster-yard, opening out

a new and striking view of the Minster for its whole length, and that without even a temporary charge on the Chapter funds. The outlay was £8,840. During the past five years over £28,400 has been expended under the direction, first of the late Ewan Christian, and then of Mr. J. L. Pearson, R.A. Of this sum £12,771 9s. was contributed by the Ecclesiastical Commissioners from the special Cathedral funds in their hands, and now entirely exhausted. It was expended in the following works, carried out by Mr. John Thompson, of Peterborough: Restoring Chapter House without and within; rebuilding and repaving cloisters; restoring from ground to roof north-east transept, north side of ritual choir, and east and north sides of great north transept; renewing the base-mouldings of west side of great north transept; and building new staircase to library. Other works executed from general funds were general substructural repairs to fabric, also carried out by Mr. Thompson at a further cost of £3,360, and a central figure, placed in the south porch, and carved by Mr. N. Hitch. Special contributions have provided for new altar furniture and carpets in choir, provided at a cost of £909; figures for choir-stall niches, £663; clerestory windows in choir, nearly £330; enrichment of Bishop's throne, £268; stalls and benches in choir, £648; improvements to organ, £275; restoration of morning chapel, £375; new roof and works of restoration in Fleming Chapel, £616; lectern for nave, £95; altar and its furniture in retro-choir, £175; and clock for north transept, £53. Six memorial windows were placed in the Chapter House at a cost of £900. In addition to these there was expended on the memorial to Bishop Wordsworth £2,143, that to Dean Butler £590, and in the restoration of Queen Eleanor's Tower, borne by Mr. Rusten, £684 6s.

LIVERPOOL.—The Lord Mayor of Liverpool recently opened a new free library and technical school that have been erected at Everton, in the north end of Liverpool. The buildings are situated off St. Domingo-road, Everton. They have been erected on a triangular piece of land, of about 700 square yards, which remained in hand after the carrying out of street improvements. The scheme provides accommodation for a district library and a technical school, the former occupying the ground floor, and the latter the first floor and the basement. The library is entered from St. Domingo-road, and includes a general reading-room, a room for ladies, another for boys, and a lending library. Entrance to the technical school is gained at the junction of St. Domingo-road and Beacon-lane, and there is accommodation in the basement for three classrooms, and on the first floor for two. The round of instruction will include the building, engineering, and metal trades, mathematics, electricity and magnetism, freehand and model drawing, and machine construction and drawing. The exterior of the structure is in the English Renaissance style. Messrs. Paterson, of Soho-street, were the contractors for the building, and Mr. Joseph Anderson has acted as clerk of works. The plans were prepared by the architectural staff of the corporation surveyor (Mr. T. Sheldermine), under the direction of Mr. James B. Hinks, the assistant architect.

RASHCLIFFE, HUDDERSFIELD.—New infants' schools are being added to the group of buildings opposite, and belonging to, St. Stephen's Church, Rashcliffe. The new building will have accommodation for 185 children. It consists of a central hall 31ft. 6in. by 24ft., and two classrooms providing accommodation for 30 children each, and a babies'-room for 50 children, whilst there will be 75 places in the central hall. The divisions between the classrooms and hall will be movable glazed partitions, so that all the rooms can be thrown into one for large meetings. There will also be a cloakroom and lavatory. The principal entrance will be from Bland-street. All the internal joiners'-work will be of pitch-pine, varnished. The school will be heated with hot water on the low-pressure system. The building will be Gothic in design, in keeping with the church. The accepted tenders for the work amount to £1,510. The plans have been prepared by Mr. J. Berry, architect, 9, Queen-street, Huddersfield. The ceremony of laying the corner-stones of the school took place on Saturday last.

SOUTHPORT.—The memorial stone of the rebuilt schools for Holy Trinity parish was laid with Masonic ceremony last week by the Earl of

Lathom. The schools have been rebuilt as far as possible on the lines of those burnt down last January, though not without some difficulty, considering the requirements which the Educational Department and the local authorities insist upon. The new premises vary from the old ones in having a well-lighted half-basement, which will be used for a drill-hall, with lavatories, cloakroom, and heating apparatus, &c. In addition, a cookery room is provided for the girls. The ground floor is approached by a flight of eight steps from a spacious and well-lighted vestibule, which gives entrance to the large hall. This hall is of considerable size, and measures 78ft. long by 33ft. 6in. wide. It is capable of further extension by the removal of a screen at one end, and has altogether a very fine appearance. The timbered roof, supported by seven elliptical principals, and the seven large traceried windows are filled in with tinted glass. The room will be available not only for school purposes, but also for tea meetings, lantern lectures, &c. The boys' school and classrooms, together with the infant school, are on this floor. Two stone staircases give access to the girls' school, which is situated on the first floor. The style is Late Gothic, and will correspond with the new church. The school is built of Blackburn bricks and Bath stone dressings and tracery. Internally no plaster is used, the bricks being pointed with white mortar. Bangor slates will be used for the roofs. The architect is Mr. Huon A. Matear, F.R.I.B.A., Liverpool, and the work is being carried out under his supervision by Messrs. Duxfield Brothers, Virginia-street, Southport.

ST. MARGARET'S, ISLEWORTH.—The new church of St. Margaret, the memorial stone of which was recently laid by the Bishop of Marlborough, is to be erected at the corner of North-cote-road and Halliburton-road. When completed, it will be of the following internal dimensions—133ft. from east to west, and 54ft. from north to south, and 54ft. from floor to ridge of nave roof. It will seat 750 adults, and will consist of nave and chancel, with north and south aisles, vestry and organ-chamber, with heating vault under, morning chapel, and semi-octagonal baptistery. There will be two porches at the western end, and also an entrance at the south-east corner of the nave; and there will also be a lofty clerestory on an arcading of five arches, springing from quatrefoil columns. The building is to be in the Early English style, and is being carried out from a design and under the personal superintendence of Mr. Edward Monson, F.R.I.B.A., of Acton Vale, W. The walls are to be built with bricks, faced externally and internally with red T.L.B. bricks from the Bracknell Works, and will be relieved with dressings of Bath stone and bands of blue Staffordshire pressed facing brick, red diaper bricks, with red moulded strings and labels. The roofs are to be of yellow deal, constructed on the hammer-beam form, double boarded, and covered with felt and Broomhall patent tiles, an air-space being left between the two lots of boarding. The flooring is to be of solid wood blocks on a layer of cement concrete. The warming of the buildings is to be by hot air on Messrs. Haden's principle, and ventilation is to be secured by vertical shafts carried up in the thickness of the external walls, under each of the side windows, covered on the top with polished brass hit-and-miss gratings as inlets, and large openings in each gable and clerestory for outlet, all thoroughly under control. It is at present intended to erect only the nave and aisles, baptistery, two west porches, vestry, and heating-chamber, with a temporary east end of apsidal form, and a contract at £4,972 for this portion of the work has been taken by Messrs. W. Patterson and Sons, of No. 5, Whitehall, S.W., and Ruskington, Sleaford.

TRURO.—The Truro Diocesan Cathedral Committee held a meeting on Thursday in last week, the Bishop presiding. A report was presented on the condition of the cathedral building, in which it was stated that in order to make further security for the proper ventilation of the fabric, certain doors and windows in the towers and clerestory had been provided. Mention was also made of the memorials which had been placed in the cathedral during the year to the memory of the late Mr. T. Chirgwin, the late Lieutenant-Colonel Cardew, Canons Wise and Coulson, and Archdeacon Hobhouse. A circular had been sent throughout the county, suggesting that a suitable memorial should be placed in the cathedral to the noble gifts of

Canons Wise, Phillpotts, and Martin. Miss Wise had signified her intention of filling two lights of a window in the north choir aisle to her brother's memory, and cartoons were being prepared. The report was adopted. The Finance Committee reported that the total sum available for further building operations was £13,329. Some discussion took place as to the probabilities of the completion of the fabric of the cathedral, and the bishop promised to bring the matter before the forthcoming Diocesan Conference in his address to be given on Wednesday, the 28th inst., with a view to testing the feeling on the subject. Canon Donaldson pointed out the suitability of renewing building operations next year, suggesting that an appeal could be made to the country as well as to Cornwall.

WEYMOUTH.—The chapel which has been added to the College buildings in Dorchester-road was dedicated by the Bishop of Salisbury on the 6th inst. The chapel consists of a nave 71ft. 6in. long by 26ft. wide and 43ft. high to the ridge of the open-timbered roof. The nave is divided into five bays with coupled lancet windows on either side and a large window of five lancets at the west end. The chancel is 16ft. by 18ft., is semi-decagonal in plan, and raised three steps above the nave. Each of the four-canted sides contains a single lancet window filled with stained glass. The chancel roof is vaulted in wood, with moulded ribs springing from shafts in each angle of the apse, and meeting in a carved wood boss at the top, from which is suspended a brass candelabra. The altar rail and standards are of brass, and the altar of oak, covered by an altar cloth. The vestry, 18ft. by 11ft., is on the south side, with organ-chamber over, and there is a south porch with deeply-moulded stone doorway. The stalls are arranged in three rows, rising in steps on either side of the nave and parallel to the side walls. They are of wainscot oak, the back row having a panelled back and curved hood at the level of the sills of the windows and running all around the church. The central passage is 7ft. wide, paved with red tiles, and the steps of blue Pennant stone. The interior is faced with Beaulieu bricks, with stone bands and a broad band of red bricks under the wall plate. The glazing of the windows is a good example of modern leaded work, each light being of different design. The roof is open-timbered, and the principals of the hammer-beam type, with iron tie-ends. Externally the chapel is faced with Beaulieu bricks to correspond with the rest of the College buildings, with dressings of Monk's Park stone. The roof is covered with Broseley tiles and surmounted by an open-timbered *fiche*, 60ft. high, covered with oak shingles. The design is Early English, treated simply. The amount of the first contract with Mr. Albert Clarke, of Weymouth, who is the builder, was about £2,800, and the oak stalls were made by Mr. A. H. Green, of Blandford; the carving was by Mr. Harry Hems of Exeter; and the architects for the building were Messrs. G. Crickmay and Sons, of Weymouth, and of 13, Victoria-street, Westminster.

WORCESTER.—The Victoria Institute, which is the city's memorial of the reign of Queen Victoria, was recently opened by Lady Mary Lygon, the Mayoress, the event being marked by a military and Civic display and by much popular rejoicing. The buildings comprise free library, museum, picture gallery, art and science school, and the cost has been nearly £45,000, and have been built from designs by Messrs. Simpson and Milner, of New Inn, Strand. The Institute covers an area of 2,330 square yards, and comprises two blocks, the library block fronting Foregate-street and the school block fronting Sansome-walk. Taylor's-lane has been widened to facilitate entrances to both blocks therefrom. The design is in the Queen Anne style with Italian modifications. The exterior is of red brick with buff terracotta ornament. A staircase of marble and mosaic leads to the museum and art galleries on the first floor. On the ground floor the reference library, 48ft. by 20ft., is next to the Shire Hall. The newsroom, which is 84ft. by 22ft. with end bays, is situated in Taylor's-lane and has a separate entrance from that street. The basement floor is 10ft. high and of considerable dimensions. The ground floor contains five museums and three art galleries. The central museum gallery is 45½ft. by 22ft., and the central art gallery is of the same dimensions. The lighting is provided by dormer windows. At the corner of Foregate-street and Taylor's-lane is a circular tower with a staircase

to the roof. Between this block and the schools block is an open space which will allow of future extension. The school block accommodates the art, science, and technical schools. The science school on the ground floor provides a commodious lecture theatre, stores, photographic dark room, &c., well-arranged cloak-rooms, laboratory, balance room, and preparation room. Beneath these rooms are a long range of north-lighted workshops for the technical classes, with cooking, plumbing, and other apparatus, lavatories, &c. The two blocks are connected by a subway. The contractors, were Messrs. Joseph Ward and Sons. The Institute was fully illustrated by plans, perspective, and details in our issues of April 6 and 27, and May 18, 1894.

CHIPS.

The session of the Royal Institute of British Architects will be opened on Monday evening, November 2, when the President, Professor George Aitchison, A.R.A., will deliver his inaugural address.

The Archdeacon of Cleveland preached at the reopening of the church at Butterwick, near Malton, on Thursday, after extensive restoration carried out by Messrs. Topham, of Slingsby, and Messrs. Gamble, of Brawley.

The new pathological building in connection with Glasgow Western Infirmary was opened on Wednesday week by Professor J. H. Gairdner. The new department, when completely furnished, will have cost £15,000.

The Langwith section of the Lancashire, Derbyshire, and East Coast Railway is making good progress. The station buildings have been commenced by the contractors, Messrs. Bateman and Co., of Ramsey. A girder bridge, upwards of 100 yards in length, spans the platforms and sidings. A reservoir has been erected at Scarcliffe for the purpose of supplying the station with water. Messrs. Saxby and Farmer have completed a signal-box which contains nearly 70 levers. The permanent way and sidings will be shortly completed, and the line will be opened for mineral traffic in November.

At Stockton-on-Tees, the almshouses in the High-street, which were founded in 1682 and rebuilt in 1816 at a cost of £3,000, are being dismantled, and the site will be occupied by shops and business premises. A sum of £5,000 has been paid for the buildings and land, and this not only enables the trustees of the charity to build new almshouses in another part of the town, but to further endow the charity for the benefit of the recipients.

Mr. A. H. Smith, of the British Museum, who has been conducting the excavations of ancient sites in Cyprus on behalf of the trustees of that institution, has returned home. The latest discoveries made at Enkomi fully equal in interest and value the treasures unearthed by the explorations of former seasons at Amathus and Curium. A large quantity of coins, inscriptions, ornaments in gold and silver, and pottery of very ancient date has been discovered. Most of these objects will enrich the national collections at Bloomsbury.

The town council of Okehampton and the local charity trustees have under consideration a scheme for the erection of a new town hall, together with free library and municipal and trustees' offices.

A timber fire broke out on Friday evening in a sawmills in Kingsgate-place, Kilburn. It originated in a large building of three floors, crammed with timber in every stage of preparation for carpentering and other purposes. The fire was not subdued until great damage had been caused.

At the last meeting of the City Corporation, the markets committee brought up a report, submitting for approval amended plans for increased accommodation on the removal of the present fish section of the Central General Market to the site of the fruit, vegetable, and flower section, and recommending that £21,000 be provided for the works. Consideration of the report was adjourned.

The Corporation of Monmouth are about to construct an entirely new system of sewers throughout the town in accordance with plans prepared by Mr. C. Nicholson Lailey, M.Inst.C.E., of Great George-street, S.W. They are also about to provide a system of electric-lighting, the engineers for this being Messrs. Bramwell and Harris, also of Great George-street.

A supper, attended by the employés of the King's Norton Rural District Council and the members of the King's Heath and Selly Oak fire brigades, took place on Monday night at the Station Inn, Selly Oak, for the purpose of presenting Mr. R. Godfrey, for the past sixteen years surveyor to the King's Norton District Council, with a silver-plated loving-cup from the employés of the council, and a smoker's cabinet and a handsome pipe from the members of the King's Heath and Selly Oak brigades.

ARCHITECTURAL & ARCHÆOLOGICAL SOCIETIES.

GLASGOW INSTITUTE OF ARCHITECTS.—The annual meeting of this institute was held on Tuesday in the rooms, 187, Pitt-street, Glasgow. Mr. C. J. Maclean, secretary, submitted the annual report of the Council, which showed that during the year six new members had been admitted, and the number now on the roll, exclusive of honorary members, was 66, and embraced, with few exceptions, all architects in the West of Scotland of the necessary standing and qualifications. The joint occupation of the rooms at 187, Pitt-street, by the Architects Institute and the Architectural Association, had, in the opinion of the Council, been beneficial to both societies, and it was believed that it would be increasingly so in the future. The reading-room was well furnished with English and Continental magazines on architecture and the other arts, and the Council hoped ultimately to acquire by gift and purchase a valuable library. The report was adopted. An opportunity was given those present of inspecting an exhibition of metal-work arranged by the members of the Institute. The exhibition included cast, wrought iron, brass, and copper work, ormolu, lead, silver, and other metals capable of decorative treatment, and there were also old examples, as well as the schemes of modern work. Drawings and photographs were also included in the exhibition.

On Wednesday, November 4th, there is to be an election at Burlington House of a Royal Academician, and it is anticipated that on the same evening the Academicians will choose their new President (the third of 1896). The choice seems to lie between Messrs. E. J. Poynter, Val Prinsep, and Luke Fildes.

In St. James' United Presbyterian Church, Paisley, on Saturday, the window which has been erected by the congregation in memory of their late pastor, Rev. Dr. James Brown, was unveiled. The memorial, which occupies the three lights of the window above the main entrance to the church, represents St. James being called to the Apostleship, and the scene at his death. The work was executed by Messrs. Ballantine and Gardner, Edinburgh, supervised by Mr. Hippolyte J. Blanc, R.S.A.

A cookery school at Longroyd, in connection with the Brighouse School Board, was opened on Saturday. The school, which has been built from plans prepared by Ald. B. Stocks, architect, of Huddersfield, has been erected, together with a caretaker's house, at a cost of £1,250.

At the Central Criminal Court, on Wednesday, Walter Earle, aged 33, engineer, of Norwich, and Edward Thomas, aged 33, surveyor, were committed on charges of conspiracy and of obtaining money from solicitors by means of forged telegrams. Earle was sentenced to three, and Thomas to five years' penal servitude.

His Honour, Mr. Lumley Smith, Q.C., the Westminster County-court Judge, awarded a Mrs. Croydon, on Wednesday, seven guineas damages against the Vestry of St. George's, Hanover-square, her dress having been spoiled in watering the road in New Bond-street.

The Carpenters' Company announce that an exhibition of works in wood and wood-carving, held at Carpenters' Hall, London Wall, will be opened on Monday next, and will remain open, free, for three weeks, every weekday from 11 a.m. till 6 p.m., and on Mondays and Fridays from 7 p.m. till 10 p.m.

Mr. John Troutbeck, the Westminster coroner, held an inquest on Monday on the body of Walter Allan Smith, 42, a crane-driver in the service of Messrs. Bywaters and Co., builders and contractors, of Regent-street, W., who was killed on Wednesday in last week. Smith was assisting in the raising of two pieces of timber on a building in course of erection at Storey's-gate, Westminster, when the block through which the rope ran round a pulley broke, and he fell from a scaffold a distance of 37ft. He died while being taken to the Westminster Hospital. The piece of rope by which the block had been fixed to its hook was produced in court, and the coroner said it was obviously rotten. The question arose as to who was responsible for the good condition of the gear, and Messrs. Bywater's foreman stated that he relied on the men themselves to see that everything was in proper order. The block had been in use two years, and when in perfect order would have borne a strain of 12cwt., whereas the timber that was being hoisted at the time of the accident weighed not more than 1cwt. The jury returned a verdict of "Accidental death," and added a rider to the effect that in the construction of scaffolds the foreman or some other person should be held responsible for the soundness of the materials used.

Engineering Notes.

GLASGOW.—The foundation-stone of Glasgow Bridge was laid by Sir James Bell, Lord Provost, last week. That structure, now being erected across the Clyde at Jamaica-street, will form, as its two predecessors have done, the main connecting link between the two parts into which the river divides Glasgow. One hundred and thirty years have elapsed since the foundation-stone of the first bridge across the Clyde at this point was laid by the Lord Provost. That fabric, which had seven arches, and was 500ft. long by 30ft. broad, had a steep gradient leading to and from the centre; but as the population of the south side of the Clyde was then exceedingly small, the bridge was sufficient to meet all requirements from 1772 till about sixty years later. The Bridge Trustees then commissioned Telford, the famous bridge designer, to plan a structure better suited to the needs of the time. This he did, and the result of his labours was the bridge built in 1833, but now in course of demolition. Owing to the increased scour of the river the foundations were undermined, and it was found necessary to undertake the reconstruction scheme now in progress, and estimated to cost about £80,000. The engineers are Messrs. Cunningham, Blyth, and Westland, C.E., Edinburgh, and the contractors Messrs. Morrison and Mason, Limited, Glasgow. Originally it was intended that the piers of the new bridge should be sunk to the solid rock, but after several of the cylinders had been put down it was found that the rock was deeper than had been anticipated. Accordingly, on the recommendation of Sir Benjamin Baker, the plans were modified, and several of the piers will be founded on gravel and sand at a depth of about 75ft. below the bed of the river. The cylinders, which are 15ft. in diameter by 6ft. in height, have been, and will be, sunk under the compressed-air system, and are each filled with solid concrete, sufficient in itself to bear all the weight that will be placed upon it. The former bridge was 50ft. wide; the one being constructed will be 20ft. broader. The work is expected to be completed about two years hence.

NOTTINGHAM.—The London extension of the Manchester, Sheffield, and Lincolnshire Railway continues to make good progress in the Nottingham district. A contract for the construction of the Great Northern Company's line, which is to connect the present station in London-road with the Manchester, Sheffield, and Lincolnshire central station at Nottingham, has been let to Messrs. J. D. Nowell and Sons, of Westminster, and the work is now well in hand. Some cottage property in the vicinity of Garner's-hill and Narrow Marsh, where the new line will join the Manchester, Sheffield, and Lincolnshire, has been demolished, and along the projected route to the London-road station the work is being rapidly pushed forward. Upon the Manchester, Sheffield, and Lincolnshire new works properly so-called, the contractors (Messrs. Logan and Hemmingway) are making a steady advance. Between Gregory Boulevard and East Leake from four to five miles of single-road permanent way have now been laid, and most of the cuttings are now completed. Bridges over the Midland in Station-street, Nottingham, and the Trent have also reached an advanced stage.

The City Court of Common Council have referred to a committee sketch plans provided for rebuilding the Sessions House, and providing new Central Criminal Courts at the Old Bailey. The estimated cost of the Courts, if the proposals are adopted, is from £130,000 to £140,000.

Mr. Thos. Burt, M.P., formally opened the new Miners' Hall at Ashington, on Saturday, in the presence of a large gathering from the chief collieries of Northumberland. The building, which has been erected from plans, and under the superintendence of, Messrs. Boulds and Hardy, of Morpeth, has cost between £6,000 and £7,000, and will accommodate 2,000 persons.

Plans prepared at the instance of the Improvement and Buildings Committee of the Manchester Corporation for 60 artisans' dwellings to be erected at Miles Platting have received the approval of the Local Government Board. These plans are being exhibited in the Council Chamber at the Town Hall, Manchester. The dwellings are being erected to comply with the requirements of the Local Government Board to provide accommodation for persons of the labouring class who have been displaced by the carrying out of the Gaythorn-street and South Junction-street improvements.

TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. All communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondents.]

It is particularly requested that all drawings and all communications respecting illustrations or literary matter should be addressed to the EDITOR of the BUILDING NEWS, 332, Strand, W.C., and not to members of the staff by name. Delay is not unfrequently otherwise caused. All drawings and other communications are sent at contributors' risks, and the Editor will not undertake to pay for, or be liable for, unsought contributions.

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Advertisements for the current week must reach the office not later than 3 p.m. on Thursday. Front-page Advertisements and alterations in serial advertisements must reach the office by Tuesday morning to secure insertion.

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The charge for advertisements for "Situations Vacant" or "Situations Wanted" is ONE SHILLING FOR TWENTY-FOUR WORDS, and Sixpence for every eight words after. All Situation Advertisements must be prepaid.

NOTICE.

Bound copies of Vol. LXIX. are now ready, and should be ordered early (price Twelve Shillings each), as only a limited number are done up. A few bound volumes of Vols. XXXIX., XL., XLI., XLVI., XLIX., LI., LIII., LIV., LVIII., LX., LXI., LXII., LXIII., LXIV., LXV., LXVI., LXVII., LXVIII. may still be had, price Twelve Shillings; all the other bound volumes are out of print. Most of the back numbers of former volumes are, however, to be had singly. Subscribers requiring any back numbers to complete volume just ended should order at once, as many of them soon run out of print.

J. H. (We know nothing about the merits or maker of the incandescent stove.)

ENQUIRER. (Try the St. Paneras Ironwork Company, St. Pancras-road, N.W.)

RECEIVED.—G. F. Horton.—Jas. W. Foley.—E. A. and Co.—W. R. B.—C. J. (Newport).—F. D. E. Co.

"BUILDING NEWS" DESIGNING CLUB.

OBESON. (One sheet is intended, and the larger majority of our members follow the rule. A few disregard the condition, and nearly always it is the least capable men who make these mistakes.)—THE EX-SULTAN. (The cottages are, of course, semi-detached, the two making one block. We do not, however, want a pair of "sub-urban villas.")—C. P. O. (The party-wall may, of course, be broken on plan, though it would be best to avoid an involved arrangement.)—MUNRO CANTLEY. (The above replies meet your query.)

Correspondence.

LOVEGROVE v. ALLSOPP.

To the Editor of the BUILDING NEWS.

SIR,—The heading of the report on this case is misleading, as the matter in question was not connected with railway arches.

Messrs. Allsopp have on lease a number of arches under the North London Railway, and arranged with the owners of that line (the London and North-Western Railway Company) to erect a building adjoining one of the arches on a piece of land next Maria-street, Kingsland. I discovered that the building had been erected, and at once demanded the usual notice from the builder—a Mr. Hinson—who refused to give notice, and referred me to the Railway Company, who pleaded exemption.

As the builder had finished the work and gone away, I raised the question of exemption by applying to the occupier, Messrs. Allsopp, for the small fee due.

Mr. Haden Corser gave judgment, after careful consideration and an inspection of the build-

ing. He decided that the building was not exempt, but that at the time the work was done the brewers were not the occupiers; so that the clause in the Act as to the liability of occupiers is of no use except in the case of alterations, where the person remains in possession of the building during the execution of the building operations.—I am, &c.,

314, Old-street, E.C. HENRY LOVEGROVE.

CHIPS.

Mr. Walter Peckmore, architect, Taunton-road, Balsall Heath, was driving along Stratford-road on Sunday night, and was turning into a lane when his trap came into collision with a lamp at the corner. Mr. Peckmore was thrown out, and picked up unconscious, and was taken to the Queen's Hospital, at Birmingham, where he remains.

In our description last week of the work done in connection with the new water supply of Birmingham, we omitted to mention the watertight skin of Claridge's Pyrimont asphalt applied between the concrete-formed conduits and the blue Staffordshire brick facing, to insure no leakage whatever of the water, which has in no small degree contributed to the stability and impermeability of the work.

A new Roman Catholic church, built from the designs by Mr. Leonard Stokes, was opened last week at Peterborough. It is decorated in style, is built of Stamford stone, and has cost, thus far, £4,000.

The City Commission of Sewers adopted on Tuesday an arrangement to acquire the interest of the leaseholder in the ground required to widen the public way in front of Nos. 98, 99, and 100, Fleet-street, for £2,600.

The memorial-stones of a new Wesleyan chapel and school, now in course of erection, on the site of the old chapel at Coal Pool, Walsall, were laid on Monday. Mr. R. Harris, of Sheffield, is the builder, and Mr. R. Jones, of Walsall, the architect.

The David Lewis Northern Hospital for Liverpool, of which the foundation-stone was laid on Monday by the Countess of Derby, is being built at a cost of £60,000, from plans by Messrs. Pennington and Son, and C. W. Harvey, whose designs were selected in a limited competition in April last. The hospital will accommodate 103 surgical cases, 72 male and 36 female; 72 medical, 48 male and 24 female, and 20 children cases. Each of the rectangular wards will have a light iron verandah, on the sunny side, wide enough to admit of beds being wheeled out on to it, and the ends provided with a similar verandah connecting the two turrets. The whole of the buildings externally will be faced with red Ruabon bricks, and dressings of buff terracotta. Steel and concrete floors will be provided throughout the building, which will be lighted by electricity.

A marble bust of Mr. W. T. Best, sculptured by Mr. Conrad Dressler, was unveiled on Tuesday at Liverpool, of which city Mr. Best was for forty years (up to 1894) the official organist. The bust occupies a place in the centre of the organ gallery in St. George's Hall.

A Local Government Board inquiry has been held at Richmond, Surrey, by Mr. W. O. E. Meade King, M.I.C.E., upon an application from the town council for powers to borrow £10,600 for purposes of water supply, £1,850 for purposes of street improvement, and £1,000 for works of sewerage. Mr. Senior, town clerk of Richmond, represented the council, with Mr. Peirce, borough engineer.

A new board school in Capworth-street, Leyton, was recently opened. It occupies a site of 1½ acre, and provides accommodation for 1,576 children—616 infants, 480 girls, and 480 boys—with cloak-rooms, lavatories, &c., to each floor. There are eight class-rooms to each floor, and rooms for head and assistant teachers. On the ground floor two rooms are set apart for infants and appliances for Kindergarten instruction. Each room is warmed and ventilated by open fireplaces. Coal stores are provided in the basement, with a lift for delivery to each floor. Rooms are also provided for teaching cookery, with sculleries attached. The buildings have been erected by Messrs. W. Grear and Son, Stratford, from the designs of Messrs. Newman and Jacques, at a cost, including furniture, of £20,200.

Colonel W. Langton Coke, Local Government Board inspector, held an inquiry at the Council Chamber on Wednesday week, concerning the application of the Bury Town Council to borrow £1,000 for the purpose of reconstructing the Turkish baths in accordance with plans prepared by Mr. J. Cartwright, the borough surveyor.

At their last meeting the city council of Bristol adopted a new code of by-laws in regard to buildings. The new rules give powers similar to those now possessed by nearly every other urban authority, and contain provisions not provided by the existing Bristol by-laws. They have been approved by the Local Government Board.

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ILLUSTRATIONS.

PALAIS DE JUSTICE, BESANÇON.—NORTH BRIDGE STREET IMPROVEMENT, EDINBURGH.—THE "PASSMORE EDWARDS" FREE PUBLIC LIBRARY, DULWICH.—DOMESTIC WORK FROM THREE CATHEDRAL CITIES.—QUEEN ANNE OAK CHEST.

Our Illustrations.

THE PALAIS DE JUSTICE, BESANÇON.

BESANÇON was not incorporated with France till the days of Louis XIV. During its previous history the town was alternately Burgundian, Arlesian, Anglo-French, and Spanish, and thus the influence on its ancient buildings may be said to have varied considerably. Before then, and under the Roman rule, Vesontio, as the place was once called, had become a centre of considerable importance. In the second century St. Ferréol and St. Ferjeux converted the town to Christianity, and, singularly enough, with typical gratitude, these two worthies were martyred at Besançon in the year 212. At one time Vesontio was the capital of the ancient tribe of the Sequani, of which Cæsar speaks enthusiastically in his Commentaries, and in this vicinity Cæsar defeated Ariovistus. Besançon is the most important military stronghold on the side of Switzerland, and it is now surrounded by a powerful system of forts and ramparts. It stands on the commanding line of inland navigation connecting the Rhine with the Rhone, and the town occupies the isthmus between the two reaches of the Doubs. The old grey-stone houses up the long winding Rue Ballant lead to the Place du Jauffroy, where there is a statue to that marquis who is reputed as the first to have applied steam to navigation. The big Classical church of La Madeleine is close by, and on the left in the Place de l'Abondance is the famous Musée, comprising also the great library, one of the most remarkable in France. The picture gallery too is here. Considerable remains of the Roman Theatre are to be seen on the heights of Rue St. Jean, and there is a Roman triumphal gateway of the time of the Antonines, higher up still. The 18th-century and Rococo Cathedral of St. Jean is much hidden by houses; but its foundations date from the 9th and 10th centuries. The modern palace for the Archbishop is handsomely furnished, and is located behind the cathedral. Other buildings in the city are the church of St. Maurice, containing wood carvings from the Abbey of La Charité; the Palais Grauvellé, built in 1534-40, which is a notable structure, and in the Place St. Pierre is a church of that name erected during the last century. The Hotel de Ville, in a heavy Classical style, dates from the 16th century. Hard by is the Renaissance Palais de Justice, of which we give a double page illustration to-day. It was built by Hugues Sambin, of Dijon, between 1582 and 1585, and decidedly takes its place among the foremost examples of "Bisontine" architecture, in what has been termed the Free Classic style. Inside the courtyard makes a common but pleasing feature, and although the façade may be lacking in continuity, there is a picturesque boldness and freedom from restraint which can hardly fail to prove suggestive to those who admire the quaint

in building and no longer feel the need of reference to the restrictions imposed by the Classical Orders of architecture. We are indebted to Mr. Bleyl, of Dresden, for this plate, which is reproduced from the first part of Professor Cornelius Gurliitt's "Die Baukunst Frankreichs" which includes permanent ink photo-prints, illustrating every variety of style and period of old building, such as the Flamboyant screen from Albi, the sturdy Norman from Angoulême Cathedral with its Gothic dome and campanile; the Roman Porte de Noire at Besançon already referred to; St. Saturnin at Toulouse; Orleans Cathedral; the clock gateway at Bordeaux, and the heavy Late Classic Hotel des Monnaies at Avignon. These we name merely to indicate the variety of the choice which the editor has made. The work will be completed in six parts, and with the last part letterpress descriptions are promised. Mr. B. T. Batsford, of 94, High Holborn, is the sole agent for the publication in this country. The size of the sheets is 20 $\frac{1}{2}$ in. by 14in., and they are issued loose in a portfolio of 25 plates. These are numbered, but the subjects themselves do not appear to have been grouped in any particular order. The photographs are excellently taken and beautifully reproduced. Some of the sheets represent old details and drawings, which will prove of interest to many students who can thus compare them with executed buildings in the same or similar styles.

RECONSTRUCTION OF NORTH BRIDGE STREET, EDINBURGH.

THIS design was prepared in accordance with the instructions issued to competitors to secure a dignified architectural effect, both from Prince's-street and the High-street, and at the same time preserve the scale of the surrounding buildings, which give such a picturesque aspect to this part of the old town. The masses of building were designed with varied outlines which would be effective at a distance, while sufficient richness of detail was introduced to give interest to a close inspection of the work. The financial side of the scheme was carefully considered, and while all special features, such as markets and arcades, were eliminated as tending to decrease its success, the revenues from shops and business premises and residential flats were sufficient to provide an ample return on the capital employed, after making due provision for all contingencies. The cost of carrying out the scheme was estimated at £200,000. Its authors, Messrs. Gibson and Russell, of 11, Little Queen-street, Westminster, were awarded the second premium in the recent competition.

THE "PASSMORE EDWARDS" PUBLIC LIBRARY, DULWICH.

THE development of the library movement in Camberwell during the past six years has been eminently satisfactory. The borough includes the Parliamentary divisions of North Camberwell, Peckham, and Dulwich; the populations being about 260,000. The building now being erected in Lordship-lane, Dulwich, is upon a fine site at the corner of Woodwarde-road, the land being the gift of the Estates Governors of Dulwich College. Since 1891 a temporary library has been in operation; but the committee, owing to the pressure of success on limited funds, could not erect a permanent library. This difficulty has been removed by Mr. J. Passmore Edwards, who has promised £5,000 for the building, which, in accordance with his wish, will stand as a memorial of Edward Alleyn, the Elizabethan actor and founder of Dulwich College. The foundation stone will be laid by Sir Henry Irving to-morrow (Saturday). When the library is complete Camberwell will have five such institutions in operation, in addition to the South London Art Gallery recently acquired. The chief librarian is Mr. Edward Foskett, F.R.S.L., &c. The new building is in course of erection from the design of Messrs. Charles Barry and Son, and under their superintendence. The builders are Messrs. James Gough and Co., of Hendon, their contract having been accepted by the Camberwell Vestry at the sum of £5,834, and the work is expected to be completed by midsummer next. The clerk of works is Mr. J. Bint. The building will be of red brick with Bath-stone dressings, and moulded brick strings and cornices. It will have fire-proof floors on the system of Messrs. Mark Fawcett and Co., of Queen Anne's Gate, Westminster. The main roof will have iron principals. The site for the new library is about three quarters of an acre in area (worth at least

£1,000), and was given to the parish with the sanction of the Charity Commissioners. The building will contain a reference library capable of containing 26,000 volumes, with a store library for an additional 17,500 volumes; a large news-room and reading-room to accommodate about 100 readers; also a committee-room, caretaker's residence, and all other necessary conveniences, and it is considered will be fully sufficient for the needs of the locality for many years. The plans, however, have been so arranged as to admit of extension, without derangement, should that be found desirable in the future. Great attention has been given to the arrangements for warming, and for all sanitary requirements.

DOMESTIC WORK FROM THREE CATHEDRAL CITIES.

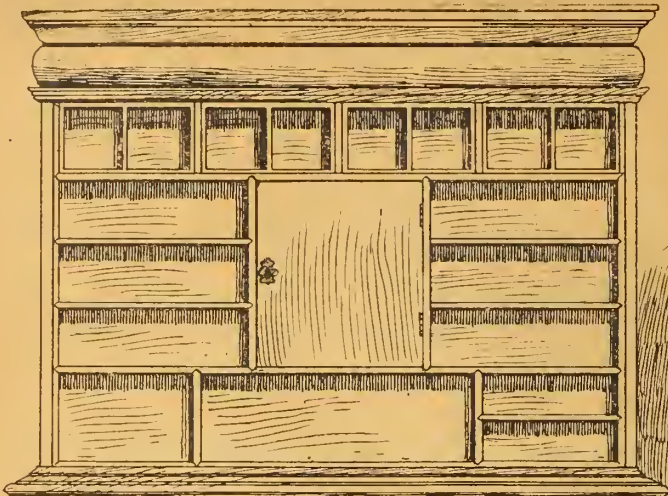
EASTGATE HOUSE, at Rochester, is in the High-street, a short distance below the Precinct Gate of the cathedral. It is a picturesque Elizabethan building, with quaint old gables and bay windows. The house, entered from a small courtyard off the High-street, is now used as a working men's institute. It has been identified with the Nun's House in "Edwin Drood."—The fine old gateway built in the Perpendicular style, illustrated in the sketch, is one of the three gateways leading into the cathedral close at Salisbury, this being the one at the end of the High-street on the north-west of the cathedral.—The other two sketches are from parts of the picturesque old Deanery at Gloucester, part of which dates back to the 11th century, being pure Norman architecture. The back part is half-timber work about the 13th century. The large room, called the Parliament House, is where the Gloucester Parliament of Richard II. was held (1377-1399). There is a public way under one corner of this building, leading round to the north of the cathedral, where there are some remains of the Benedictine abbey. H. TANNER, JUNR.

QUEEN ANNE OAK CHEST.

THE measured drawings and sketch view illustrated this week show a compound piece of furniture, in which the lower part is a chest of drawers compact by itself, and the upper part, as the interior arrangement indicates, partakes more of the character of a writing cabinet. Its interest, to a great extent, lies in this dual capacity, for of ornamentation there is virtually nothing. Not even the rich effect produced by simple means, as in the case of the chest of drawers illustrated in our pages on August 28th last. Yet its simplicity and appearance of durability attracted one's attention as more ornate and complex pieces might fail to do. Utility is branded on all its parts. The four drawers below comprise two half-drawers 5in. deep, and two long ones 7in. and 8 $\frac{1}{2}$ in. deep respectively. The drawers and divisions above are numerous and diversified in size. The eight pigeon-holes at top are made in pairs and slide out, revealing secret drawers behind. The central cupboard was locked, so prevented inspection. The inclosing flap is of unusual size, the panel being only very slightly sunk, with $\frac{1}{2}$ in. delicate moulding slightly broken at the four angles. This flap is held in a horizontal position by hinged stays. An ingenious use is made of the cushioned frieze, which forms the front of a concealed drawer. The feet are evidently of a later date. The drop-handles are semi-round and hollow at back.

A travelling studentship of £50 is about to be awarded by the Painters' Company for the encouragement of the study of decorative painting. The studentship is open to competition by students between the ages of 20 and 35 in any recognised school of art or other institution devoted to the study of applied art in any form, and situate within the limit of the larger metropolitan postal area. Particulars may be obtained at Painters' Hall, Little Trinity-lane.

Good progress is being made in the commencement and erection of the Grove Fever Hospital, Tooting, the third of the series of fever hospitals now being built by the Metropolitan Asylums Board. The accommodation is for 520 patients and nurses and servants, and the estimated cost of the completed establishment will be about £212,000. A unique feature in this establishment is the adaptation of the échelon principle in the arrangement of the whole of the large pavilions, twelve in number, probably the first instance of such a large adoption of this mode of arrangement to hospital planning. The architect is Mr. A. Hessel Tiltman, F.R.I.B.A., who wou the work in open competition in the summer of 1894. We hope shortly to publish a view and plans of the buildings.

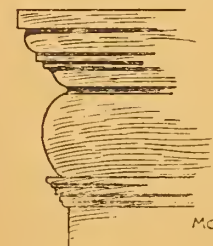


INTERIOR ARRANGEMENT OF UPPER PORTION.

NOTE - THE PIGEONHOLES AT TOP ARE MADE IN FOUR PAIRS TO SLIDE OUT FORWARDS AND DO NOT RUN THE WHOLE DEPTH BEHIND THESE ARE SECRET DRAWERS.

1 1/2"

2 1/3
2 1/4



CORNICE



MOULD BETWEEN UPPER & LOWER PORTIONS

3/4"

MOULD TO FLAP



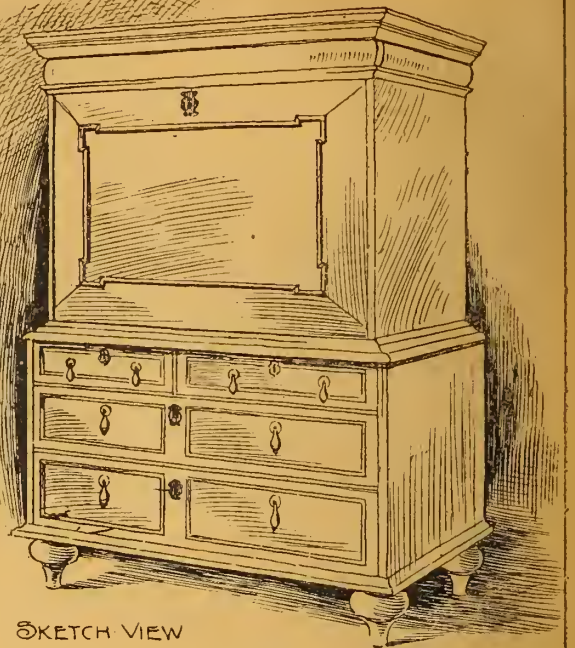
5/8"

MOULD TO DRAWERS



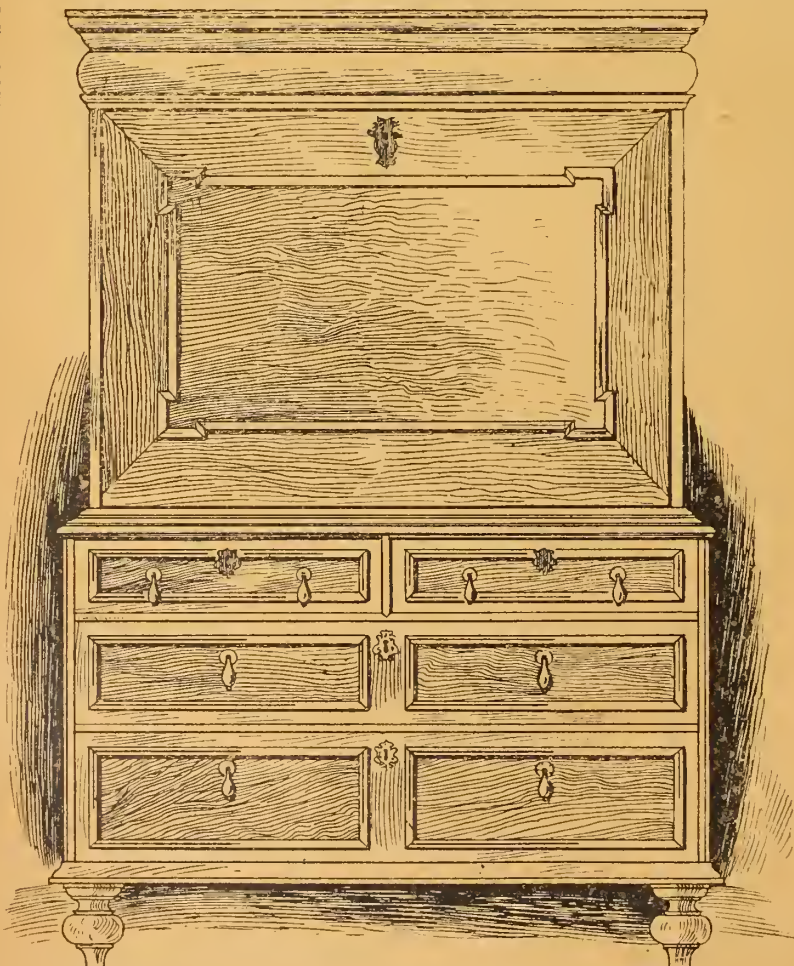
HANDLES TO DRAWERS

2"



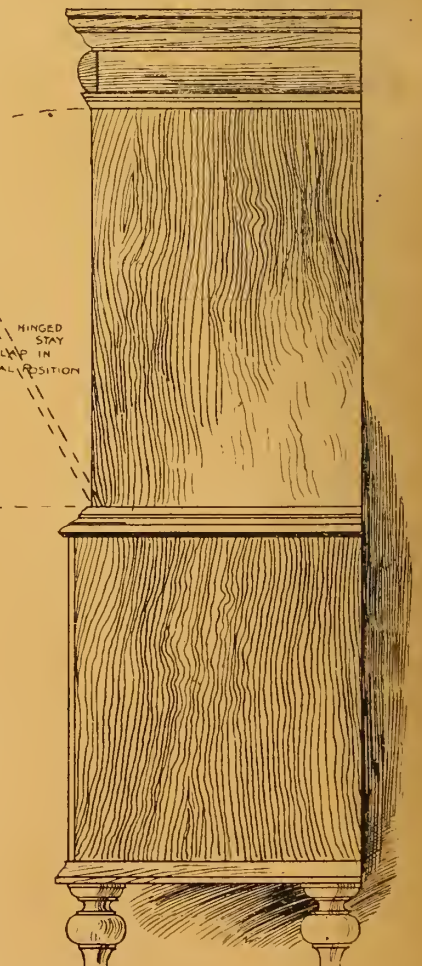
SKETCH VIEW

QUEEN ANNE CHEST
WITH FALL-DOWN FLAP
IN DARK OAK



FEET MODERN.

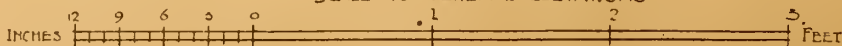
FRONT



HINGED STAY
TO HOLD FLAP IN
HORIZONTAL POSITION

SIDE

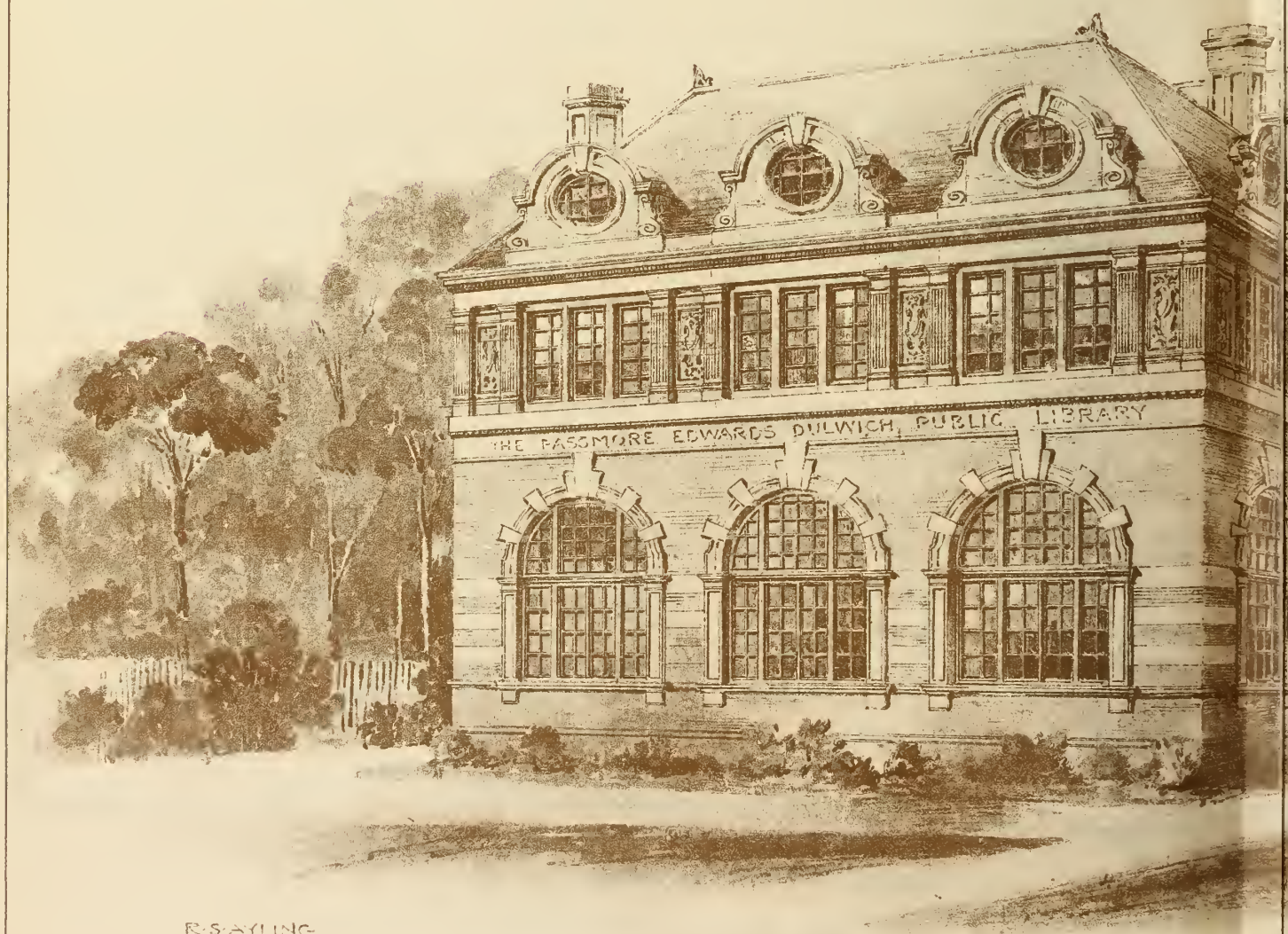
SCALE TO GENERAL ELEVATIONS



A. Brierley & Co. del.

THE PASSMORE EDWARDS PUBLIC LIBRARY, DULWICH.

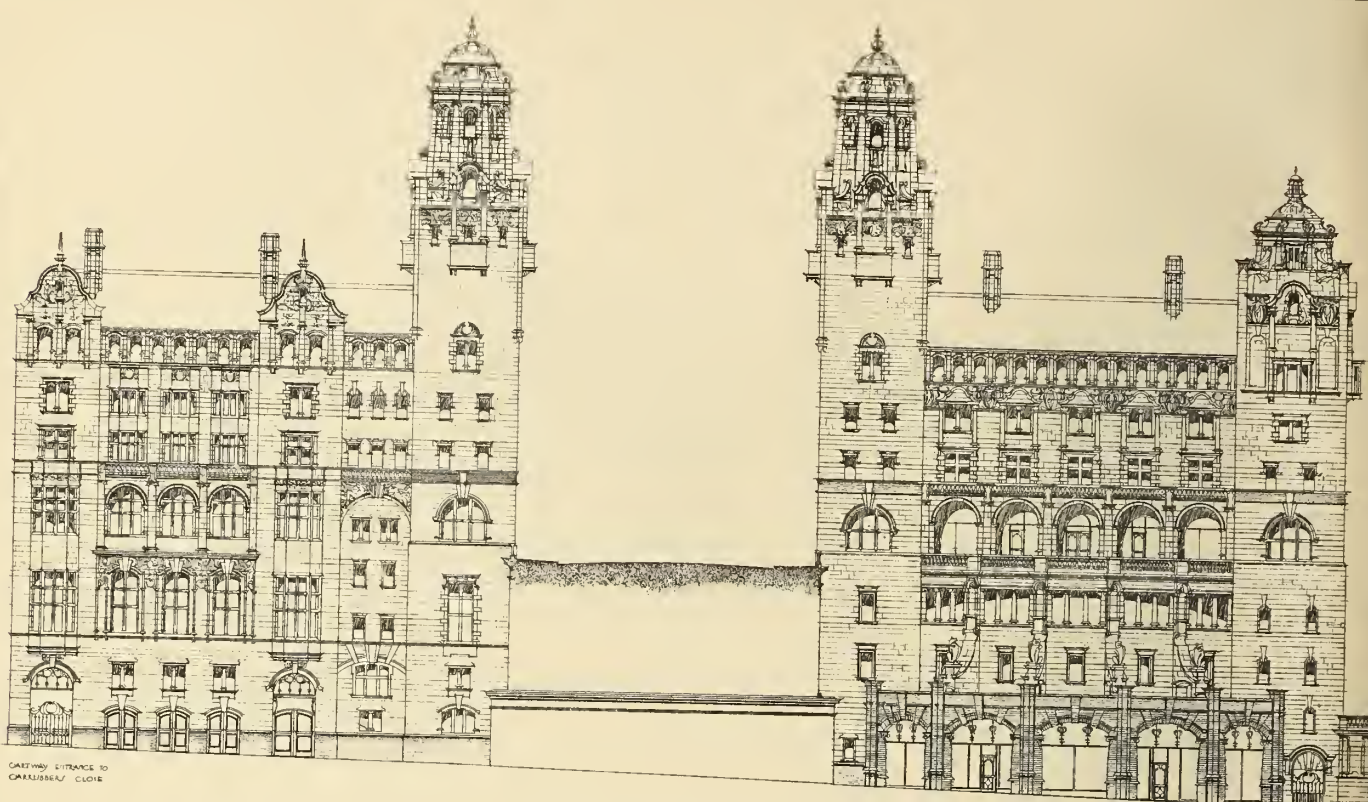
CHARLES BARRY & SON, ARCHITECTS.



R. SAYING
DELT



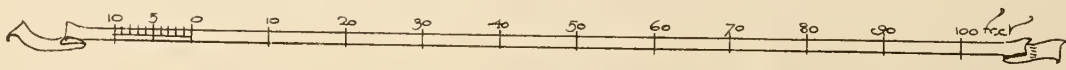
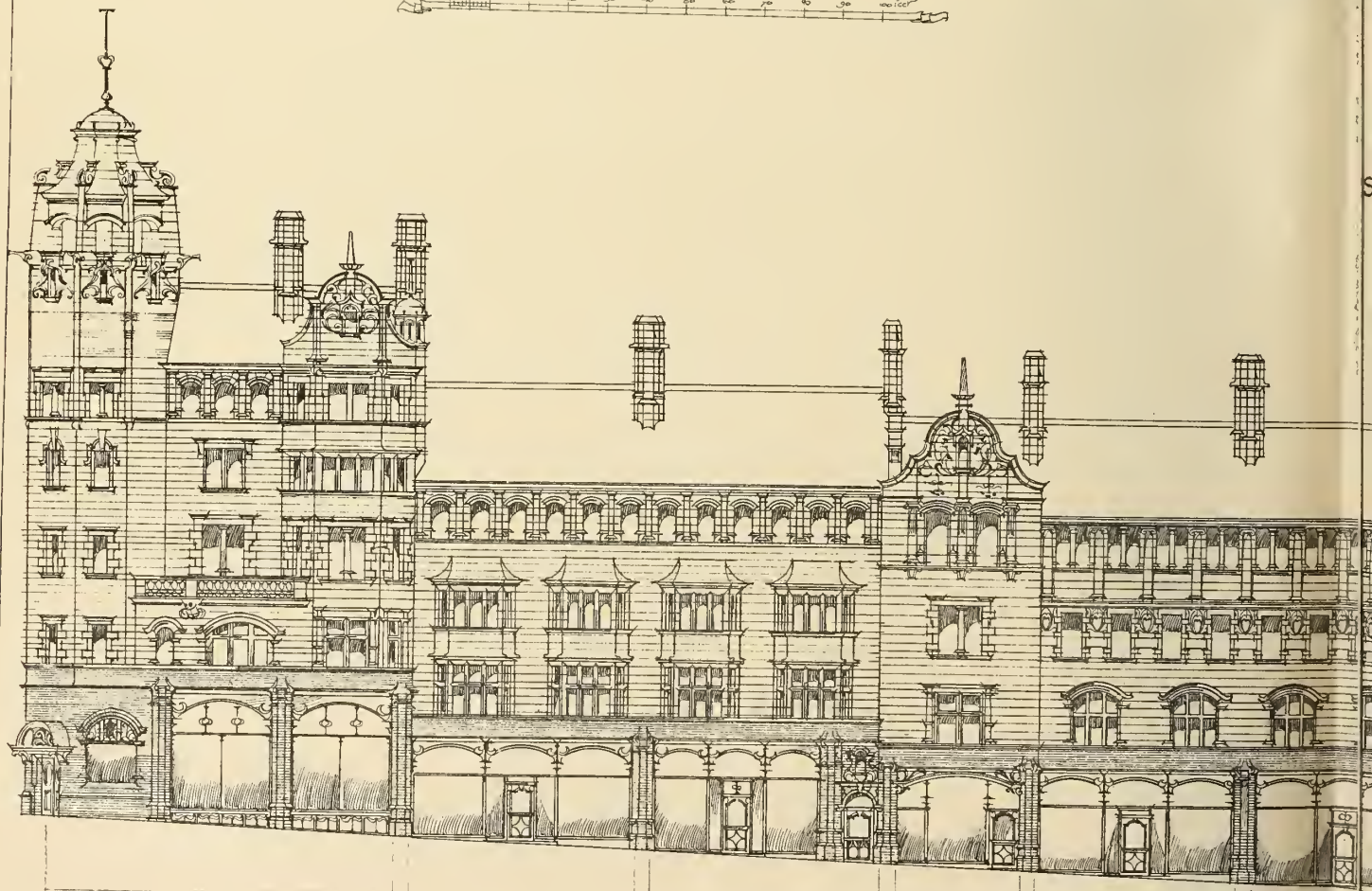
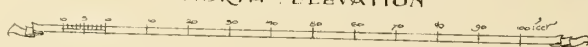
Charles Barry & Son



CARTONRY ENTRANCE TO
CARLISLE CLOSE

NORTH ELEVATION

PUBLIC TRAIL UP TO
ENTRANCE CLOSE
IN NORTH BRIDGE ST



NORTH BRIDGE
ELEVATION OF VE

NORTH BRIDGE STREET · EDINBURGH
RECONSTRUCTION OF BUILDINGS

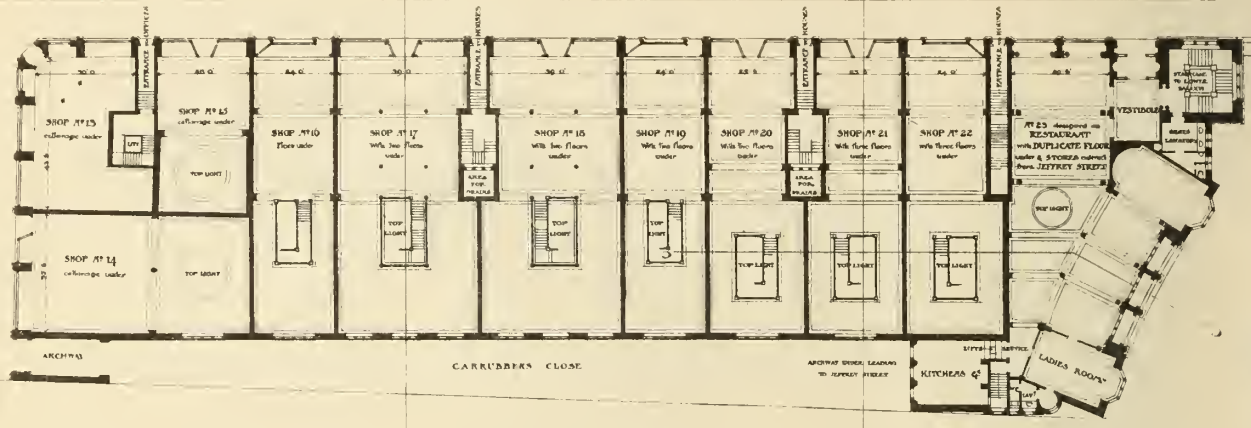
SECOND PREMIATED DESIGN BY MESS^{RS} GIBSON & RUSSELL, ARCHITECTS.

STREET

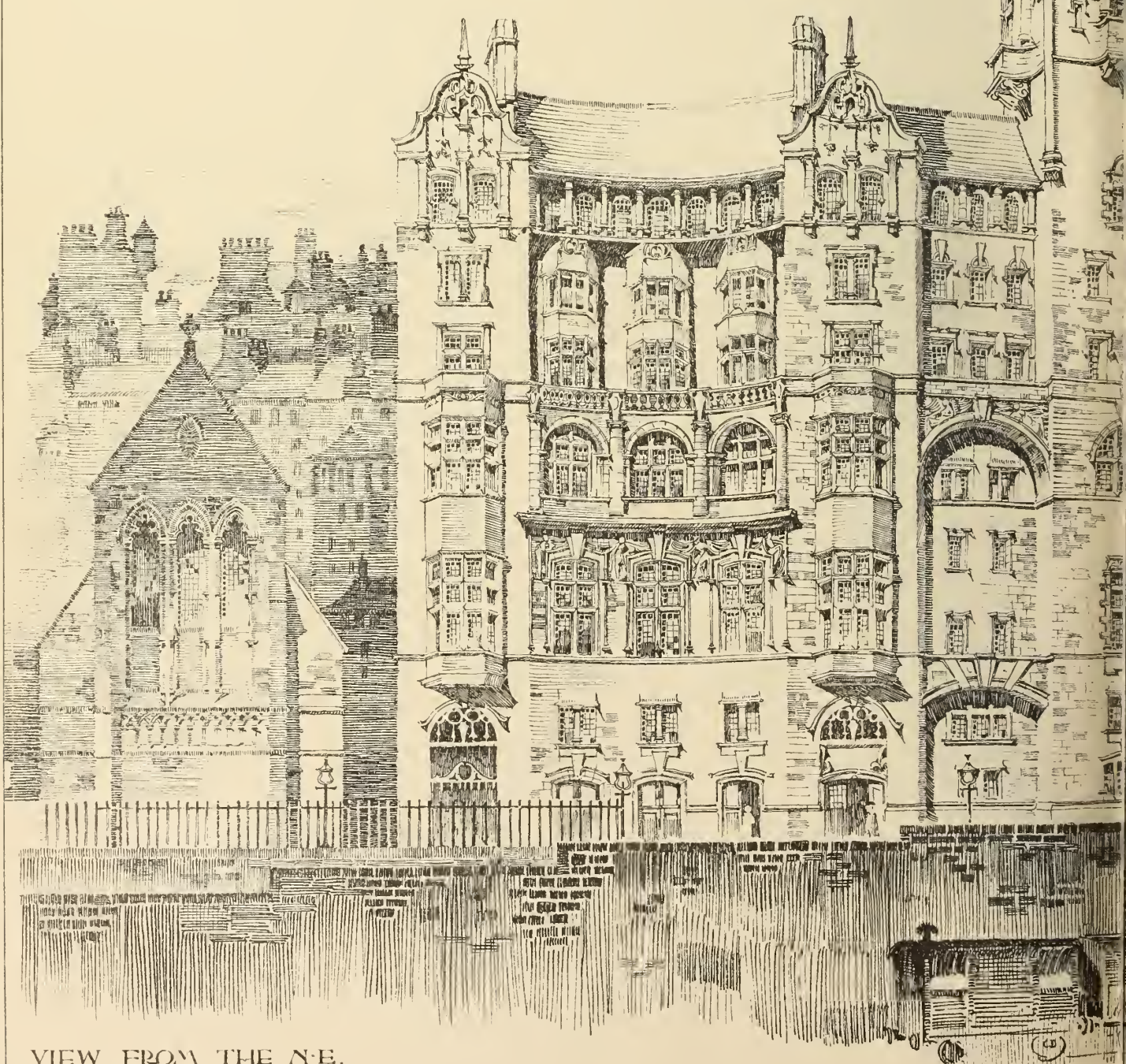
WEST SIDE

LEVEL OF FLEMING MARKET CLOSE

ENTRANCE TO LOGGIA & PUBLIC STAIRCASE DOWN TO MARKET STREET LEVEL



GROUND PLAN
AT LEVEL OF NORTH BRIDGE STREET



VIEW FROM THE N.E.

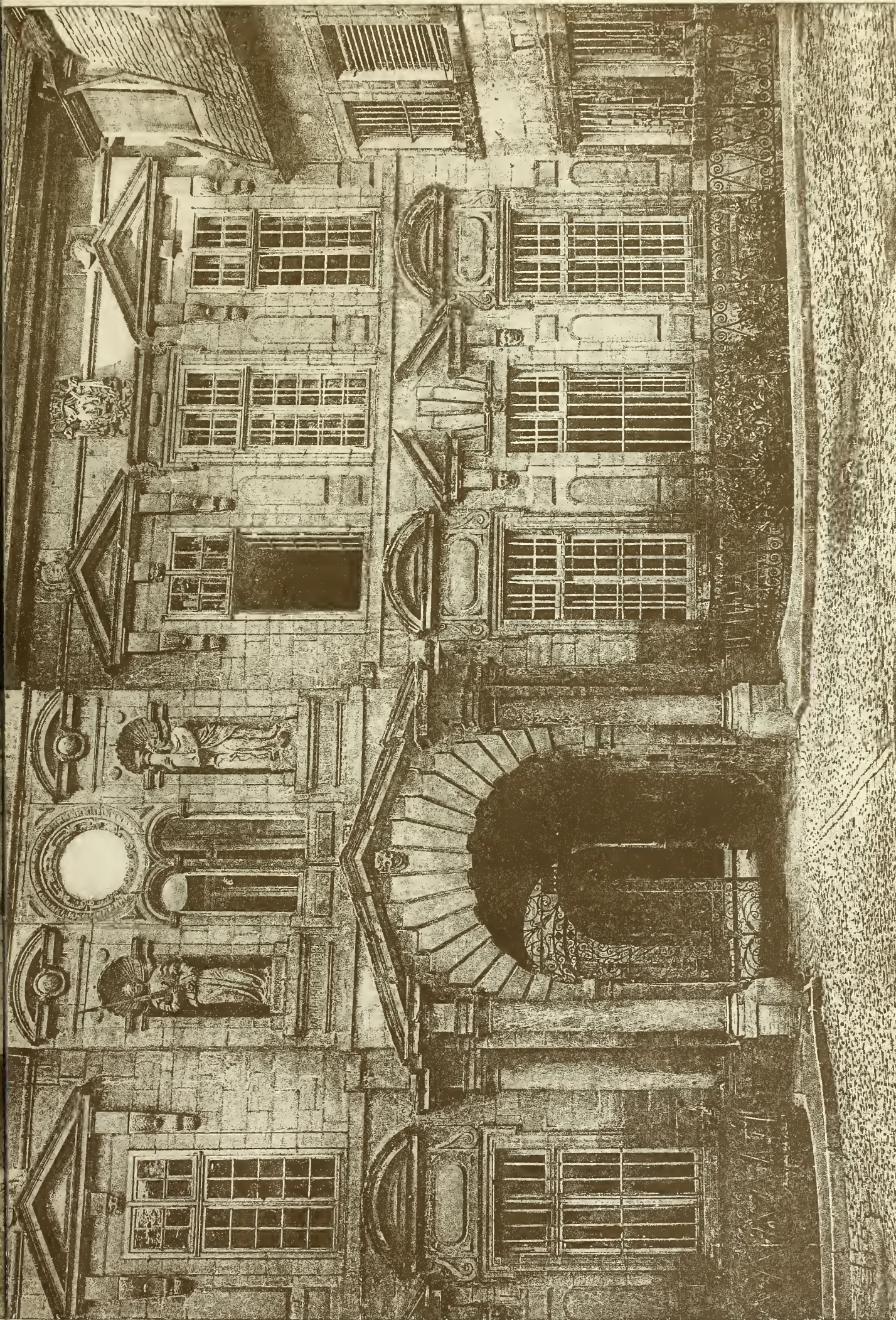
NORTH BRIDGE STREET · EDINBURGH
RECONSTRUCTION OF BUILDINGS

SECOND PREMIATED DESIGN BY MESS^{RS} GIBSON & RUSSELL, ARCHITECTS



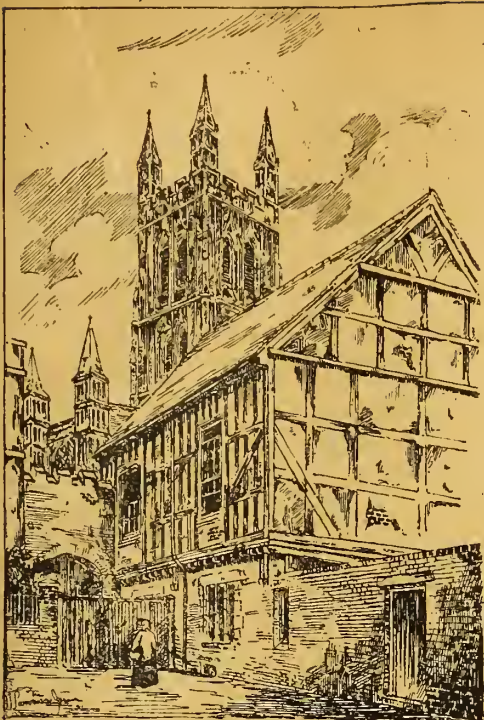
PALAIS DE JUSTICE · BESANÇON ·





FROM PROF C GURLITT'S "DIE BAUKUNST FRANKREICH'S" PUBLISHED BY J BLEYL (DRESDEN)

"PHOTO-TINT" BY JAMES AKERMAN & QUEEN SQUARE LONDON, W



PARLIAMENT HOUSE · GLOUCESTER



CLOSE GATE SALISBURY

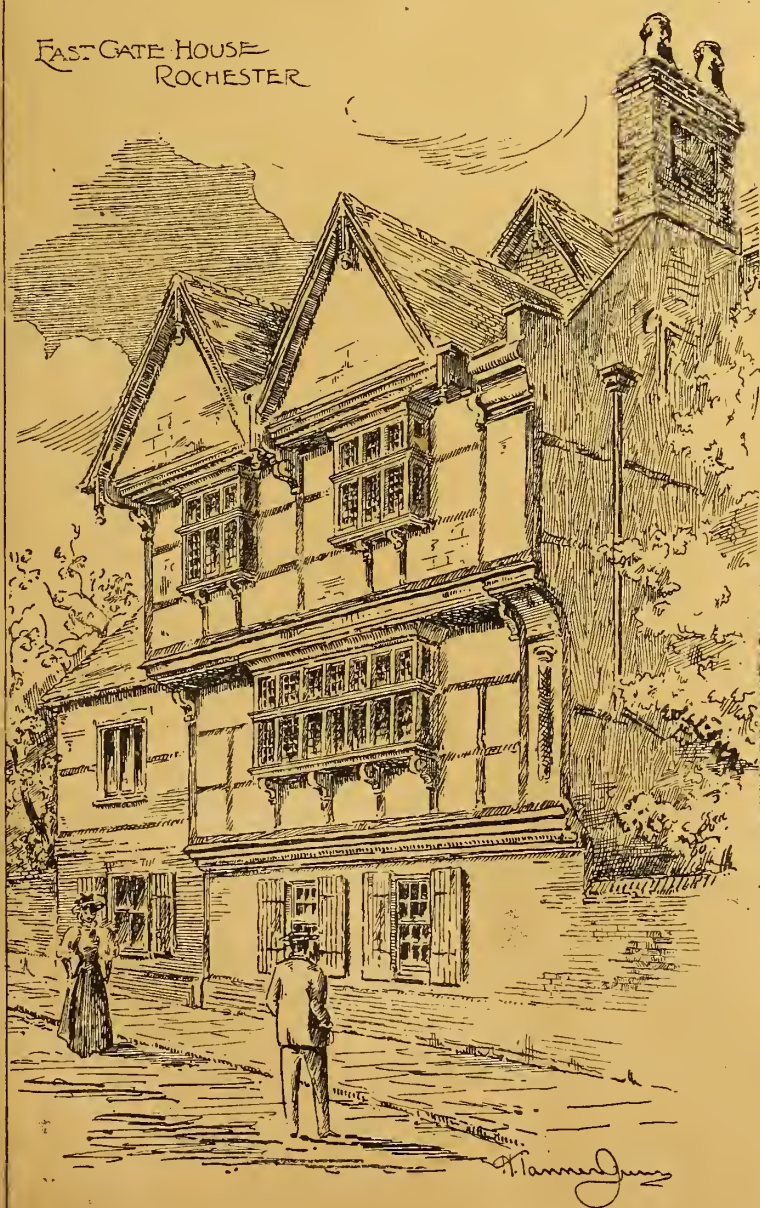
H. Tanner Junr.

DOMESTIC WORK · FROM THREE CATHEDRAL CITIES

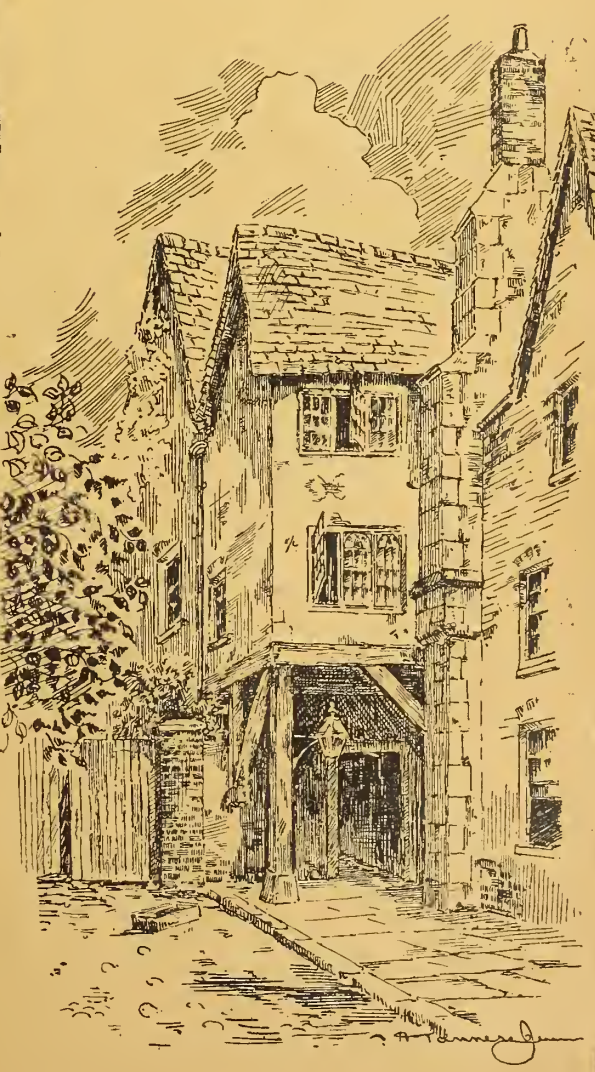
BY · H TANNER JUNR

EAST GATE HOUSE
ROCHESTER

OLD HOUSE · GLOUCESTER



H. Tanner Junr.



H. Tanner Junr.

LEGAL INTELLIGENCE.

WHAT IS A BUILDING?—At the South-Western Police Court on Thursday in last week, John Genders, trading as Parsons and Co., contractor, 135, High-street, Wandsworth, was summoned for contravening the Building Act. Mr. W. W. Young, who prosecuted for the District Board of Works, said the defendant had elevated a wall at the back of a house in Geraldine-road, Wandsworth, and had subsequently erected a greenhouse on it, with the result that both wall and greenhouse were within 50 feet of the highway, and beyond the general line of building. Mr. H. R. Jones, for the defendant, urged that the wall was not a building. Mr. Denman observed that the Act must be so interpreted that each case should be decided more or less on its merits. In this case he did not think the mere elevation of the existing wall made it a structure in the meaning of the Act, but undoubtedly the erection of the greenhouse was an infringement. He adjourned the summons to enable the defendant to take down the greenhouse.

LABELLING A READING CORPORATION OFFICIAL: £100 DAMAGES.—The Deputy Under-Sheriff (Mr. W. F. Blandy) and a jury sat at the Assize Courts, Reading, on Thursday in last week, to assess damages in the case of Lloyd v. Manning. Mr. McCarthy, in opening the case for the prosecution, reminded the jury that they had not to try the case, only to assess damages. The plaintiff, believing himself to be both libelled and slandered by the defendant, after endeavouring to obtain an apology, at last brought an action in the High Court. The writ was issued and served, but defendant did not appear. He did not attempt to justify his statement, and judgment was given against him, the question of damages being remitted to the Under-Sheriff. The plaintiff was Mr. Richard Lloyd, the building inspector under the Reading Corporation, and he had to see that the buildings for which plans had been previously passed by the Corporation were erected in accordance with the by-laws. About two-and-a-half years ago his duties brought him into contact with the defendant, a builder, living at Rose-cottage, Cranbury-road, Oxford-road. Manning was then building Rose-cottage, and the plaintiff had to complain that the defendant was utilising an old wall, which would not be sufficient to carry the building. Defendant had to alter it; but, before doing so, said he would "make it all right" with Mr. Lloyd if he would overlook the matter. A few months later it was discovered that the defendant had put a bedroom in the roof which was not in the plan. Again he told Mr. Lloyd he would "make it all right" with him if he overlooked the matter. Mr. Lloyd refused, and defendant eventually sent in other plans which were passed. Subsequently, the defendant wrote the following letter to Mr. Jane, assistant to the borough engineer, which contained the libel complained of:—"Rose-cottage, Cranbury-road, Oxford-road, Reading, July 17th, 1896. To Mr. J. Bowen. Sir,—As I have had such a job to get my plans passed, I have made a complaint to Mr. Jane about Mr. Lloyd about other buildings which have been done about breaking the bye-laws, and he has informed Mr. Lloyd, and that has upset him. I am going to bring several complaints against Mr. Lloyd for allowing and encouraging people to break the bye-laws, which thing ought not to be done, and it will be impossible for him to keep his post, as he is not a fit man to fill the position he is in. I have weighed him in the balance, and he is found wanting. I should be pleased to see you down here, and I will show you several things which you ought to know. You will see how your bye-laws are treated by the man who ought to look after them. I should not go to all this bother if things were carried out as they ought to be. If you have any desire to try and keep in Mr. Lloyd he can come down with you and he can hear and see what I am going to bring against him. Yours truly, John Manning." Mr. Bowen showed the letter to Mr. Lloyd, and a meeting took place, the plaintiff, the defendant, Mr. Bowen and Mr. Jane being present. The defendant then made a series of allegations of neglect of duty on the part of Mr. Lloyd, and an investigation was made into them. The premises where the plaintiff alleged the bye-laws had been broken with Mr. Lloyd's connivance were examined, and it was found that there were no such defects as the defendant had alleged. After this the defendant wrote a letter to the Building Committee repeating his allegations, and even after judgment against him was signed he repeated them again. Towards the end of July the defendant went to a firm of solicitors and a correspondence "without prejudice" ensued between them and the complainant's solicitors. A form of apology was agreed to, but defendant refused to sign it, and after that his solicitors refused to act for him. Mr. Lloyd was not seeking to make money out of the action—if he was he would probably seek in vain. He wanted a public apology, and would settle the matter then, but the defendant would not do that. The plaintiff then went into the box, and explained that the statements of the defendant lowered his position before the whole town. Further, they damaged his character, and

would tell against him if he wanted to get an appointment in another town. He had been asked several times about the matter in the town. Mr. W. Jane spoke to being present when the houses in which the defendant alleged there had been breaches of the bye-laws were examined; and Mr. C. J. Mackrill, confidential clerk to Mr. Bowen, proved the receipt of the libellous letter. The defendant then went into the box, and, although several times told by Mr. Blandy to address himself to the question of damages, he said nothing on that subject except remarking that he "did not see where the damages came in." He repeated that what he said in the letter was true, and subsequently when taken sentence by sentence through the letter said each allegation was true. The jury assessed the damages at £100. They expressed "their indignation at Manning's refusing to apologise."

CURIOUS DISPUTE AS TO LAND MEASUREMENT.—His Honour Judge Edge heard, at Tavistock County Court on Saturday, an action brought by David Ritchie, outfitter, East Stonehouse, against the Rev. James Knowles, of Roborough Rock Estate, Yelverton, to recover possession of land and £50 damages for trespass and mesne profits. The action was brought to establish the title of the plaintiff to land in Yelverton, bought by the plaintiff in 1889 from the Westcountry House Property Land and Investment Company. At that time defendant was one of the directors. In 1894, about five years after he had purchased the property, the plaintiff went to see it, and found that the defendant had built a wall inclosing a considerable slice of his land, and depriving him of a valuable portion of building sites which he had bought and not developed. He visited the place in consequence of having received a peremptory claim from the defendant, Mr. Knowles, for payment of half the cost of a party-wall which Mr. Knowles had erected, and then found that Mr. Knowles had inclosed 62 ft. in depth of the block of land plaintiff had agreed to buy. The solicitors for the directors of the company, Messrs. Snell and Holman, wrote stating that a mistake had been made in the description of the parcels conveyed to Mr. Ritchie. Plaintiff was not satisfied with this explanation, and ultimately the present action was taken. In cross-examination, plaintiff said he never agreed with Mr. Richards, the company's architect, to give up any part of his land or to alter his boundaries, nor did he know until he visited the property that his boundaries had been shifted. Mr. B. Priestley Shires, A.R.I.B.A., deposed to having made plans of the premises in question. The infringement on the plaintiff's boundary considerably affected the value of his property for building purposes. On behalf of the defendant, it was alleged that a mistake had been made in the descriptions given in the conveyance. The land conveyed to the plaintiff was not of the extent which he now claimed, but about an acre, being the land inclosed by the party-wall in question. The defendant alleged that the mistake in the particulars arose from the inclusion in some of the dimensions of the measurements of an adjoining piece of land which had been bought of the company, before the plaintiff's purchase, by a Mr. Bennet. Mr. W. N. Richards, architect to the company, stated that the plaintiff requested him to alter his boundary, which he did, and staked out the present boundary. In cross-examination, witness said the plaintiff did not agree to give up any part of his land. His Honour adjourned the legal arguments in the case till next week.

ARBITRATION AT PORTISHEAD.—At the Royal Hotel, Portishead, the arbitration meeting in connection with the Urban District Council in respect of the sewerage works, was held on Tuesday, and continued on Wednesday, Thursday, and Friday in last week. Mr. Mansergh, M.I.C.E., Westminster and Birmingham, was the arbitrator. Mr. Foote represented the council, and Mr. F. Weatherly was for Mr. Wilkins, contractor. The chief witnesses for the District Council were Mr. M. Flower, Mr. Trim, and Mr. James Lemon, M.Inst.C.E., Southampton. For the other side Mr. Wilkins, Mr. A. P. I. Cotterell (Bristol), Mr. Smart (foreman), and Mr. Jenkins (ganger). The award will probably not be made for a few weeks.

THE LONDON BUILDING ACT.—SCOTT V. WALLEN. —At Marlborough-street Police Court on Thursday, October 8, Mr. Frederick Wallen, district surveyor for the parish of St. Pancras, West, was summoned before Mr. Plowden to show cause why a notice of objection, with respect to certain proposed pilasters at No. 73, Charlotte-street, Tottenham-court-road, should not be quashed. The building owner, Mr. E. Sanderson, proposed to form a new shop-front in the flank wall of his premises, immediately in front of which there had always existed a small area belonging to him, enclosed with railings, and about two feet wide, and it was contended on his behalf by Mr. O. H. Swann, solicitor, of 103, Cannon-street, that Sub-sections 3 and 8 of Section 73 entitled him to project the shop-front 10 inches beyond the external wall of his premises, and the pilasters on either side a greater distance (in this case 14½ inches). Mr. Wallen, on the contrary, contended that the restriction as to the 10 inches

applied equally to the pilasters as to the actual sashes of the shop-front, expressing his opinion that the pilasters in question were not like "architectural decorations" to those mentioned in Sub-section 8, inasmuch as none of these would reach the pavement and cause an obstruction. Mr. P. H. Adams, A.R.I.B.A., of 65, Leadenhall-street, put in explanatory plans of the matter in dispute, and also drawings, showing how "window dressings" might come down to the pavement. Mr. Plowden said the matter was a highly technical one, but that having considered Section 73 he was of opinion that the pilasters fell within the "exceptions" of Sub-section 8 of that Section, and made an order setting aside the notice of objection of the district surveyor.

DILAPIDATED BUILDINGS NOT "DANGEROUS TO PASSERS-BY."—At the North London Police Court on Wednesday the London County Council summoned the owner of some property in Cassland-road, South Hackney, which was declared by the district surveyor, Mr. A. Payne, to be a dangerous structure. It was not denied that the buildings in question were in a dilapidated condition, that the ceilings and floors were falling—in one case there was a hole big enough for a man to fall through—and that the brickwork was defective. The defence was that the buildings were on private land, and, therefore, could not be dangerous to "passengers." Mr. Collman, the magistrate, said, under the circumstances, these were not dangerous structures under the Act; but he adjourned the case for the Council to consider whether they would proceed under another section of the London Building Act.

HEWING "STONE" IN PUBLIC PLACES.—At the Guildhall Police Court on Tuesday, George Conybeare was summoned for hewing stone in a public place. A police constable said he received a complaint from a gentleman that he had been struck outside the Royal Exchange by a chip of stone. He went to the defendant, who was chipping away a flag-stone in order to remove it from the pavement. He had no screen round, and large chips were flying in all directions. Mr. Vickory, solicitor, appeared for the defendant's employers, Messrs. Mowlem and Co., and contended that defendant did not chip the flagstone, because he took it up whole, and what he chipped away was the hard cement underneath. The chip produced was not stone but hard cement. For the defence, Mr. George Gardner, foreman to Messrs. Mowlem, said the old stones near the Exchange were removed and replaced on new beddings of cement. The sample chip produced was "neat cement," hardened. Alderman Green considered it proved that what was chipped was cement, and that it was just as dangerous as stone. The Act of Parliament did not forbid cement chipping, and therefore the summons must be dismissed.

CHIPS.

The Ipswich Corporation decided at their last meeting to extend the wood-paving in Prince's-street, St. Helen's-street, and other main thoroughfares, as recommended in a report by Mr. E. Buckham, the borough surveyor, the estimated outlay being £4,620.

Mr. A. H. Claypoole, A.M.I.C.E., chief engineering assistant to the city surveyor of York, has resigned his position under the Corporation, on being appointed as assistant engineer on the City of Manchester main drainage.

At the City Guildhall, on Monday, a marble bust of the Duke of Cambridge in uniform, and executed by Mr. F. J. Williamson, of Esher, was presented to the City Art Gallery.

The east window of West-end Church, Southampton, is about to be filled with stained glass, designed by Sir Arthur W. Blomfield, A.R.A., the architect of the church, as a memorial to the late Edwin Jones, J.P. The five lights will be occupied by subjects illustrating the Te Deum.

A new organ in Holy Trinity Church, Armley, Leeds, built by Messrs. Wordsworth and Co., of that city, was opened yesterday (Thursday).

The foundation-stone of the new Sandeman Public Library, in Perth, was laid on Wednesday week with Masonic ceremonial by Lord Provost Dewar. The building, which, besides the library, will also contain a picture gallery, will cost £13,000.

The Duchess of Teck formally opened on Friday the new infirmary for the Brentford Board of Guardians, built at Isleworth. The building contains 264 beds, and consists of a series of four pavilions connected by corridors, and each having three floors. The architect was Mr. W. H. Ward, of Birmingham, and the actual work of building was carried out by Messrs. T. J. Messom, of Twickenham, at a cost of £30,000, to which a further sum of £10,000 for interior fittings and furniture must be added.

The city council of Chester at their last meeting unanimously adopted a scheme by Mr. Isaac M. Jones, the city surveyor, for the sewerage of the district on the north side of the river, at an estimated cost of £5,000.

Intercommunication.

QUESTIONS.

[11575].—**Architects' Charges.**—An architect received notice to proceed to a town 32 miles by rail from his place of business, to take instructions for alterations and additions to an important building. He made drawings, &c., obtained tenders, and superintended the execution of the works. No terms were agreed on for services. The works cost £800. He sent in his account, charging 5 per cent. commission on the outlay, the sum paid for travelling, and 9s. an hour for the number of hours actually in the train. He paid seven visits to the works, each visit occupying 7 hours, 4 of which were passed in the train and 3 at the works. The proprietor will pay the commission and railway fare, but refuses to pay for the time in travelling, thus placing the architect in the position of a local man, although he had to travel 64 miles on each visit.—W. B. G.

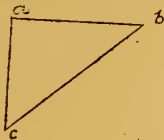
[11576].—**Wall Posters.**—I have a high brick gable I have tried to use for advertising purpose, but up to the present have not been able to make the posters adhere to the wall after a heavy rain. Most of the mortar joints are good; some pointing may be required in places, but do not suppose that would prevent the rain getting behind the posters and gradually loosening them. Before going to the expense of boarding the gable, should be glad to hear if a paste can be made which will withstand the weather.—WALTER RICHARDS.

[11577].—**Quantities.**—Would someone favour me with an expeditious method of taking out quantities: that is, generally, for multiplying together feet and inches, and fractions of inches?—XIV.

[11578].—**Dancing-Floor.**—I shall be glad if any of your readers can give me any particulars as to the construction of a floor suitable for dancing—that is, containing the necessary spring.—ATLAS.

REPLIES.

[11572].—**Strains.**—Draw ac vertically to represent the weight (2 tons) to any convenient scale; draw cb parallel to CB , and ba parallel to BA . Then the length of ab gives the strain (5,220lb.) on the bar AB , and the length of cb gives the strain (6,900lb.) on the bar BC , to



the same scale to which ac represents the weight (4,480lb.). "Anxious" is referred to "Graphic Statics" III. p. 480, for fuller information on this subject. In the question it is not stated what is given. If the lengths of AB , BC , and CA be given, the strains may be calculated thus—

$$\text{Strain in } AB = \frac{\text{length of } AB}{\text{length of } AC} \times \text{weight}$$

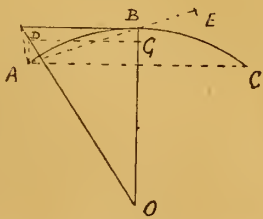
$$\text{Strain in } BC = \frac{\text{length of } BC}{\text{length of } AC} \times \text{weight}$$

If the angle at A is a right angle, we shall have—

$$BC = \sqrt{(AB)^2 + (AC)^2} \text{ (Euc. I. 47).}$$

—J. C. PALMER.

[11574].—**Centre of Gravity.**—Let ABC be the arc which passes through the centres of gravity of all cross sections of the bar, B being the point of bisection of the arc. Let O be the centre of the arc. Then the required centre of gravity is evidently the centre of gravity of the



$$OG = \frac{(OA)^2 \times \sin AOB}{\text{length of arc } AB}$$

arc ABC , and lies on OB . At B , draw the tangent BT , making BT equal in length to the arc AB ; join OT , draw AD parallel to OB , cutting OT at D ; draw DG perpendicular to OB , cutting OB at G , which is the centre of gravity required. Note: In order to make BT approximately equal to the arc AB , we may join AB and produce to E , making BE equal to half the chord AB . With E as centre, and EA as radius, describe an arc cutting BT at T . Then BT is approximately equal to the arc AB . If it be desired to calculate the distance, OG , of the centre of gravity from O , we may obtain easily from the integral calculus, or from the above construction,

The centre of gravity can be roughly found by cutting up into small arcs, and treating as straight lines.—J. C. PALMER.

A survey has been ordered by the engineers of the South-Eastern Railway Co., with a view to carrying on an extensive enlargement of Folkestone Harbour, and a loan of £450,000 required for the work has already been guaranteed. One part of the plan is stated to be the extension of the present mail-packet pier.

Our Office Table.

IN opening the exhibition of the Aberdeen Artists' Society on Friday, the Marquis of Huntly enloured the promising works of young Aberdeen artists, and considered that the influence of the Society, as regarded both art and artistic work, might be more widely spread than it was. As a frequent visitor to Aberdeen, for example, he protested against the atrocious specimen of art recently reared facing Union-terrace in the form of the new Trades Hall. One of the finest sites in the north of Scotland had been irretrievably ruined by a building which, in its architecture and finish, should have been carried out in a better design and in an artistic manner. Scotsmen generally would never dream of permitting Princes-street, Edinburgh, to be desecrated in such a manner. His lordship sympathised very strongly with the suggested granite statuary in Aberdeen; but pointed out the difficulty of treating figures in modern dress in that stone. He trusted, however, there would be a movement to treat the native granite as a material for large allegorical subjects, after the manner of the Egyptian sculpture.—This art exhibition is one of the best displays of pictures yet brought together in the "granite city." Among the chief works are Leighton's "Bracelet," "In Perfect Bliss" by Millais, "Pauvre Fauville" by Bastien Le Page, "Love's Jewelled Fetter" by Alma Tadema, "The Widow" by Paul Chalmers, and "The Hamadryad" by J. W. Waterhouse. Among the portraits are Whistler's "Carlyle" (lent from the Glasgow Art Gallery) and one of the artist himself, and works by Orchardson, Shannon, Fildes, Sir George Reid, and Coutts Michie. A small but representative collection is brought together of works by William Dyce.

IN a report recommending the London County Council to sanction the expenditure of £30,000 on temporary iron buildings at Hanwell Asylum, the asylums committee of that body point to the difficulties they experience in meeting demands for accommodation. The proposed new buildings will accommodate 400 additional patients. Preliminary investigations have been made at the Horton Manor Estate, Epsom, which has been acquired by the Council for the purpose of building a seventh county asylum, with a view to erecting temporary buildings on that site, but at present no definite proposal has been formulated. The committee estimate that with an increase of 600 certified lunatics per annum in the county, they will, on January 1, 1901, have 15,866 lunatics to accommodate, and the estimated accommodation at that date, including the sixth (Bexley Heath) and the seventh (Horton Manor) asylums for 2,000 each, with the present proposal of 400 extra beds at Hanwell and 700 at Horton, will even then be only sufficient to meet the demands. They express the hope that the sanction of the Home Secretary will be obtained to their occupation of the proposed new buildings for a longer period than the five years granted for the buildings at Colney Hatch and Banstead.

At Tuesday's meeting of the London County Council, this report by the Asylums Committee was adopted. A discussion arose on the recommendation of the same committee that the tender of Mr. Lovatt, of Wolverhampton, amounting to £91,879, for the first part of the superstructure of the Bexley Heath Asylum, be accepted. The Committee reported that blank bills were recently sent to the Works Department with an invitation to them to fill in prices for the work. After examination of these prices by the architect, Mr. Hine, and the quantity surveyors, they were unable to accept them, and therefore invited tenders. Complaint was made that the Works Committee had not been treated fairly in this matter; but the proposal that they should be given the opportunity of reconsidering their schedule was defeated by a large majority. The chairman of the Asylums Committee stated that the expenditure on asylums contemplated during the next five years was not far short of £1,000,000. The recommendation of the General Purposes Committee on arbitration in disputes with contractors was accepted. It provided that, with a view to applying the principle of outside arbitration in the case of works carried out by the Works Committee, the points of final difference between the officers of the Works Department and the certifying officers be reported to the General Purposes Committee, and that that committee be empowered to give the necessary

authority for the points in dispute to go to arbitration, and to appoint an arbitrator after receiving agreed nominations from the officers of the Works Department and the certifying officers.

A SPECIAL committee of the Glasgow Town Council, who are considering the desirability of establishing a fire insurance department, made an interim report on Thursday, in which they state that the insurance schemes of various English and Continental bodies and corporations have been under consideration, but that further information is still desirable. The committee, however, recommend the corporation in the mean time to take over the insurance of their own property, and remitted to the chairman, and two other members, with the town clerk, to take the opinion of counsel on how best to carry out this recommendation. In order to conserve freedom of action, the committee also recommend the corporation to provide notice in the Bill to be promoted by them in the ensuing session of Parliament for power being conferred on the corporation to insure against loss by fire their own and other property, and that the matter be remitted back to the committee for further consideration. There was also submitted an abstract of the insurances of the corporation for nine years from 1888 to 1896, with a statement of the reserve funds of the several departments. Taking the whole period, the total sum insured was £7,144,487, and the net premiums paid £12,244 6s. 4d., being an annual average of the former of £793,832, and of the latter of £1,360 9s. 7d. The average rate of premium was 3s. 5d. per cent. The losses during the whole period made good by companies amounted to £7,215 3s. 10d., being equal to 2s. per cent. of the sum insured, while the percentage on net premiums was £58 18s. 6d. The total of the reserve funds was stated at £17,534 0s. 5d. The report gave rise to a long discussion at the meeting of the town council, and by 24 votes to 12 it was referred back to the committee for further consideration.

THE Improvement Committee of the Birmingham City Council have reported to that body, recommending the adoption of plans prepared by Mr. Addie, the manager of the important scheme for the provision of artisans' dwellings in Mill-street in that city, and advising the council at its meeting in December to apply to the Local Government Board for sanction to raise a loan to carry out the improvement. Seventy-two houses were condemned, and the Act requires that half the number of new dwellings shall be erected. The plans provide for the erection of 64 dwellings; but it is the intention of the committee, should the sanction of the council be received and the assent obtained of the Local Government Board, to have only half that number built at the outset. The area of the proposed site is about 4,040 square yards, and has an awkward angle on the one side, caused by the junction of Little Ann-street with Milk-street. The buildings which it is proposed to erect will be of a dual character; but, unlike the flat system common in many large towns, each dwelling will be provided with a separate entrance, and complete privacy will thus be secured to the tenants. Each dwelling will consist of three rooms—namely, a living-room and two bedrooms, and, in addition, will be provided with a scullery, water-closet, and a dust-receptacle. The living-rooms will be 12ft. 9in. by 10ft. 6in., and the bedrooms 11ft. 4½in. by 8ft., and 11ft. by 9ft. 6in. respectively. The ground-floor dwellings will have doors at the front, and the dwellings above will open into a long corridor, which runs the complete length of the block, and is approached from below by a flight of steps. The corridor cuts off the living and sleeping-rooms from the scullery and conveniences. The ground-floor dwellings are also provided with a similar corridor at the back. It is estimated that they will be let—the ground-floor dwellings at 4s. 3d. per week, and the first-floor tenements at 3s. 9d. per week. It is impossible to let them at lower rents, owing to the fact that the ground-rent is 1s. 2d. a yard. Fully one-third of the land has been left vacant to provide ventilation.

THE Leeds Master Builders' Association and Builders' Exchange Club gave a complimentary dinner, on Thursday in last week, to Councillor Hannam and the members of the Strike Committee who were instrumental in bringing the recent prolonged dispute in the building trade of Leeds to a close. The dinner was served at the Queen's Hotel. About seventy persons sat down, the chairman being Mr. Isaac Gould.

Mr. Umpleby proposed the toast of "The Master Builders' Association and Builders' Exchange Club." Mr. Chas. Myers responded on behalf of the Master Builders' Association, and Mr. W. H. Dews for the Builders' Exchange Club. "The Strike Committee," which was given by the chairman, was responded to by Mr. Irwin, Mr. Wilby, and Councillor Hannam.

The urban district council of Weston-super-Mare after much discussion decided, on Friday, to seek powers in their Improvement Bill of next session for building a pavilion. Objection was raised by some members to the estimated cost of £8,000, it being urged that Plymouth, with a population of 60,000, had only expended £8,000 on a pavilion, while at Ilfracombe the cost had been £4,000, and at Torquay the designs recently adopted would only cost £5,000. It will be seen by an advertisement elsewhere that the council have decided to invite competitive designs for the pavilion and offer premiums of £50, £20, and £10. They promise to appoint a "qualified and independent architect," not in practice in Weston, as assessor, and will pay an inclusive commission of 5 per cent. to the competitor selected as architect, but reserve to themselves the right to carry out any one of the three premiated designs as they may regard as most suitable. A guinea is asked for plan of site, and designs must go in by December 10.

A porch and other additions are about to be made to St. Andrew's Church, Fulham, from designs by Messrs. Aston Webb and Ingress Bell.

The West Riding Rivers Board met at Wakefield on Friday, and appointed Mr. H. Wilson, M.D., B.Sc., of Shrewsbury, deputy medical officer of health for Shropshire, as chief inspector of rivers, at a salary of £700, in succession to Dr. Whitelegge.

Mr. Joachim B. Mathisen, member of the firm of Howard and Mathisen, architects, of San Francisco, Cal., committed suicide by hanging in Berkeley, Cal., September 26.

The Newark-on-Trent Rural Sanitary Authority recently received no fewer than 108 applications for the post of surveyor and inspector of nuisances, the salary offered being only £130 a year. Mr. T. Vickers, at present lighting inspector to the Sleaford District Council, was elected.

Lord Carysfort has offered to build a Protestant church for the parishioners of Arklow at a cost not to exceed £25,000.

The organ of St. Mark's Church, Torquay, which has been rebuilt and enlarged by Messrs. Hele and Co., of Plymouth, at a cost of £500, was reopened on Friday.

Mr. William Ambrose, the arbitrator appointed by the Local Government Board as between the Southampton Corporation and the various owners of property under the Housing of the Working Classes Act, 1890, and the Southampton (Simmel-street and West Quay) Improvement Scheme, 1894, sat at the Audit House, in that town, from Monday till Saturday in last week, hearing evidence from owners, their agents and surveyors, as to the value of the properties sought to be acquired.

At last a joint effort on the part of the Board of Works for Ireland and the Royal Antiquarian Society and Royal Irish Academy is about to be made for the preservation of the ancient monuments, and more especially the Round Towers, of Ireland.

At the half-yearly meeting of the Court of Governors of the University College for South Wales, held at Cardiff, Lord Tredegar presiding, it was reported that at the end of July last nearly £19,000 of the necessary £20,000 for the building fund had been secured, and that a guarantee bond had been given by a few friends for the remaining £1,000.

The Ripon Board of Guardians have adopted the plans of Mr. F. H. Hargreave, of Ripon, for the new workhouse infirmary. The cost of the new building is estimated at £2,350, in addition to which draining and heating are to be provided for.

Damage to the extent of £6,000 has been caused by a fire which broke out in the drying-tower and trellis stores of the Waterside Engineering Works of Messrs. Ransomes and Rapier at Ipswich.

A proposal is on foot for erecting a pier at Warrepoint, Co. Down, at an estimated cost of about £16,000, to be equally borne by the Warrenpoint Town Commissioners, the Great Northern Railway of Ireland, and the London and North-Western Railway.

Cheering reports as to the state of trade come from Perth, in Westralia. The building trade is extremely active, and all kinds of builders' requisites are in short supply. Cement, the normal price for which is 11s. 6d. per cask, is in strong demand at 17s. Timber is scarce and dear. Sheet lead has advanced to £18 per ton.

MEETINGS FOR THE ENSUING WEEK.

MONDAY.—Exhibition of Works in Wood and Wood Carving, Carpenters' Hall, 11 a.m. to 6 p.m. (Open free to the public for three weeks.)

TUESDAY.—The Society of Architects. Annual meeting of members, and election of officers and council, St. James's Hall, Piccadilly, 8 p.m.

The Society of Architects.

Founded 1884. Incorporated 1893.

THE ANNIVERSARY MEETING of the Society of Architects, for the Session 1895-96, will be held at the Rooms of the Society, at St. James's Hall, Piccadilly, W., on TUESDAY, OCTOBER 27th, 1896, at Eight p.m., when the OFFICERS and COUNCIL for the Session 1896-97 WILL BE ELECTED.

ELLIS MARSLAND, Hon. Sec.
MONTAGU BALDWIN, M.A., Sec.

CHIPS.

Messrs. Laroyd Bros., Leeds-road, Huddersfield, have had a new illuminated turret-clock, showing time on three dials, erected in the tower at the entrance of their new works, Messrs. William Potts and Sons, of Leeds and Newcastle-on-Tyne, having made and erected the same.

A brass eagle lectern has just been placed in Sleights Church, Yorkshire. The base is a replica of the famous Southwell model, and is supported on three lions. The ball bears the inscription. The work was executed by Messrs. Jones and Willis, of Birmingham, London, and Liverpool.

The Deanston Public School, Donne, Perthshire, is being warmed and ventilated throughout by means of Shorland's patent Manchester grates, the same being supplied by Messrs. E. H. Shorland and Brother, of Manchester.

On Tuesday week Colonel A. S. Durnford, R.E., an inspector of the Local Government Board, attended at the Guildhall at Peterborough, to hold an inquiry concerning applications from the Peterborough Town Council for sanction to borrow £800 for purposes of the Fletton Recreation Ground, £700 for the purchase of land for the widening of Park-road, and £70 for the improvement of St. John's-street. The borough surveyor, Mr. Walshaw, explained the proposals.

The new clock in the central tower at Southwell Minster will be formally opened this (Friday) afternoon. The clock itself will go for six days without winding, but the chimes for the quarters require winding every day. The new clock has cost about £200, and the maker is Mr. Joyce, of Whitchurch.

The memorial-stone was laid on Thursday in last week by Mr. Batty Langley, M.P., of a new Congregational church in course of erection in Sheffield-road, Barnsley. The cost, including the alterations required in the old chapel to make it suitable for a school, will be £1,500.

The Worsop to Tuxford section of the East-to-West Railway is steadily nearing completion. The buildings at Edwinstowe, one of the largest stations on the line, are nearly finished, as is also the station-master's house, and not much remains to be done at the neighbouring station at Ollerton. During last week the company's engines made trial trips and tested the bridges. The line will be opened for mineral traffic about the 1st November.

A fire broke out on Friday night in the large workshops of Messrs. John Taylor and Son, cabinetmakers and upholsterers, Rosemount, Edinburgh. The buildings, which are 150 yards in length by 32ft. in breadth, lie between Gardner's-crescent and Grove-street. Damage to the extent of over £25,000 was caused, but the designs and patterns were fortunately saved.

Mr. and Mrs. Elijah Slater, of Ashville, Farsley, have presented to Farsley parish church a reredos, which the Bishop of Wakefield unveiled on Saturday. The material of the reredos is oak, and the total height from the floor to the top of the cross is 14ft., whilst the breadth is that of the chancel itself. The centre part is carried above the rest, and terminates in a carved floral cross. The picture in the centre is a copy of Rubens' masterpiece, "The Descent from the Cross," in Antwerp Cathedral, and painted by the Dutch artist, Van Lil. The work has been executed by Mr. J. Taylor, of Yeadon, and the decoration by Messrs. Powell Bros., of Leeds, the whole from the designs by Messrs. T. H. and F. Healey, architects, of Bradford.

Mr. Henry L. King, one of the pioneers in the settlement of California, and who was 20 years ago the most prominent architect on the Pacific Coast, was found dead in his room in San Francisco on September 25. He had been asphyxiated by illuminating gas accidentally turned on. Mr. King superintended the construction of the Palace Hotel, San Francisco, as well as some other of the best buildings of the earlier years of that city's history.

Trade News.

WAGES MOVEMENTS.

ABERDEEN.—A dispute has arisen between the Operative Masons and Granite Cutters' Union and a contractor in the city over the introduction of quarry-wrought material in the building trade. This is stated by the union to be a contravention of the by-laws agreed on between the employers and operatives. The matter was under the consideration of the committee of the Masons and Granite Cutters' Union on Friday night.

BIRMINGHAM.—The General Purposes Committee of the Birmingham Corporation received a deputation on Monday from the Building Trades' Federation with reference to the carrying out of the clause in the corporation contracts requiring the contractors to pay "the minimum standard rate of wages current in the district in which such works may be constructed or executed." The deputation, which was introduced by Councillor Stevens, consisted of Messrs. L. Gascoigne and H. Cook (carpenters), J. Farr (stonemason), W. Baker (plasterer), J. Wilmot (plumber), J. R. Mole (painter), and G. Hickman (labourer). Mr. Gascoigne, speaking for the deputation, submitted suggestions as to the amendment of the regulation, and urged that the spirit of the regulation had been violated by contractors in the building trades sub-letting portions of their contracts to persons outside the district, who paid wages much lower than the standard rate of the Birmingham district. The Lord Mayor promised, on behalf of the committee, that the representations made should be fully considered.

CARPENTERS' STRIKE IN BELGIUM.—A deputation of Belgian carpenters and joiners are at present on a visit to this country, their mission being to ask for material aid for the carpenters and joiners of Belgium, who, to the number of more than four thousand, have now been for some months on strike. This appeal has been recommended by the Parliamentary Committee to the support of the Trade Unions of England. At present Belgian carpenters are paid at the rate of 3½d. an hour for a week of 72 hours, including Sundays; i.e., a possible maximum wage of a guinea a week, and from this deductions are made. They ask for increased pay to the extent of 40 per cent., the abolition of Sunday labour, and a 60-hour week. Even if all this were conceded, their gross earnings could not exceed the sum of 25s. a week.

EDINBURGH.—The masters in the Edinburgh and Leith lathsplitting trade have agreed to advance the rate of wages of the men from 8d. to 8½d. per hour, the increase to take place from Monday, November 16.

The consecration of the new church at Carlton Miniot, near Thirsk, took place on Friday. The new edifice occupies the site of the ancient parish church, which had become so dilapidated as to be dangerous for the holding of service. The contractor for the new building was Mr. Harwood, of Mansfield, Darlington.

A new church for the Wilson United Presbyterian Congregation, Perth, which has been erected at a cost, including organ and furnishings, of £10,000, was opened on Friday.

The Prince of Wales has accepted an invitation from the corporation of Longton, Staffordshire, to lay the foundation-stone of the new Free Library and Technical Instruction Buildings early in January.

Mr. Richard Johnson, the chief engineer of the permanent way of the Great Northern Railway, has sent in his resignation to the directors, to take effect at the end of the present year. Mr. Johnson, who has seen close upon fifty years of railway life, entered the service of the company as a mechanic.

Lord Wolsley completed his first inspection of the Garrison at Devonport on Friday. In the morning he visited the new barracks being erected at Crown-hill, near Plymouth, at the cost of £100,000.

The first annual dinner of the Watford branch of the General Union of Operative Carpenters and Joiners was held at the Swan Inn, High-street, Watford, on Wednesday week, when over 40 were present. Mr. W. G. Buckoke (president of the Watford branch of the G.U.C.J.) occupied the chair, and Mr. A. Babbs (vice-president) was in the vice-chair.

The new south wing of Lady Margaret Hall, Oxford, was opened on Thursday in last week.

A memorial cross to the memory of the late Mr. Isaac Baty (1850-94) has been erected in Hexham Cemetery by Mr. Robert Beall, sculptor, of Newcastle, under the direction of Mr. Charles C. Hodges. It is executed in stone, and is a replica of the cross erected to Acon, Bishop of Hexham, about 740. The cross is richly carved on three sides, and stands upon three steps.

CHIPS.

The Colne Corporation have decided to erect a new cattle-market on a suitable site in Dockray-square, off Windy Bank. Public abattoirs will also be constructed. Sanction has been received from the Local Government Board to borrow the necessary amount. The Colne Corporation have also decided to petition the Local Government Board for sanction to borrow £10,000 for the construction of sewerage and drainage works.

At the Dewsbury Cemetery on Saturday a monument to the memory of the late Rev. Peter Mackenzie, the well-known Wesleyan preacher and lecturer, was unveiled by Miss Mackenzie, the daughter of the deceased. The monument is of Rubishaw grey granite and stands 22ft. high, and the total cost has been about £180.

The Liverpool Baths Committee have instructed the superintendent to have prepared plans and estimates for the erection of new baths at the Pierhead, at a cost of £30,000.

New premises in Corporation-street, Birmingham, are approaching completion for A. R. Dean, Limited. The building, which has been erected from the designs of Messrs. Crouch and Butler, comprises cabinet factory, mill, stabling, showrooms, offices, &c., and is lighted throughout by electricity. The showroom on the ground floor consists of a front shop, with a frontage to Corporation-street. A basement is also fitted up as a showroom.

The city council of Truro have appealed to the Local Government Board for sanction to borrow £530 for the purchase of a site for the proposed technical school and art gallery.

A new theatre has just been opened in Corporation-street, Chesterfield. It is in style Classical Renaissance, and the façade has a stone base and brick upper portion, with stone dressings, pediment, and balustrade. The windows are of tinted glass. The building will seat about 1,300 persons, and being greater in width than length, all the audience will be within hearing distance of the stage, and, as the floor and galleries are sloping, all will be able to see well. There are in all 15 exits, the doors have "panic" fittings, there are six fire hydrants, and the curtain is fireproof. The prevailing tint in the decorations is terracotta, relieved with white and gilding. Half-a-dozen dressing-rooms have been provided. Messrs. Rollinson and Son, Chesterfield, are the architects, and Messrs. Green and Co., Rotherham, were the contractors.

At Aldeburgh, East Suffolk, a new hotel, to be styled the Wentworth Castle, is about to be built. It will be erected from plans by Mr. Key, of London and Aldeburgh, and will contain 37 bedrooms, besides the usual public apartments.

The city corporation of York have received as a gift from a lady who is removing from the city several works in statuary for the Fine Art Gallery, including "The Boy and Butterfly" and "Alexis and Hamadryads," by Thrupe; "Ruth, or the Gleaner," "Jephtha's Daughter," "Crossing the Brook" and "Rebecca," by Gott; "A Dancing Girl," and a Magdalen, in alabaster, both after Canova.

A new residential hotel, to be known as the Orwell Arms, is about to be built at Felixstowe, from plans by Mr. J. Shewell Corder, of Ipswich. The estimated cost is about £14,000.

At Barnsley the memorial-stone has just been laid of a new Congregational chapel. The building will be Gothic in style, will be built of stone, and will accommodate 400 persons. Mr. George Moxon is the architect.

The Tasmanian Government intend to ask Parliament to offer a bonus of £2,000 for the first 5,000 tons of cement manufactured in the colony, and should the vote pass, a powerful syndicate will be formed in Melbourne to develop the rich deposits of the required minerals known to exist in Maria Island.

The Liverpool Chamber of Commerce, which has been devoting attention to the improvement of railway facilities between Liverpool and Lancashire towns, has issued an intermediate report. Mr. Alfred Holt's scheme for a plateway and Mr. Calthrop's for a light railway have been discussed. Mr. Holt estimates the cost of his project at £38,500 a mile. Colonel Horne, the well-known railway contractor, has submitted a scheme for a goods railway. All are under consideration, as is also a project of Mr. J. T. Wood for extending tramways in co-operation with towns near Liverpool.

The will of the late Mr. Henry Clarkson, of Alverthorpe Hall, near Wakefield, land surveyor, who died, in June, aged 95 years, has been proved, the value of the personal estate amounting to £15,858.

A freehold estate at Watford, known as "Bushey Grove Park," of sixty-eight acres, recently offered by Messrs. Edwin Fox and Bonsfield, has been acquired for the sum of £13,000 by the Royal Masonic Institution for Boys, for the removal of that Institution from Wood Green.

The Parks and Galleries Committee of the Town Council of Glasgow have recommended that body to purchase a portion of Tollcross estate, in the east end of the city, as a public park. The area proposed to be acquired extends to about 82½ acres, and the price £350 per acre, or about £29,000 altogether.

It has been decided to promote a Bill next session for the construction of a railway through North Fife, from Newburgh *via* Lindores, Rathillet, and Kilmany to St. Fort.

The Trafford Park Estate, near Manchester, which was purchased a few months ago by Mr. Hooley, has been resold to a "development" syndicate. The purchasers have already spent £3,000 in surveying the estate and in preparing plans for laying it out as a residential suburb in squares and crescents.

The Great Western Railway Company are making arrangements for considerable developments of their London suburban passenger traffic. At Ealing the station is to be reconstructed at once, and the platform lengthened by 100 yards; and arrangements have been made for forming a dock in the central platform, with the view of making Ealing the terminus of a new local service to and from Paddington. At Southall a siding at the north side of the station is being lengthened for the purpose of affording greater facilities for the present services of trains.

The city council of Chester decided on Friday to proceed with a sewerage scheme dealing with Queen's Park, Handbridge, Curzon Park, and the eastern portion of Hough Green, at a cost of £5,000.

The Works Committee of the Stirling Town Council reported on Monday that an examination had been made of the vault at the West Church, handed over to the town by Mr. Graham Moir, of Leckie, and as it was understood to be one of the finest examples of a small chapel of the pre-Reformation period in Scotland, the committee recommended that Mr. J. W. Small, architect, be employed to prepare plans for a restoration of the chapel. Provost Kinross strongly objected to restoration, although he was quite in favour of preservation, and after some discussion, the matter was delayed for a month.

A group of workmen's dwellings at Plymouth was opened by the Mayor of that borough last week. It is the first of a series of nine blocks of houses, now in course of erection, which will house, in all, 500 persons. Messrs. Hine and Odgers, of Plymouth, were the architects, and Mr. May, of the same town, was the contractor.

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TENDERS.

. Correspondents would in all cases oblige by giving the addresses of the parties tendering—at any rate, of the accepted tender: it adds to the value of the information.

ARMAGH.—For various works at the County Armagh Lunatic Asylum, for the asylum board. Accepted tenders:—

For providing electric lighting:—	
Cox and Walker	£1,070 0 0
For building boiler-house, coal store, and chimney:—	
McLaughlin and Harvey	1,000 0 0
For heating and malleable pipes:—	
Musgrave and Co.	308 0 0
For two steam boilers and feed pumps:—	
Penmares and Co.	

ASHBY-DE-LA-ZOUCH.—For alterations and additions to bank premises, for Parrs's Banking Company. Messrs. R. J. and J. Goodacre, Leicester, architects:—
Slater and Son, Ashby (accepted) ... £1,943 17 0

AXMINSTER.—For erecting iron and wire fencing at Trinity-hall, for the Axminster Highway Board:—
Heal (accepted) ... £138 12 7

AYLESTONE.—For new rectory at Aylestone. Messrs. R. J. and J. Goodacre, Leicester, architects:—
Herbert, Leicester (accepted) ... £3,557 11 6

BEDFORD.—For new shops on site of old police station, Silver-street, for Mr. W. E. Draper. Mr. W. H. Syme, Watford, architect:—

Spencer	£1,537 13 0
Corby and Son	1,500 0 0
Fathers, G. E.	1,483 0 0
Harrison, G.	1,466 10 0
Melcombe Bros.	1,443 0 0
Warton, J.	1,440 0 0
Coleman, T. H.	1,409 0 0
Haynes and Son (accepted)	1,372 0 0

All of Bedford.

BELFAST.—For making roads and sewers on their show grounds, Balmoral, for the North-East Agricultural Association. Mr. John Waters, C.E., 23, Donegal-place, Belfast, engineer:—

M'Kee, J., Dungannon, co. Tyrone	£3,176 13 8
M'Laughlin and Harvey, Belfast	3,046 18 7
Craham, J., jun., Dromore	2,696 0 0
Grainger Bros, Holywood	2,022 9 9

* Accepted.

BEXLEY.—For erecting the first portion of the superstructure of the Bexley Heath Lunatic Asylum, for the London County Council. Mr. G. T. Hine, architect:—

Patman and Fotheringham	£117,500 0 0
Kirk and Randall, Woolwich	114,435 0 0
Estcourt and Son, Gloucester	101,800 0 0
Leslie and Co., Kensington	99,772 0 0
Foster and Dicksee, Rugby	95,550 0 0
Shillitoe, J., and Son, Bury St.	

 Edmund's | 95,000 0 0 |

Lovatt, H., Wolverhampton† | 91,879 0 0 |

Parnell, J., and Sons, Rugby† | 90,756 0 0 |

* These tenders are subject to modification of the conditions of contract. † Accepted. ‡ Withdrawn. | |

BEXLEY.—For providing at the Bexley Heath Lunatic Asylum 320 rods of oak park pale fencing, with alternative prices for 7ft. and 6½ft. fence, for the London County Council. Mr. Hine, architect:—

	A.	B.	C.
Horton and Son	£5 15 0	£5 9 0	£0 1 3
Rowland Bros., Fenny Stratford	4 2 6	3 17 11	0 0 1 4
Agate, J. & S., Horsham (accepted)	3 19 9	3 17 6	0 0 1 0
A.—7ft. fence, period. B.—6½ft. fence, per rod. C.—Each extra foot beyond 11ft. long.			

BIRMINGHAM.—For works at Jameson-road, Nechells, Birmingham, for the Fairbanks Rim Manufacturing Co., Limited. Mr. Henry Hendriks, F.S.I., architect:—

Law, G., Kidderminster	£4,311 0 0
Hughes, M., Birmingham	3,991 0 0
Moorhouse, J. E., Handsworth	3,982 0 0
Johnson, T., Birmingham	3,800 0 0
Wilcox, H., Birmingham	3,500 0 0
Weldon, H., Birmingham (accepted)	3,300 0 0

BOURNEMOUTH.—For making-up Bennett and Fitzharris-roads, Bournemouth. Mr. F. W. Lacey, borough engineer and surveyor:—

Troke, G.	£255 3 2
Saunders, W. H., and Co. (accepted)	244 3 0

BOURNEMOUTH.—For making-up Beckford and Windsor-roads, and road to Artillery headquarters. Mr. F. W. Lacey, borough engineer and surveyor:—

Troke, G.	£248 11 3
Saunders, W. H., and Co. (accepted)	238 11 0

BRANSTON, LINCOLNSHIRE.—For the work of scavenging Boultham and Bracebridge:—

Boultham:—	
Hill, J.	£100 0 0
Linton, B. V.	90 0 0
Dawson	60 0 0
Wilson, R. (accepted)	55 0 0
Bracebridge:—	
Dawson	85 0 0
Linton	75 0 0
Hill, J. (accepted)	60 0 0

BRENTWOOD.—For erecting a villa residence, for Mr. A. Smart. Messrs. Dale and Gadsdon, architects:—

Hoare and Sons	£1,350 0 0
Irwin, City-road, E.C. (accepted)	1,250 0 0
Rogers and Robson	1,200 0 0

BRIGHTON.—For alterations to the town hall:—

Peters, P., and Son, Horsham	£33,500 0 0
Martin, J., Eastbourne	32,300 0 0
Longley and Co., Crawley	31,993 0 0
Field, W. A., and Co., Brighton	30,291 0 0

* Recommended for acceptance.

BRISTOL.—For house at Stanley Park, Kingswood, for Mr. S. Perkins. Mr. A. R. F. Trew, M.S.A., 22, Broad-street, Bristol, architect:—

Lent and Son, Bristol	£315 0 0
Dowling, A., Bristol	260 0 0
Monks, W., Fishponds (accepted)	247 3 0

(Continued on page 618.)

LIST OF COMPETITIONS OPEN.

Belfast—New City Hall (Assessors, A. Waterhouse, R.A., and J. C. Bretland) (limit of cost, £125,000)	£300 divided	S. Black, Clerk to Corporation, Belfast	Oct. 26
Poplar—Coroner's Court, Mortuary	£30, £20	W. H. Farnfield, Clerk, 117, High-street, Poplar	" 26
Malmö, Sweden—New Gasworks	3,000, 2,000, & 1,500 Swedish crowns	Corporation Gas Works Offices, Malmö, Sweden	Nov. 1
Boole—North Board School for 1,000 children (local architects only)	No premium	F. K. Wilson, Clerk, Balliol-road, Boole	" 11
Sunderland Corporation—Artisans' Dwellings (for 490 persons)	£50, £30, £20	Fras. M. Bowey, Town Clerk, Sunderland	" 14
Stamfordham and Hawkwell Drainage Plan	£10	Geo. Wilkinson, Clerk, 27, Mosley-street, Newcastle-on-Tyne	" 14
Sunderland—Workmen's Dwellings	£50, £30, £20	Fras. M. Bowey, Town Clerk, Sunderland	" 14
Darlington—Laying-out Southend Estate	£35, £15	R. C. Pearce, Estate Agent, Darlington	" 20
Douglas, I.M.—Municipal Buildings (£10,000 limit of cost)	£40, £20, £10	T. H. Nesbitt, Town Clerk, Douglas	" 20
Shotley Bridge, Co. Durham—Cottage Homes for Children	No premium	Geo. Craighill, Clerk to Guardians, Gateshead	" 21
Peel, Isle of Man—Approach Road to Shore-road	£20, £10, £5	Geo. Cannell, Town Commissioners' Office, Peel	" 30
Newport, Mon.—Hospital (£16,000 limit of cost)	£100, £50	J. K. Stone, Secy., 39, High-street, Newport	Dec. 1
Rhos-on-Sea, Colwyn Bay—Laying-out Building Estate	£100, £30, £10	Philip J. Kent, Rhos Abbey, North Wales	" 5
Weston-super-Mare—Pavilion at Knightstone (£8,000 limit)	£50, £20, £10	Wm. Smith, Clerk U.D.C., Town Hall, Weston	" 10
Kieff, Russia—Theatre (£48,000 limit, 1500 seats)	£250, £160, £120, £76, £32	Imperial Society of Architects, 83, Quai de la Moika, St. Petersburg	" 15
Liskeard, Cornwall—Rebuilding Tower, Parish Church (£3,000 limit)	£50 (merged in Commission), £25	Nettle and Bone, Hon. Secs., Liskeard	Jan. 1
Sunderland—Technical School (£18,000 limit of cost)	£100, £50, £25	Fras. M. Bowey, Town Clerk, Sunderland	" 16
St. Gilles, near Brussels—Town Hall (£42,000 limit of cost)	£160 and two lesser premiums	Communal Authority, St. Gilles, Belgium	Feb. 1
Osgodby, Lincolnshire—Wesleyan Chapel & Schools (cost £600)	No premium	E. H. Davy, Secretary to Trustees, Kirkley, Market Rasen	"
Kirriemuir, N.B., Parish Church Hall			"
Kesteven District Lunatic Asylum (C. H. Howell, Assessor)			"
Eccleshill, Bradford—Sewage Disposal	£20, £10	Jos. Richardson, Clerk, U.C., 4, Town Hall-square, Bradford	"
Barry, Glam.—Municipal Buildings (£10,000 limit)	£100, £50	Clerk to Urban District Council, Barry	"
Chapel, Cropton, near Pickering		Robert Harland and T. Pickering	"

LIST OF TENDERS OPEN.

BUILDINGS.

Batley—Terrace of Fourteen Houses, Mount Pleasant	Batley Corporative Society	H. B. Buckley, Architect, 8, East Parade, Leeds	Oct. 26
Batley—Fourteen Terrace Houses, Mount Pleasant		H. B. Buckley, Architect, 8, East Parade, Leeds	" 26
Kendal—Infant School Additions		John Stalker, M.S.A., Kendal	" 26
Bradford—Urinals	Corporation	Geo. McGuire, Town Clerk, Bradford	" 26
Brierfield, Nelson—Gasworks	Nelson Corporation	R. M. Prescott, Town Clerk, Nelson, Lancs.	" 26
Wigton—Alterations, Joiners' Arms Inn		W. G. Scott, architect, Workington	" 26
Chesterton—Additions to Workhouse		J. F. Symonds, Clerk, 9, Benet-street, Cambridge	" 27
Perth—Post Office		Hon. Reginald B. Brett, Secretary, Whitehall, S.W.	" 27
Parc Gwyllt—Asylum Block, 120 patients	Guardians	T. T. Lewis, Solicitor, Bridgend	" 27
Hunslet, Leeds—Public Baths	H.M. Office of Works	J. Harrison, Town Clerk, Leeds	" 27
Erdington—Vagrant Wards	Glamorgan County Council	Jno. North, Clerk, Vauxhall-road, Birmingham	" 27
Mountain Ash—Buildings	Corporation	Morgan, Elford, and Kenshole, Architects, Mountain Ash	" 27
Trimley St. Martin—Walls and Playsheds	Aston Board of Guardians	Spencer Dixon, Clerk, Hatton Court, Ipswich	" 27
Falmouth—Hospital Dispensary	Duffryn Company Operative Society	Chairman of Building Committee, Falmouth	" 27
Keswick—High School	School Board	J. Broatch, Court Buildings, Keswick	" 28
Liverpool—Premises and Works, Chatham-street	Committee	Thos. Price, Architect, 2, Whitechapel, Liverpool	" 29
Allerton—Club Premises		Fairbank and Wall, Architects, Bradford	" 29
Stratford—Movable Floor and Platform at St. Mary's	Robinson and Price	E. Harrow and Pinches, 5, John-street, Adelphi, W.C.	" 29
Newbury—Alterations to Primitive Methodist Chapel	Liberal Club	Walter H. Bell, Architect, Market-place, Newbury	" 30
Arnsby—Two Semidetached Villas	Trustees	John Stalker, M.S.A., Kendal	" 31
Middlesbrough—Eight Houses	Thos. Taylor	R. Lofthouse and Son, Architects, 62, Albert-road	Nov. 1
Tintagel—Pair of Villas	— Oates	Wise and Wise, Architects, Launceston	" 2
Greetland, Halifax—School	U.D. School Board	Horsfall and Williams, Architects, 15, George-street, Halifax	" 2
Wattstown, Rhondda Valley—Vestry, C.M. Chapel		Rev. J. Morgan, Garig-road, Ynysyrry	" 2
Ulverston—Alterations to Oddfellows' Hall	Committee	J. W. Riley, Upper Sun-street, Ulverston	" 3
Holborn—Working-Class Dwellings, Brooke's-market	London County Council	C. J. Stewart, Clerk, Spring-gardens, S.W.	" 3
Belfast—Parcel Post Depot	Official	P. J. Tuohy, Secretary, H.M. Office of Public Works, Dublin	" 5
Haslingden—Sewage Disposal Buildings	Joint Sewage Board	R. W. Bugler, Clerk, West View, Haslingden	" 14
Bideford—Police Station	Devonshire County Council	H. Michelmores, Clerk, Exeter	" 25
Harrogate—Two Houses	Ryder and Leyland	W. Lupton, North Lodge, New Park, Harrogate	"
Hull—Repairs 23 Houses		75, Charles-street, Hull	"
Newland—Alterations Property		N. Swindle, Chemist, Keswick	"
Leeds—Pulling down House		J. W. Watson, 21, New Station-street, Leeds	"
Harrogate—House		J. M. Fawcett and Sons, 26, Albion-street, Leeds	"
Towyn—House	C. H. Young	Hipkiss and Bassett, Architects, Aberdovey	"
Bury (Lancs)—Stables, Butcher-lane		F. Cartwright, C.E., Phoenix-yard, Bury	"
Sheerness—Club	Sutton and Co.	E. Pover, Architect, Faversham	"
Bristol—Alterations to Fish Market	Trustees	J. Thomas, City Surveyor, 51, Prince-street, Bristol	"
Leeds—Two Houses and Shops, Dewsbury-road	Corporation	Percy Robinson, Architect, 72, Albion-street, Leeds	"
Kirkby Overblow—Additions to School		T. E. Marshall, Architect, Harrogate	"
Belfast—Business Premises, St. Peter's Hill		J. Armstrong, 16, Shankhill-road, Belfast	"
Chopwell—Two Houses and Shops		T. Atkinson, 6, South-avenue, Ryton-on-Tyne	"
Harrogate—House in Duchy-road		J. M. Fawcett and Son, Architects, 96, Albion-street, Leeds	"
Devonport—Block Floor to School	Female Orphan Asylum	G. Luff, Architect, 64, Chapel-street, Devonport	"
Aldershot—Queen's-road School	School Board	Clerk to School Board, Aldershot	"
Standish, Wigan—Additions to Grammar School	Governors	H. Lord, Architect, 47, John Dalton-street, Manchester	"
Leeds—Shed, Park-lane (3,000 square yards in area)		J. J. Mosley, 6, Wormald-road, Leeds	"
Tunbridge—Business Premises, High-street	Harlington School Board	W. H. Cuthbert, 192, Upper Grosvenor-road, Tunbridge Wells	"
Buxton—Additions, Harper's Hill Schools	School Board	W. R. Bryden, Architect, 1, George-street, Buxton	"
Coventry—Additions, Earlsdon School		G. and I. Steane, Architects, 22, Little Park-street, Coventry	"
Aberthaw—Mission Room		Seddon and Carter, Architects, St. Mary-street, Cardiff	"
Stotfield, Elgin—Villa		Reid and Wittet, Architects, Elgin	"
Belfast—Extension, &c., of Licensed Premises	W. J. Martin	W. J. Moore, Architect, Ann-street, Belfast	"
Kegworth—Erection of Inn		W. T. Hampton, Brook House, Loughborough	"
Leeds—Two Houses		Percy Robinson, Architect, 72, Albion-street, Leeds	"
New Leeds—Four Houses		J. Chas. Spivey, Dagmar House, Roundhay	"
Leeds—New Stables	Burgon and Co.	Walter A. Hobson, Architect, 82, Albion-street, Leeds	"
Nottingham—Pulling Down and Erection of Turkish Baths	Nottingham Turkish Bath Co.	Brewell and Bailey, Architects, Angel-row, Nottingham	"
Overseal, Leicester—Erection of an Hotel	Marston and Son	W. T. Hampton, Brook House, Loughborough	"
Sheffield—Erection of Houses	A. Longmuir, Walkley Bank, Sfield	James C. Haller, Savile Town, Dewsbury	"
Tonbridge—Business Premises	W. Hodgskin	W. T. Cuthbert, 192, Upper Grosvenor-road, Tunbridge Wells	"
West Cross, Swansea—Currant Tree Inn		T. P. Martin, Architect, Northampton Chambers, Swansea	"
Woodlesford—Houses		W. Simpkins, Swan Junction, Hunslet	"
Bristol—Alterations to Fish Market	Corporation	J. Thomas, 51, Prince-street, Bristol	"
Norwich—Caretaker's Cottage at Shire Hall	Norfolk County Council	Chas. Foster, Clerk, Shire Hall, Norwich	"
Morley—Six Houses		H. Pearson, Britannia-road, Morley	"
Market Harborough—Board-room	Board of Guardians	R. and J. Goodacre, Architects, 5, Friar-lane, Leicester	"
Londonderry—Shed Extension, Prince's Quay	Harbour Board	E. A. Hamilton, Secretary, Londonderry	"
Smithstow, Greenock—Gatehouse		Boston and Menzies, Architects, 11, William-street, Greenock	"
Sheffield—Corner Shops, Pinsbone-street		Holmes and Watson, Architects, St. James's-road, Sheffield	"
New Milns, N.B.—Police Station	Ayr County Council	Shaw, County Buildings, Ayr	"
Leeds—Wesleyan Sunday Schools, Cardigan-lane		G. F. Danby, Architect, 46, Great George-street, Leeds	"
Higham Ferrars—Four Houses	W. B. Skinner	A. Skinner, A.R.I.B.A., 45, Finsbury-pavement, E.C.	"
Exmouth—St. John's Church, Restoration	Committee	Kerby and Ellis, Architects, Exmouth	"
Bridford, Devon—Rebuilding Harriers' Inn		J. Sherman, Bridford	"
Byram, Yorks—Range, Glass Houses	Sir J. W. Ramsden, Bt.	E. Bernard Wilson, Estate Office, Sutton, Ferrybridge	"
Hornchurch, Romford—Two Houses	L. H. Hatting	F. C. Tyas, 162, Brixton-hill, S.W.	"
Leeds—Four Houses in Harehills-lane		Geldard and Ward, Leeds	"
Kirkstall, Leeds—Two Brick Houses, Vesper-lane		Robshaw and Son, 7, Upper Fountains-street, Leeds	"
Landrindod Wells—Additions to Pump House Hotel		A. B. and W. Scott Deakin, Shrewsbury	"
Nechells—Erection of Works		Henry Hendriks, 43, Waterloo-street, Birmingham	"
Blackpool—Three Houses	Fairbank Wood Rim Co. Limited	Thos. Fox, Layton, Hawes	"

BUILDINGS—continued.

Burnley—New Board Schools	School Board	W. A. Quarumby, Architect, Grinshaw-street, Burnley	—
Leeds—New Board Schools	School Board	W. S. Braithwaite, Architect, Leeds	—
Nottingham—Pulling Down Buildings	—	C. H. Kitchen, Warsengate, Nottingham	—
Sheffield—Shops	—	Holmes and Watson, Architects, St. James's-row, Sheffield	—
Nottingham—Painting Interior of Premises, Eastercroft	Hide Company, Limited	Mr. Dawson, Eastercroft	—
Leeds—Plumber's Works, Thirty Houses	—	H. W. Thompson, 170, Harehills-lane, E.C.	—
Dublin—Plumbing Works up till Dec. 31, 1897	Corporation	Spencer Hart, City Hall, Dublin	—
Cardiff—Rebuilding Hayes Market	D. Rees and Co., Limited	J. P. Jones, Richards and Budgen, Architects, Cardiff	—
Woodlesford—Houses	—	W. Simpkins, Swan Junction, Hunslet, Leeds	—
Manchester—Row of Six-Roomed Houses	—	Manchester Guardian Office	—
Sherriff Hill, Newcastle—Three Cottages	School Board	Shepherd Inn, Blue Quarries, Sherriff Hill	—
Burnley—Rose-grove Schools	City Council	W. A. Quarumby, Architect, Imperial Chambers, Burnley	—
Leeds—City-square Improvement (Granite Work)	—	Town Clerk, Leeds	—
Kettering—Semi-Detached Villas	—	M. Hall, Huntly-grove, Kettering	—
Kettering—Three Houses, Cavendish-street	F. Wright	M. Hall, Huntly-grove, Kettering	—
Chelsea—Middle-class Flats	—	Alfred J. Best, Surveyor, 38, Sloane-street, S.W.	—
Edgefield, Norfolk—School and House	School Board	H. J. Green, Architect, Norwich and Lynn	—
Cardiff—Rebuilding Haye's Market	Rees and Co.	Jones, Richards, and Budgen, Architects, St. Mary-street, Cardiff	—
Antwerp—Covered Quay (about £6,800)	Official	Eastern Railway Station, Antwerp	—

ENGINEERING.

Burnley—Bridge over Curzon-street	Lancashire and Yorkshire Ry. Co.	C. W. Bayley, Secretary, Hunt's Bank, Manchester	Oct. 27
Great Malvern—Bridge under Railway at Station	Great Western Railway Co.	G. K. Mills, Secretary, Paddington	27
Rugby—Water Mains (2,800 yards)	Urban District Council	T. M. Wratlaw, Clerk, Rugby	28
Honfleur—Pair Sluice Gates (about £3,000)	Official	Ministry of Public Work, Boulevard St. Germain, Paris	28
Towyn—Cast-Iron Water Mains and Valves	Urban District Council	Pryse H. Hughes, Surveyor, Towyn, N. Wales	28
Salford—Strengthening River Bank and Forming Recreation Ground	Corporation and Lewis Trustees	Richard Mottram, Mayor of Salford	28
Stansted, Essex—Reservoir	Stansted Water Co.	H. H. Gayford, Secretary, Central Hall, Stansted	28
Islington—Heating Machinery, Caledonian-road Baths	Islington Vestry	Wm. F. Dewey, Vestry Clerk, Upper-street, W.	29
Naj Hamadi, Kinch Line, Upper Egypt, Metallic Bridges	Official	Colonel Weston, Broadway Chambers, Westminster, S.W.	30
Sheffield—Enlarging Gasholder	Sheffield Gas Co.	Hanbury Thomas, Secretary, Commercial-street, Sheffield	31
Leigh, Essex—Engine House, Reservoir, and Pipes	Roehford Rural District Council	J. Mansergh, M.I.C.E., 5, Victoria-street, S.W.	Nov. 2
Cologne—30-ton Crane	Official	Tiefbauamt, Cologne	2
Monmouth—Machinery	Town Council	Bramwell and Harris, 5, Great George-street, Westminster, S.W.	2
Monmouth—Cast Iron Pumping Main	Town Council	Bramwell and Harris, 5, Great George-street, Westminster, S.W.	2
Monmouth—Electric Lighting Main	Town Council	Bramwell and Harris, 5, Great George-street, Westminster, S.W.	2
Livourne, Italy—Dredging Harbour (about £23,000)	Official	The Préfecture, Livourne	3
Torquay—Electrical Plant	Corporation	F. S. Hex, Town Clerk, Torquay	3
Cagliari, Sardinia—Iron Bridge (£20,000)	Official	The Préfecture, Cagliari	4
Dewsbury—Two Steel Bridges (70 tons)	Waterworks Co.	G. T. Lee, Clerk, Town Hall, Dewsbury	4
Relley Mills, Durham—Brick Viaduct and Approaches	North-Eastern Railway Co.	C. N. Wilkinson, Secretary, York	4
Vienna—Bridge-work on City Railway (£100,000 in four contracts)	Austrian State Railways	Railway Bureau, Vienna	4
Jassy, Roumania—Baths Installations	Municipal Council	N. A. Bogodan, Secretary, Jassy	5
Manchester—Railway (15½ chains in length)	Great Northern Railway Company	Wm. Latta, Secretary, King's Cross Station, N.W.	5
Heyst-sur-Mer, Belgium—Pumps for Waterworks and Sewers	Official	L'Administration Communale, Heyst-sur-Mer	9
Barden, Bolton Abbey—Barden Beck Bridge	Official	Gilson Martin, Estate Office, Bolton Abbey	10
Mexico City—Pumping Machinery and Boilers	Official	City Sanitation Board, Mexico	14
Alexandria—Landing Stage	Harbour Board	President, Administrative Council, Cairo	15
Calcutta—Sewage Pumping Machinery	Municipality	W. R. Macdonald, Corporation Secretary, Calcutta	Dec. 8
St. Malo—Waterworks	Municipal	Hôtel de Ville, Ile-et-Vilaine, France	31
Wellington, Salop—Deepening 4in. Bore from 140ft. in Bunter Beds	Waterworks Co.	Groom and Sons, Wellington, Salop	—
Cheltenham—Driving Headings in Well	Waterworks Co.	Wm. Fox, M.I.C.E., 5, Victoria-street, S.W.	—
Wellington—Deepening Borehole	Official	R. Groom, Sons, and Company, Ltd., Wellington, Salop	—
Furnes, France—Cleaning Canal (7½ miles, about £3,000)	Official	The Préfecture du Nord, Lille, France	—
Newmarket—Laying Water Mains (1½ mile)	Stewards of Jockey Club	E. A. Sandford Fawcett, C.E., 1, Victoria-street, S.W.	—

FENCING.

Whitefield—Lagged Fence	Urban District Council	Wm. Skinner, Surveyor, Whitefield	Oct. 26
Porth—Mound and Quickest Fence (1175 yards)	Llantrissant R. D. C.	E. C. Spickett, Clerk, Pontypridd	27
Stockport—Hazel-grove Recreation Ground	Rural District Council	Chas. F. Johnson, Clerk, Shaw Heath, Stockport	Nov. 2
Muirhead Common, N.B.—Iron Fences (300 yards)	Calder Parish Council	Thos. McLelland, Clerk, Bishopbriggs	2
Tottenham—Iron Fencing, Commons (3,000 yards)	Urban District Council	Edward Crowne, Clerk, Tottenham	3

FURNITURE AND FITTINGS.

Pontypridd School—Laboratory Fittings	Governors	John Phillips, Clerk, Town Hall, Pontypridd	Oct. 27
Brentwood Asylum, Sixty Iron Bedsteads	Essex County Council	W. P. Gepp, Clerk to Visitors, Chelmsford	31
Bracebridge, Lincoln—W. I. Window Sashes (2 doz.)	Committee of Visitors	Committee, Bracebridge Asylum	Nov. 5

PAINTING.

Painting of Iron Bridges, L.D. and E.C. Railway	Clowne Branch	S. Pearson and Son, Clowne, near Chesterfield	Oct. 21
Whitehaven, Alston, and Workington—Lock-ups	Cumberland County Council	G. D. Oliver, A.R.I.B.A., 5, Lowther-street, Carlisle	26

PLUMBING.

Streatham Hill—Lead Roofing, St. Anne's Home	St. Pancras Board of Guardians	A. M. Milward, Clerk, Vestry Hall, Pancras-road, N.W.	Oct. 28
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ROADS AND STREETS.

Denbigh—Additions and Alterations	Asylum Visiting Committee	W. Baker, Clerk, Denbigh	Oct. 26
Totterdown—Making-up Upper-street	Long Ashton R.D.C.	Maynard Froud, Surveyor, Bristol	26
Southampton—2in. Guernsey Granite (1,000 tons)	Corporation	G. B. Nalder, Town Clerk, Southampton	27
Willesden—Roadmaking and Paving	Urban District Council	O. C. Robson, Public Offices, Kilburn	27
Newmarket—Roadings off Bury-road	Urban District Council	W. C. and A. S. Manning, Architects, Rothsay House, Newmarket	27
Hoyland Nether—Street Works	Local Board	Wm. Farrington, Town Hall, Hoyland Nether	27
Woolwich—York Paving (1,700yds.) and Aberdeen Kerbing	Corporation	Clerk, Town Hall, Woolwich	27
Colchester—Pownall and Meyrick-crescent Roads	Corporation	H. Goodyear, Borough Engineer, Colchester	27
Deal—Flint and Rag	Urban District Council	T. C. Golder, Borough Surveyor, Deal	27
Knutsford—Making-up and Paving Roads	Urban District Council	E. L. Ashworth, Clerk, Knutsford	28
Shoreham—Flints (225c.yds.)	Urban District Council	J. E. Brown, Clerk, Town Hall, Shoreham	28
Salford—Road Works	Corporation of Salford	Borough Engineer, Town Hall, Salford	28
Knutsford—Road Works	Urban District Council	Council's Surveyor, Knutsford	28
Aberdeen—Making-up Streets	Aberdeen Land Association	Walker and Duncan, C.E.'s, 3, Golden-square, Aberdeen	28
East Molesey—Road Works	Urban District Council	Council Offices, Walton-road, East Molesey	30
Abertillery—Widening Highway	Urban District Council	J. A. Shepard, Clerk, 1, King-street, Abertillery	31
Northwich—Road Works	Urban District Council	Council Offices, Northwich	Nov. 3
Tottenham—Making-up Private Roads	Urban District Council	Edward Crowne, Clerk, Tottenham	3
Harrow—Making-up Headstone-road	Urban District Council	R. E. H. Fisher, Clerk, Harrow	3
Tottenham—Widening Philip-lane	Urban District Council	Edward Crowne, Clerk, Tottenham	3
Harrowdene, Wembley—Road and Footpath	Owners of Estate	Walton and Lee, Surveyors, 10, Mount-street, W.	4
Dartford—Making-up Gas-lane	Urban District Council	J. C. Hayward, Clerk, Sessions House, Dartford	5
Abergavenny—Widening Penbiddle-lane	Rural District Council	Jno. Gill, Surveyor, North-street, Abergavenny	9
Berkhamstead—Widening Road	Urban District Council	Chas. H. Rew, 87, High-street, Berkhamstead	—
Woodhall Spa, Lincolnshire—Road	Urban District Council	Hucknall, Secretary, Woodhall Spa	—
Withington—Draining and Flagging Passages	Urban District Council	A. Roberts, Clerk, Town Hall, Withington	—
Willenhall—Steam Road Roller	Urban District Council	R. Tildesley, Clerk, Willenhall	—
Wealdstone—Granite Slag and Gravel	Urban District Council	Kirby G. Bailey, Clerk, Peel-road, Wealdstone	—
Berkhamstead—Widening Road	Urban District Council	Chas. H. Rew, 87, High-street, Berkhamstead	—
Woodhall Spa, Lincolnshire—Road	Corporation	Hucknall, Secretary, Woodhall Spa	—
Southampton—Road Works	Corporation	W. B. G. Bennett, Borough Engineer, Southampton	—
Southampton—Road Works	Corporation	W. B. G. Bennett, Borough Engineer, Southampton	—
Withington—Drainage and Flagging Passages	Urban District Council	A. Roberts, Clerk, Town Hall, Withington, Manchester	—

SANITARY.

Bradford—Urinals, W.C.'s, and Lavatory	Corporation	J. H. Cox, Town Hall, Bradford	Oct. 26
Sandown, I. W.—Sewers in Lake Ward	Urban District Council	Wm. H. Wooldridge, Clerk, Town Hall, Sandown	" 26
Northallerton—Sewerage Works	Urban District Council	W. Fowle, Clerk, Northallerton	" 27
Whitworth—Sewerage Works	Urban District Council	H. Leonard Hinwell, 41, Corporation-street, Manchester	" 28
Brentwood—Works to Workhouse Schools	Hackney Board of Guardians	Frank R. Coles, Clerk, Homerton, N.E.	" 28
Healey—12in. and 9in. Sewers	Whitworth Urban District Council	Owen March, Clerk, Whitworth, Lancs.	" 28
Ludworth—Glossop—Pipe Sewers (3,300 yards run)	Glossop Rural District Council	W. W. Spinks, Engineer, 20, Park-road, Leeds	" 30
Hanwell—Sewers and Manholes	Urban District Council	Clerk to Council, Hanwell	Nov. 2
Monmouth—Sewage Disposal and Electric Lighting	Corporation	T. R. Oakley, Town Clerk, Monmouth	" 2
Monmouth—Sewers throughout Town	Corporation	T. R. Oakley, Town Clerk, Monmouth	" 2
Auckland—Sewers (290 yards) at Sunnyside	Rural District Council	S. Adams, Clerk, Bishop Auckland	" 2
Middlewich—Sewer in Canal-terrace	Urban District Council	F. B. Cooke, Clerk, Kinderton-street, Middlewich	" 2
St. Austell—Supply of Socket Drain-Pipes for One Year	Rural District Council	John Stephens, Clerk, St. Austell	" 4
Burnley—Sewage Outfall Plant	Corporation	W. T. Fulllove, Clerk, Burnley	" —
Paisley—Drainage at Poorhouse and Asylum	Parish Council	J. M. Campbell, Paisley	" —
Eccles, Lancs.—Brick Culvert	Corporation	A. C. Tarley, Borough Engineer, Town Hall, Eccles	" —
Paisley—Drainage at Poorhouse and Asylum	Parish Council	J. M. Campbell, Paisley	" —
Manchester—Glazed Earthenware (for 12 months)	Corporation	City Surveyor's Dept., Town Hall, Manchester	" —
Pelsall—Sewer and Catchpit, Heath End	Walsall Rural District Council	T. T. Fisher, Lichfield Chambers, Walsall	" —

STEEL AND IRON.

India—Steel Girders and Gutters	East Indian Railway Co.	A. P. Dunstan, Secretary, Nicholas-lane, E.C.	Oct. 27
India—Cast-Iron Piping (516 tons)	Bengal and North-Western Ry. Co.	E. L. Marryat, Secretary, 237, Gresham House, E.C.	" 27
India—Cast and Iron Sleepers, Chairs, &c.	South Indian Railway Co.	H. W. Notman, 55, Gracechurch-street, E.C.	" 27
India—Steel Rails (1,106 tons) and Wire Fencing	South Indian Railway Co.	H. W. Notman, 55, Gracechurch-street, E.C.	" 28
Brussels—Wrought and Cast Iron, Steel, &c.	Belgian State Railways	Administration Offices, Brussels	" 30
Alexandria—Bridge Works (Iron)	Administration of Railways	Chief Engineer to Administration, Alexandria	" 30
Stockport—Iron Fencing, &c.	Rural District Council	H. Turner, Union Offices, Stockport	Nov. 2
Hamburg—Ironwork for Bassendith Lighthouse	Official	Registrar of Ports and Harbours, Dalmann-Strasse, Hamburg	" 14
New South Wales, Australia—Steel Rails (150,000 tons)	Government of New South Wales	Hon. Sir Saul Samuel, 9, Victoria-street, S.W.	Dec. 30
Sweden—Rails (13 miles 1,180 yards) for Christiania-Kolmer	Official	Electric Tram Co., 47, Kirkeveir, Christiania	Jan. 1
Kolmer Electric Tram	Official	Electric Tram Company, 47, Kirkeveir, Christiania	" 1
Norway—Rails	Gasworks	Manager	" —
Rickmansworth—Cast-iron Pipes			" —

STORES.

Dublin—Timber and Red Wood Blocks for Paving, up till December 31, 1897	Corporation	Spencer Harty, City Hall, Dublin	Oct. 24
Swindon—Railway Stores	Great Western Railway Co.	G. K. Mills, Secretary, Paddington Station, W.	" 26
Bermondsey—Stock Bricks (30,000)	Vestry	F. Ryall, Vestry Clerk, Spa-road, S.E.	" 28
Hyde—Ironwork, &c., for 12 months	Corporation	Geo. Stevens, Town Clerk, Hyde	" 28
London—Red Fir Telegraph Poles	General Post Office	Chas. E. Stuart, Controller of Stores, G.P.O., E.C.	" 29

BRISTOL.—For alterations necessitated by the setting back of the Baldwin-street frontage of the fish-market, for the city council:—

Chard	£3,729 0 0
Love and Wait	3,459 0 0
Hayes, C. A.	3,377 0 0
Davies, J. E.	3,345 0 0
Humphreys	3,330 0 0
Perkins	3,264 0 0
Wilkins and Gosling	3,110 0 0
Cowlin and Sons	3,075 0 0
Forse, H. A.	3,060 0 0
Perrott	2,998 0 0
Walters (accepted)	2,990 0 0
Hughes and Weeks	2,877 0 0

BROMLEY, KENT.—For the erection of a new church of St. Mark, at Mason's-hill:—

A.	B.
Arnaud	£6,281 0 0
Payne, D.	6,220 0 0
Duthoit	6,179 0 0
Grady	5,999 0 0
Crossley, T.	6,050 0 0

A.—Entire church. B.—Erection of chancel and three eastern bays of nave. * Accepted for B.

BROMLEY, KENT.—For erection of houses to front Gleebe-road, Bromley, Kent. Messrs. F. and W. Stocker, 90 and 91, Queen-street, E.C., architects:—

Green, F. W., Beckenham	£2,950 0 0
Smith, W., and Son, Croydon	2,800 0 0
Mills, H. C., Brixton	2,750 0 0
Wilkinson, G., and Sons (too late)	2,450 0 0
Ashford, J., Clapham	2,450 0 0
Thomas and Edge, Woolwich	2,429 0 0
Watt, J., Catford	2,250 0 0
Taylor, E. J., Sydenham	2,245 0 0
Furniss, W., Loughborough Junction	2,240 0 0
Knight, A. W., Gray's Inn-road	2,205 0 0
Buck, H., and Co., Aldenham-street	2,090 0 0
Johnson and Aldridge, Catford	2,070 0 0
Gurr, C. R., Chiswick	2,050 0 0
Philpot, F. W. A., Bromley	1,996 7 4
McDowall, A. G., Camberwell	1,975 14 0
Grier, J., and Co., Croydon	1,470 0 0

BROMSGROVE.—For sewerage works, Aston Fields, for the rural district council. Mr. W. Fiddian, Town Hall, Stourbridge, engineer:—

Meredith, W. L.	£5,500 0 3½
Jones and Fitzmaurice	5,444 0 0
Johnson Bros.	4,922 15 0
Currall, Lewis, and Martin	4,861 14 3
Vale, T.	4,586 17 0
Law, G.	4,487 0 0
Mackay, J.	4,376 5 10
Weldon, H.	4,372 2 6
Crwys and Hobrough	4,219 4 9
Brazier, J. and A.	4,060 14 3
Tilt, J., Bromsgrove (accepted)	3,999 11 0

BURNLEY.—For the various works required in the erection of St. Margaret's Church, Burnley. Mr. Thos. Bell, 14, Grimshaw-street, Burnley, architect. Accepted tenders:—

Masons and Bricklayers:—Parker, A. and R. Burnley.	
Joiners:—Moore Bros., Rawtenstall.	
Slaters:—Foster Bros., Padiham.	
Plumbers and Glaziers:—Collinge Bros., Burnley.	
Plasterers and Painters:—Foster Bros., Padiham.	

BURTON-ON-TRENT.—For the construction of sewers from Derby-turn to Waterloo-street and along Horning-blow-street, for the town council:—

For constructional work:—	
Bentley, E., Fosse-road, Leicester	£3,785 5 2
For supply of pipes:—	
Boothorpe Pipe Co., Woodville	406 11 0

* Accepted.

CHYVELAH.—For erection and completion of a school near Chyvelah, for the Kenwyn School Board. Mr. Silvanus Treval, F.R.I.B.A., Truro, architect:—

Harris, Truro	£665 0 0
Moyle, Chacewater (accepted)	639 0 0

CLERKENWELL.—For fitting up Board's Stores:—

Lascelles and Co.	£3,300 0 0
Illingworth, Ingham, and Co.*	3,200 0 0

CORK.—For the erection of the Palace Theatre of Varieties. Accepted tenders:—

Building contracts:—O'Connell, Wm.	
Upholstering:—Grant and Co. and Leslie and Co.	
Electric lighting:—Handley and Shanks.	

CROSSNESS, S.E.—For the construction, delivery, and erection at the Crossness outfall of two triple-expansion vertical-cylinder engines, together with their accessories complete, for the London County Council:—

Stewart, D., and Co., Ltd.	£59,400 0 0
Cochrane, J.	35,000 0 0
Fleming & Ferguson, Ltd., Paisley*	34,350 0 0

(Central Engine Works, West Hartlepool, at prices in schedule.)

CROYDON.—For the erection of The Arcade, High-street. Mr. A. Broad, 3, High-street, Croydon, architect. Quantities by the architect:—

Lorden, W. H., and Son	£5,311 0 0
Smith, W., and Son	5,280 0 0
Bulled, E. P., and Co.	5,241 0 0
Maides and Harper	5,225 0 0
Barker, D. W.	5,174 0 0
Page, S.	5,150 0 0
Lascelles, W. H., and Co.	5,100 0 0
Hart, S.	5,020 0 0
Bullock, A.	4,975 0 0
Smith, J., and Sons	4,842 0 0
Marriage, W., and Co.	4,819 0 0
Saunders, E. J. (accepted)	4,810 0 0

DEPTFORD.—For paving and sewer works in connection with the Mill-lane, Deptford, scheme, now being carried out under Part II. of the Housing of the Working Classes Act, 1890, for the London County Council:—

Mowlem and Co.	£1,988 0 0
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[Only tender received. Work will be carried out by the Works Committee, whose revised estimate is £1,968. Engineer's estimate, £1,854.]

DURSLEY.—For the erection of new buildings, and the extension of premises, for Messrs. R. A. Lister and Co., Dursley. Mr. J. Fletcher Trew, M.S.A., C.E., Gloucester, architect:—

Jones, W., Gloucester	£2,780 0 0
Forse, H. A., Bristol	2,445 0 0
Wilkins, G. H., Bristol	2,440 0 0
Hughes and Weeks, Bristol	2,350 0 0
Hudson, J. B., Yale	2,138 0 0
Bloodworth, S., and Son, Dursley*	2,000 0 0

HAMMERSMITH.—For the erection of superintendent's house at Marlesford Lodge Branch School, Hammersmith, W., for the managers of the Kensington and Chelsea School District:—

Wilkinson, G., and Son	£1,590 0 0
Scharien and Co.	1,463 0 0
Nash, W., and Co.	1,340 0 0
Thomas, T. W.	1,075 0 0
Pope, B., and Co., Hammersmith*	695 0 0

(Architect's estimate, £875.)

HARROGATE.—For sewerage and paving West End-avenue, for the corporation. Mr. Samuel Stead, borough surveyor:—

Annakin, W., 53, Franklin-road (accepted)	£1,590
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HARTLEPOOL.—For providing accommodation for 500 children of the upper standards, and including laundry, cookery classroom, and rooms for technical instruction, at Galley's Field School, for the Hartlepool School Board. Mr. J. Mitchell Bottomley, 46, Albion-street, Leeds, and Middlesbrough, architect:—

Meredith, J. H., West Hartlepool	£8,894 0 0
Curry, H., and Son, Hartlepool	5,860 0 0
Cockburn, West Hartlepool	5,409 0 0
Rennie, A., Hartlepool	5,088 0 0
Marshall, R. J., Hartlepool	4,988 0 0
Howe, J., West Hartlepool	4,763 0 0
Sudron, H., Hartlepool*	4,594 0 0

* Accepted subject to the approval of the Educational Department.

HEMEL HEMPSTEAD.—For a new bridge at Two Waters, Hemel Hempstead, for the county of Hertford. Mr. Urban Smith, C.E., county surveyor:—

Payne, J., Hemel Hempstead	£669 7 9
Smith, S. C., Piccotts End	605 15 5
Dickson, J., St. Alban's	584 7 0
Hunt, C., High Wycombe (accepted)	547 7 6

HINCKLEY (LEICS.).—For restoration of tower and spire of the parish church. Messrs. R. J. and J. Goodacre, Leicester, architect:—

Pendleton and Banbury, Leicester (accepted)	£1,213
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HOVE (SUSSEX).—For providing and fixing about 2,890ft. lineal oak park paling at the Aldington Recreation Ground, for the corporation. Mr. H. H. Scott, surveyor:—

Box and Turner, Ardingly	£400 0 0
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HULL.—For erection of new boiler-house, engine-house, chimney, &c., at the sawmill of Messrs. Reckitt and Sons, Limited, Starch House-lane, Hull. Messrs. Gelder and Kitchen, 76, Lowgate, Hull, architects. Quantities by the architects:—

Jackson, G., and Sons (accepted)	£1,351 5 11
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LEEDS.—All the tenders for the improvement of the City-square have now been let, except that for the granite work.

LEICESTER.—For new premises, Fox-lane, for Messrs. Berridge and Co. Messrs. R. J. and J. Goodacre, Leicester, architects:—

Chambers & Co., Leicester (accepted)	£1,733 10 6
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LEICESTER.—For additions to hotel and new stabling in Northgate-street, for the Midland Brewery Company. Messrs. R. J. and J. Goodacre, Leicester, architects:—

Herbert, Leicester (accepted)	£1,319 0 0
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LEICESTER.—For premises, for the Worcestershire Furnishing Company. Messrs. R. J. and J. Goodacre, Leicester, architects:—

Hardington & Elliot, Leicester (accepted)	£4,323
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LISTOWEL (IRELAND).—For erecting a dispensary residence, with out-offices, of the medical officer of the Ballyduff dispensary district, for the guardians of Listowel Union:—

Thornton, J., Kanturk, Co. Cork	£1,000 0 0
Holly, P., Tarbert, Co. Kerry	1,000 0 0
Cosey, T., Causeway, Co. Kerry	1,000 0 0
O'Brien, M., Ballyhae, Ballylongford (accepted)	970 10 0

LOCK'S BOTTOM.—For alterations and repairs at the White Lion Inn, Lock's Bottom, Kent, for Messrs. Nalder and Collyer's Brewery Co., Ltd. Mr. Robt. M. Chart, F.S.I., M.S.A., Union Bank Chambers, Croydon, architect and surveyor:—

Quintenton, J., Warlingham	£258 0 0
Bullock, A., Croydon	321 0 0
Gould, E., Croydon	307 0 0
Smith and Sons, Bromley Common*	294 0 0

* Accepted.

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CATALOGUE AND SHOW-ROOM
ART.

PRACTITIONERS of architecture are in these days literally overwhelmed with circulars and solicitations, descriptions of manufactures, and materials. Every post brings the professional man trade lists, catalogues, and pamphlets dilating on the virtues and qualities of certain articles, sanitary fittings, decorative materials. Year by year these circulars seem to multiply to such an extent as to preclude on his part any wish to preserve the more essential and important of them. They tax the most assiduous efforts to "file" or pigeon-hole them, and the bulk of this literature finds its way into the waste-paper basket or the fire. There are other and better ways of making known the advantages and merits of such goods. The influence of the manufacturer and tradesman on architecture shows what a complex industry building has become; how numerous are the materials and inventions which contribute to it; what a vast expenditure of capital and skilled labour of all kinds, from the highest art to the most mechanical trade, is called out. Our forefathers would have been simply amazed at the modern industrial output connected with the building trades; their mental vision of what they conceived architecture was would never have grasped the extent and multifarious requirements of modern practice. But it may be asked, whether the great development of the modes of production, the use of machinery, and the manufacture of ready-made goods, would not have been prejudicial to architecture? What would our 13th century, or even our 16th or 17th, architecture have been if modern trades and appliances had been in existence? These are questions which have never yet been satisfactorily answered. From reasoning we may affirm that the great examples of the Middle Ages at least would not have been what they are. Instead of the massive hand-wrought masonry, the solid hand-worked timber roofs and oak screens, and the charm of the painted glass and metalwork, which at present impart such beauty and character to our old churches and halls, we should have seen a very different class of work, machine-sawn and moulded work, "skimped" details, and repeated patterns. All the life and spirit of the old work would have been crushed out. Reasoning by analogy, such a conclusion would not be impossible. But we cannot affirm positively that our machinery and industries would have made the same difference in the 14th and 16th century that it has made in our own. Conditions have changed. The motives, religious and social, have altered in some degree; we have become wider and more diverse in our tastes, and to that extent have less of the depth and sincerity and enthusiasm for art which the old craftsmen possessed. So that it is just possible that if our ancestors had the mechanical advantages we possess, their art would still be superior in some points to our own. A more practical suggestion is, How we can compensate for the loss of unity and sincerity, which our complex and divided system has brought about—how we can restore the spirit of art? That the catalogue and all that it implies have been demoralising, we can scarcely deny. The architect is largely influenced by it: it makes him lazy in design. Ready-made, manufactured articles enter largely into the contract of every building. The builder and owner

are ruled by the market—those means of production which a keen competition has brought about. If we take, for example, such things as terracotta, ornamental brick, cast-iron goods, there is a strong temptation to employ those designs and patterns which have been so multiplied that they can be supplied cheaply. And does it not save individual exertion? The architect has only to select his bricks, moulded or ornamental, or the patterns shown in the catalogue for his guttering, rainwater-pipes and heads, his verandahs or railings, and specify the firm and the numbers in the printed catalogue. Possibly he might not have done better if he had sat down and made special designs for these details, for sometimes he has the advantage of choosing designs which have been prepared by architects and designers of note, and we may at once congratulate our modern enterprising brick manufacturers and dealers in cast iron and metal-work on the superior class of goods they illustrate; but he would at least have had the satisfaction of seeing his own ideas executed, and articles used adapted to all circumstances. The "ready-made" article, whatever it is, has been designed by a man who possibly knows little of building, or it may be by an architect for a particular building; it is possibly attractive, or ornamental, or fussy, and is kept in stock because the ordinary builder likes it. The architect may select a pattern, not because he likes it, but because he knows the extra cost of preparing a new mould or pattern, the delay in burning or casting. We do not believe any architect cares about selecting articles in stock, but circumstances compel him to do so. The owner may have a taste to consult, or the contractor may urge the necessity to use a brick or a casting that is to be had to expedite the work. But it may be a source of discord ever after; it may jar on the eye of the architect whenever he sees the building. The "catalogued" article is often exasperating; the architect may lose his peace of mind by seeing the same pattern of brickwork or casting he has selected for a public building utilised round the corner on a public-house. Adaptation is one of the essential conditions of a living art. We cannot understand stereotyped forms such as those of the illustrated catalogue. It is true, indeed, that the stock designs made for a great many classes of work are less appreciated than they were some years ago. We can recall many a church in the country which was "restored" from the ecclesiastical furniture-maker's designs: seats, stalls, pulpit, lectern, altarpieces, and ornamental accessories, even the font and window-glass. That wave of church revival which passed over the country fifty years ago, and which was largely promoted by such men as Augustus Welby Pugin and his followers, no doubt largely stimulated the manufacture of art furniture: it was a natural result of the movement. Catalogues and illustrations of wood, tile, and metal and glass work poured from the press, reproducing designs borrowed from the leading modern Mediævalist's work, and the architect drew some inspiration from this source. A little later another wave set in of Secular and Domestic work; the manufacturer eagerly embraced the opportunity. Instead of stall ends, altar and sanctuary fittings, metal corone, and standards, he gave the profession old woodwork and furniture, chimney-pieces and stoves, door furniture, and a variety of articles for houses. Since the teaching of art there is now more reticence in accepting these stock patterns, as our workmen are better instructed in design, and the architect is more reliant on his own resources. The manufacturer's influence is still great, however. Leading firms find it to their advantage to show what can be done by them. For one who makes his own design there are hundreds who are contented to accept designs and patterns made by others

—the speculative builder and the architect, for instance, who do not want to make trouble and expenso. Take as an instance terracotta and tile-work. The "stock" design has been carefully prepared to suit the material; the sheet of tile patterns gives a large variety of designs, many of them quite appropriate, and in pleasing harmony of colour. To prepare a new design for a lobby pavement or a vestibule would be to be fastidious to a degree; but there are some who like originality or a new motive of design, and for these the "pattern-sheet" is distasteful. One of the strongest objections that can be used against this form of art is its pandering to popular tastes. An architect may go over all the circulars that are sent to him, or visit the leading showrooms of the trade, and yet be unable to see one design that he cares to adopt. They are tawdry in ornamentation or colour, defective or obtrusive in design—as in many of the modern fireplaces—the fussy and showy cast-iron stove and the tawdry pictorial tiles printed or hand-painted, the elaborate overmantel.

In another department which has recently developed—that of woodwork, it is hard to know what to do to escape the "show-room" influence. The Philistine is everywhere; but in these departments he is supreme. Correctness and convention and fashion are almost synonymous terms with him; he cares not a straw about the "forward" or any other movement, which he looks upon as eccentric or faddish. The furniture he buys is generally from Wardour-street or Tottenham Court-road. Everywhere the catalogue is paramount in his eyes. The same complaint can be made with the makers of goods or furniture in iron or brassware. The stereotyped design is omnipresent, but how few are really appropriate or adapted to the architect's building! We heartily welcome those manufacturers of door furniture and window fastenings who have broken through the commonplace and hackneyed style for door-handles and finger-plates and locks, for example, and have infused a little honest art into their work. Whether made in brass, bronze, or aluminium, the door and window furniture ought to be part of the design, and, if possible, made under the architect's direction. Even in such external features as ventilators, surely we may expect to see some improvement taking place. The same forms that did ten years ago can hardly satisfy the architect of today. One enterprising firm, at least, has made considerable concessions to the architectural demands, and there is no reason why the same system of natural ventilation should not be applied in a way equally honest from an art point of view. It could, of course, if architects made their own designs. There are other departments of building in which the dominating "note" is of the same kind. Some of them are more constructive than decorative, as, for example, the ironfounder, the maker of columns and girders and iron erections; but the stock design is equally distasteful. Other goods, like sanitary fittings in all its endless diversity, have a good deal that is common to both. How the "shop" design is felt every architect knows. The very technical nature of the work prevents his interference with the artistic. We have only glanced at a few of the leading forms of manufactured goods which are yet under the influence of the makers, and which still conform to existing models and prejudices. When will the architect and the manufacturer and craftsman co-operate in the production of goods that are really the outcome of the building?

INSTITUTE OF PAINTERS IN OIL
COLOURS.

WITH the improvement in the hanging, and the lowering of the "sky-line," or upper row of pictures, the oil-paintings at the Institute, despite a great many canvases

which are of indifferent merit, are seen to an advantage. As usual, there is much in this collection which would have been better unlabeled—pictures of weak *genre* and transcripts of nature that fail to convey any idea; but we have also many canvases of interest, if not of power, as in Alexander Harrison's "Garden at Grez" (21), a broad study of colour and sunlight, a work of advanced order, and by a Paris-trained painter. The president, Sir J. D. Linton, sends one picture, "Meditation" (244), an able study of a lady, the drawing and painting of which show much of the technique, grace, and refinement of the master; but the scheme as a whole disappoints. The features are regular, if not the most pleasing; the drawing of the lady, her rich rose-coloured satin robe, and the handling of the folds and the sheen on the satin atone for much.

In the West Gallery there are few subjects that need keep us. Fresh colour is one of the qualities in which J. L. Pickering excels. "Blakeney Hill" (1), a sketch of meadow and village in the distance, and "Wharves, Norwich" (223), are both distinguished for the higher motives of work. Thos. Huson is also a colourist, as we cannot fail to see in his "To Market, to Market" (4)—a fresh-toned work. The vice-president, Frank Walton, has in his carefully-painted landscape, "In the Meadow," represented one of his autumnal renderings in all the beauty of undulated meadow and foliage, full of softness and atmosphere. The long, flowering grass in the foreground is most delicately painted. "Holmbury Hill," in the next gallery (200), is also a masterful landscape. Nature is seen under a different mood in T. Austen Brown's "October Evening—Potato Harvesting" (44)—a strongly-handled work, and represents a harder-featured landscape; or in his "Poplars," an autumnal-toned and more pleasing work. T. Hope McLachlan is also powerful in landscape. His "Edge of the Wood" (66) is solidly painted, the dark masses of trees obscuring the evening light. Anderson Hague has a warm sunset effect in his strongly-painted "Beneath the Firs"; Claude Hayes sends a forcibly-handled landscape, "Haymaking on the Bourne" (109); A. D. Peppercorn (116) a piece of impressionism, "A Surrey Village," in which the trees are sympathetically shown against a cold grey light—perhaps a little inky in tone. James Orrock's "Solway Marshes" (132) is a large, somewhat mannered, but broadly-painted work. Broad and vigorous also is R. Thorne Waite's "Cornfield" (90). Amongst the lady flower-painters we must place Miss Lily Blatherwick, whose "Poppies" (8) is charming in rich colour and feeling. Amongst subject pictures, John A. Lomax's "Where Ignorance is Bliss" deserves notice as one of the cleverest. It represents an interior parlour of a country house of the 18th century. Enjoying a reposeful after-dinner nap are an elderly gentleman and his wife, in blissful ignorance of the little flirtation that is going on behind them at the open casement window, where a suitor is handing the daughter a letter. She is elegantly attired in a light dress, and is anxious not to arouse her father, evidently pleased with the addresses of her lover. It is a very carefully-painted work in the details and costumes. Edgar Bundy, whose delineations of character are always of interest, has a conspicuous work representing "Barnaby Rudge at the County Justice's" (72). The red-haired, half-witted youth has taken out his companion raven on the floor. The bird, chattering, looks towards the old jovial gentleman seated on the other side of the room with knee-breeches and whip in hand. The unconcern of the seated lady near the table, and the other figures, are cleverly depicted; the furniture and adjuncts of the room exhibit knowledge of the period, and the painter has realised the humour and sentiment of the gifted author, if a trifle exagger-

ated and wanting in unity of composition. We need scarcely add the colour is warm and rich. T. Graham paints a kneeling girl whispering her "Confession" to an elderly priest, who, in cassock and stole, is taking a pinch of snuff on the other side of the partition. John White's "Village Barber," cropping a man's hair outside a cottage, is amusing, the colour and evening light admirable. One of the cleverest child studies is St. George Hare's "Preaching to the Heathen"—a little fair-haired girl at a table, with a large Bible before her, demurely addressing a row of masks, the comical faces of which have the most contorted features. The grim, ludicrous, and hideous are cleverly represented in this motley group of inanimate listeners. John R. Reid, in his picture of "The Fairy Queen" (112), has very adroitly combined pantomime and real life. In a small room, of humble surroundings, a little danseuse, in short white skirt and holding a fairy's wand, stands while her careworn mother is putting the finishing touches to the toilet. On a crib an emaciated child is looking very listlessly at the proceeding. The painter brings together in painful contrast the extremes of pleasure and poverty which are shown in the accessories, in the white fairy figure, and the dark dress of the mother. One of the few ideal portrait studies is T. B. Kennington's "The Crystal," a lady in white, low-cut satin dress against a violet background. She holds a crystal ball in her hand. The idealistic or symbolic meaning is obvious, and the painting admirable. A word of praise is due to E. Sheridan Knowles for his clever picture, "An Impromptu," a girl in light dress dancing—admirable in tone and drawing; also to G. S. Walter's view of "The Mumbles" (131), and Adam E. Proctor's nice study, "A Pet Lamb" (124). In Alfred East's "Autumn Study" (113) there is delicacy in handling and colour; the reflection of trees in the placid water is sweetly sympathetic.

In the Central Gallery, besides the president's study already mentioned, there are a few works of interest. Landscape is here again the strongest, if we except such a masterly and touching canvas as N. H. J. Baird's "Light of the Dwelling" (253), a noble study of light and shadow in both a physical and spiritual sense. The gloomy cottage interior is irradiated by a young mother, who is tenderly nursing an infant, while a sister or friend is admiring the newborn—an old tale, but told with much power and feeling; the dim light that steals in through a casement illumines the group. The painting is solid, but conventional in its handling. J. C. Dollman's "Chance Companions" (141) is extremely felicitous as a character study; the loquacious old gentleman on horseback is a perfect bore to his elderly companion in the saddle, and the expression of two opposite natures is very cleverly delineated. The same artist's "Two Heads are Better than One"—a donkey's head appearing above a seat on which sits a young man looking at a paper—is delightfully facetious. "Pandora's Box" (201), by Fred Roe, is a modernised version of the old legend. The young lady opening a handsome casket is rich in the golden hues of her dress and furniture. Haynes King is still content to give us comely lasses loitering over quay walls or chatting together. His "Gossiping" (192) is one of these, in which three comely maidens in coloured corsets and petticoats are looking over a wall by the sea. The painter, by the way, never gives us a slatternly girl, and is perhaps even too particular about the shoes these fisher-girls wear. An old lady reading her Bible, "Eventide," by Arthur Burdington, is a touching and realistic study; and in a different vein is St. George Hare's study of a dark girl in a pink corsage and golden-toned drapery (176). Full of tenderness, refinement, and delicacy is E. Blair Leighton's "Songs of Other Years" (274);

a young lady dressed in a light 18th-century high-wasted gown, singing a song which strikes a chord of sympathy in her listener, an elderly ecclesiastic. The piano, bookcase, and details are all painted with the extreme care and quietness of tone we are wont to see in this painter's work. We must also mention James Clark's study of a girl, "In Merry Mood" (208), Hugh Carter's "London Street Scene"—a fish-stall at night, with a group of hungry faces. The light and shadow is well managed. T. B. Kennington's "Sweet Content" is a graceful study of a nice face, reading. As a portrait, Arthur Hacker's "The Artist's Mother" (203) is modelled with extreme care, almost to a fault, but it is a clever presentment of age. Turning to landscape, the works of a few painters call for notice. E. M. Wimperis's powerful and imposing canvas, "Mists Lifting off Dartmoor," in the East Gallery, with its foreground of furze, rock, and stream, and its expanse of distance and moorland, with gleams of sunshine lighting up the scene and the sheep, must be mentioned for its large size. In the Central Gallery, we have some broad painting and sunlight in J. J. Alsop's "In Somerset" (144); strong colour in the blue sea, boats, and golden sands of Robert W. Allan's "Cromarty Firth" (166); a carefully-drawn view of the "Palladian Theatre, Vicenza," by John Fulleylove; a fine seascape by Edwin Hayes (178). As a study of deep colour and contrasts of dark blue sky and sullen sea, T. Hope McLachlan takes the lead in his powerful "A Cloud Rift" (182); of impressionism, A. D. Peppercorn's "Evening" (210) and "Southampton Water" (215) give us two extremely black, Corot-like toned landscapes. Anderson Hague's "Harvesting" (287) is full of vigour, but the sky is somewhat blotchy. J. Aumonier is stronger than ever; his "Full Summer," in the Central Gallery, and his "Hayfield" (305) are more after Constable in tone and style. William Rainey has a strong piece of colour in a canal scene, "Dutch Skippers" (283). Ernest Parton in his large coast view, "A Quiet Morning on the Bay" (289) is a pleasing work; and we must also notice the fine landscape of Jas. Orrock, "Old Lock on the Soar" (320). Though full of breadth and vigour, it suffers from a mannerism of style not unlike some of Constable's work. Arthur Severn's "Clouds Over Lancaster Sands" and "After Sunset" are atmospheric studies; the first (415) is cleverly painted in the reflection and the clouds and sands in tones of grey and yellow; the latter a luminous grey seascape and sky. Amongst the principal subject pictures is A. Chevallier Taylor's "Enoch Arden," the last tragic scene in Tennyson's poem, in which the wanderer is seen under a dark tree peering into the lighted window of the old home with despair written on his countenance; it is scarcely, to our minds, a happy conception. Henry J. Stocks' curious imaginative work, "Dead Summer" (308), is a little repulsive, but withal clever as a piece of symbolic painting. John R. Reid has a piece of incident painting that is characteristic, "There's a Picture for You," if somewhat stale (326). T. B. Kennington's "Memories" (381) shows how this gifted painter has turned from real life to idealised subjects—we cannot think successfully. In this example is seen a young girl, undraped, in kneeling posture in a woodland by a stream. A few irises are on the ground. Her memories overpower her, and she sobs. One can learn little else from the picture. It is needless to say the figure is drawn with grace and the colour is refined. "Under the Vine" (373) is a piece of portrait painting, but the painter, John W. Godward, has raised the subject to an almost ideal one by his treatment, and the background a trellised vine. The dark bonnie girl in navy-blue print dress, black hair, and straw hat, is very admirable in modelling, technical handling, and colour. One of the finest land-

scapes is Leslie Thomson's "Axmouth," in the Central Gallery, a quietly-treated landscape, a clump of trees at the side of a road, which is carried over a silvery stream by an old stone bridge. There is real charm of colour and movement in this work of a rising artist.

THE ROYAL SOCIETY OF BRITISH ARTISTS.

THE walls of this Society in Suffolk-street continue to give us evidences of a higher aim than we generally meet with in the ordinary picture gallery, where the commercial element is often so conspicuous. Disciples of what has been called the "forward" movement are generally to be found here, and though there are many examples of excessive zeal in this direction, there are a few canvases which represent distinctly a departure and honest effort. Beginning in the Central Gallery, we come to a large picture by H. T. Schäfer, whose work of late years has been ambitious. "Contemplation" is certainly masterly in composition: the half-draped figure of a woman seated on a leopard's skin outside the entrance to a temple is modelled with grace, and the expression on the face is meditative and thoughtful; but we think the subject would have gained if a smaller scale had been attempted. The colouring is dark, of a sombre tone of brown and grey. Alfred S. Edward's work, "In With the Tide" (10) is handled with a thorough sense of atmosphere and colour, the sea is fresh, and there is movement in the scene. A quiet evening effect is attained by Stuart Lloyd, whose work seldom falters; the light and reflection from sky and the dark group of cottages on the bank of the river are conscientious. We may ask indeed why this popular painter of riverside pieces so persistently follows the same combination of water and landscape? Near it J. Peel has a nice study of colour and reflection in his seascape "St Bulade's Bay, Jersey" (24). Walter Fowler's "The Edge of the Marsh" is bold and broad in its light and shadow effect over the meadow. One of the best landscapes is Tom Robertson's "Orchard-neak on the Tay" (72), a vernal scene, practically and broadly handled, and in rich colour. The shadows of the apple-trees, the bloom of which is deftly painted, are well distributed; the least successful part of the performance being the sky. William Hunt is one of the advanced band of landscapists: he sees nature as colour, light, and shade, and spurns the conventional manner. "Twixt Grey-seamed Stems of Apple Trees," is a poetic rendering of an orchard next a river. The grey tones of the trunks, and the light breaking through the branches and foliage, are effective. J. Sanderson Wells, in his "Fish Market, Whitby" (74), is a delightful study of atmosphere and figure drawing. "Evening Calm" (99), is one of the most conspicuous works on the long wall. Charles H. Eastlake has shown his capabilities here as a painter of evening effects. A reposeful harbour, in which ships are moored—a haven of rest, bathed in the blue-grey tones of evening twilight. In "Drifting Cloud Shadows" (108), Edmund G. Fuller paints an expansive blue sea with drifting clouds shadowed on the waves—a work of crispness and movement. The waves full of the latter quality, and of daylight intensity. Near it, Julius Olsson has another pleasing study of the sea, "Sea Holly and Thistles," in which the reflection is admirably rendered. Albert Kinsley (86), Alfred de Brianski, and Arnesby Brown are other interpreters of landscape. Two or three subject-pictures demand our notice. Mr. F. Cayley Robinson, whose quaintly Mediaeval compositions have won for him a deserved place among the few poetic painters who have broken away from conventional trammels, and have a mission in art, has

this year sent a picture of even greater merit than the one we previously noticed. "The Foundling" tells its own tale in its own subtle and mystic manner. It represents a small room lighted by two conflicting lights—the cold grey light of a wet evening and a ruddy firelight, which gilds the interior. A little wan girl, a foundling, sits on the floor opposite the comfortable fire half-asleep, while a tenderly compassionate woman bends over a small bed, which she is preparing for the drenched and weary child, whose bandaged feet are evidence of kindly care. An open drawer reveals the motherly tenderness for a lost child, for here are seen in exquisite order little shoes, toys, and other mementoes of a dead son. The firelight glints many objects, and throws into shadow the fire-dogs. Mr. Robinson has many beautiful and touching passages in his work. The motherly guardian of the young foundling, as she arranges the bedclothes, looks with tenderness towards her charge; on the fireplace are tiles depicting the story of her plighted love and the death of her own child. Again, the painter has most gracefully arranged the lines of the woman's figure and drapery. There is a strong touch about this picture of the pre-Raphaelite sentiment in the drawing, details, and colour. The large head of the child is remarkable. "The Daughter of Herodias," by Leonard Watts, is a conspicuous work of some refinement in the modelling and colour. The young maiden, who is sent on a cruel and distressful errand, clad in light drapery, stands just outside the banquetting hall-door on marble steps, her figure relieved by the darkness of the interior and the massive curtain which is held back by a cord. Rose petals lie strewn on the marble floor at her feet, and on the steps is a silken scarf. The face of the maiden has a petulant look, not pleasing. Hanging in a central position, R. C. W. Bunny's large bluish picture, "Eos" (103), attracts the visitor for its mysterious subject and qualities. When he knows that the luminous shadowy figure of a female, who is shown walking on the surface of the sea, is Aurora, the goddess of the dawn, who was supposed to have ascended from the ocean at the dawn, he may be a little relieved of his anxiety. Two fishermen are about to cast their net into the sea. If the theme is a little mysterious, the scheme of the work is above the ordinary level. There is a poetic meaning in addition to the decorative value of the conception; the rosy-footed and shadowy figure of Dawn and the delicately-reflected clouds indicate the vivifying dawn of the coming day. Rosy morn is rising out of the mist. A pleasing decorative subject is E. A. Fellowes Prynne's "Labour and Love" (67), painted in a nice tone. "The Torn Dress" is a well-studied figure subject. The painter, W. T. Warrener, has caught the true inspiration of a life of toil in the drawing and colour of the elderly sister looking at the garment, and her neat, homely room. In the other galleries we may notice in passing H. G. Hewitt's "Winter Tale," a well-told incident (133), the firelight effect on the boy and girl is cleverly depicted on their terrified faces; the old, large kitchen fireplace throws weird shadows around. It is almost superfluous to say that the president, Wyke Bayliss, sends three splendid interiors, one of "Chartres Cathedral," showing the lovely apse and screen (160), and another in the central gallery, "The Church of the Angels, Lugano" (51), in which the mighty frescoes by Luini of the Crucifixion and the Passion are depicted—a subject charmingly rendered by the president's facile pencil. His great work is the "Interior of Milan" (241), a noble subject for the architectural painter, in which subtlety of line, mystery of perspective, light and shadow, and charm of colour are combined with a true sense of the poetry of art. The work of Montague Smyth, "A Dutch Mill" (167), has a

true sentiment and the elements of a good composition. J. Sanderson Wells is charming in the colour and handling in the sun on the red-tiled roof of his "Boats Leaving Whitby." As a study of modern lady's costume, O. Eckhardt's portrait of a lady is noticeable for its light scheme of colour in blue and white, and delicacy of treatment. S. H. Sime's realistic full-length portrait of a gentleman is also a remarkable instance of French portraiture. The figure is imposing and intense in its realism. On the other side of the room, J. W. T. Manuel has a portrait of a lady (223) in walking dress, a black bodice with a skirt of deep turquoise. The figure stands full-length against a decorative background of arabesque, also a remarkable study of French mannerism. The dark head-gear and symmetry has almost a decorative meaning. W. Hunt's large sombre picture, "The Lady of Shalott," in her barge floating down the stream amidst wooded banks, is too dark to be discernible. A very large coast view (212), "Carting Seaweed," by Terrick Williams, has the merit of atmosphere and cloud painting, and the colour is harmonious. Large and luminous in its painting of sea and surf is S. M. Laurence's "Breaking Waves" (193), and we may note the works by R. Machell, especially his clever symbolic composition "Love" (166), treated more as a piece of decoration, in which the frame forms a conspicuous part in the scheme. It is undoubtedly clever. Many excellent water-colours are to be seen. One is a nicely-toned view of Blythburgh, by W. Lee Hankey, who sends several charming studies (284, 299, &c.) Admirable drawings and studies by Albert Kinsley (258, &c.), F. W. Davis (247), L. Burleigh Bruhl, Leopold Rivers, John Eyre, J. W. T. Manuel, Victor Burnand, E. Borough Johnson (297), Reginald Smith, and a few on the screen must be passed over for want of space.

THE A.A. SOIREE.

THE annual soiree of the Architectural Association was held on Friday evening in the great hall of the Church House at Westminster, and passed off very successfully. The President, Mr. Beresford Pite, the vice-presidents, Messrs. W. H. Seth-Smith and John Begg, and members of the committee received the visitors, who numbered over 700. During the evening selections of music were rendered by the band of the Honourable Artillery Company, under the leadership of their bandmaster, Mr. Edward Walker, and by the Rainbow Amateur Mandolin and Guitar Society, conducted by Miss Creswell. With the exception of a series of forty photographs, illustrating the recent A.A. summer excursion to Tunbridge Wells, by Mr. H. Goodman, and of the students' prize drawings of last session, the exhibits, as befitted the meeting-place, were entirely ecclesiastical in character. Mr. Alfred Stalman, of Frith-street, Soho-square, showed embroidered altar frontals and dossals, and examples of the printed flax hangings with which the walls of the Upper House of Convocation (which, curiously, is located under the great hall) are covered; an exhibit of much interest was the altar frontal, first specially designed and made for the parish church of St. Martin-in-the-Fields; it is English Renaissance in character, the somewhat stiff design being carried out in embroidery on rich red velvet and damask silk, with orpheys of green velvet. Messrs. Essex and Co., of Wandsworth and Battersea, showed a number of new designs in machine-made papers in small white-beaded panel-frames. Other exhibits of wall-papers were sent by Messrs. Charles Hayward and Son, of Newgate-street, including designs by Messrs. Beresford Pite, A. L. Gwatkin, John Belcher, and Clement Heaton. Another firm sent a series of five full-sized oil paintings for mosaics to be placed in the Guards' Chapel. Mr. Alfred Robinson, of Broad-street, Bloomsbury, showed a number of choir-stalls in oak, Late Perpendicular in style, intended for All Saints' Church, Leek Wootton, and executed from designs by Mr. W. D. Caroc, F.S.A. Another large work, also Perpendicular in treatment, was an elaborately carved reredos in untreated oak, intended for Munatun Church, Devon; this had

been designed by Mr. G. H. Fellowes Prynn, and executed by Messrs. Lonnie and Co. of Kennington; the panels were filled with oil paintings, illustrating incidents in the life of Our Lord, painted by Mr. E. A. Fellowes Prynn. Messrs. Barkentin and Krall, of Regent-street, had a large selection of metal-work in gold, silver, brass, bronze, and iron, all of ecclesiastical character. Underneath some large silver and brass sanctuary lamps were a processional cross in repoussé iron, and altar crosses, candlesticks, vases, ewers, and censers, a noteworthy central feature being a jewelled crozier in ivory and silver, made for the Universities' Mission for the African See of Likomo, the ivory having been taken from a tusk given to the missionaries as a peace-offering by a native chief; the crook is crocketed all round, and rests in an hexagonal tower, in the niches of which are placed half-a-dozen full-length figures. Some colour schemes for church decoration were sent by Mr. George Ostreham, of Hampstead Heath, including a design for the central portion of the altar of Gloucester Cathedral. A series of designs for stained glass to be placed in Lichfield Cathedral, St. Mary's Church, Nottingham, and elsewhere, drawn by Messrs. Thomas C. and Henry Grylls (Messrs. Burlison and Grylls), was a feature of the display. Other exhibitors were Messrs. Longden and Co., Messrs. Shrigley and Hunt, of Lancaster, Mr. Tuberville Smith, and Messrs. Watts and Co.

CONSTRUCTION OF STEEL SPIRES AND STEEPLES.—VI.

AFTER summing up in our last article the resultant of all the external forces inducing stresses upon the rafter member of the half-principal, it was found that a T steel, having a gross sectional area of 6in. by 4in. by $\frac{1}{2}$ in., equal to 5sq.in., would fulfil the duty required of it. Referring to the skeleton elevation of the half-truss of the spire in our former articles, which it is unnecessary to reproduce here, it will be seen that the total height from the junction of the spire with its steel basis or cradle was 100ft. The truss is, therefore, divided into ten equal panels, which makes the length of each panel equal to 10ft. Thus, making no allowance for the difference between the inclined length of the rafter and the vertical ordinate, which has been shown to amount to only a couple of feet, the rafter, or the compression member, at present under investigation is practically divided into ten equal parts. The unsupported length of each part of the vertical and inclined member of the truss is also 10ft., since these distances constitute the apices from which spring both the horizontal and diagonal connecting bracing. Given an unsupported length of 10ft., what ought to be the least lateral dimension, or least side, which a strut or column should possess, in order to secure safety from deflection or deformation? Put M for the minimum lateral dimension, L for the length in feet of the strut or compression member, and P for the proportion of length to lateral dimension. Then the equation becomes—

$$M = L \times 12 \times \frac{1}{10}$$

Substituting for L its value of 10ft.,

$$M = \frac{10 \times 12}{40} = 3\text{in.}$$

As the least lateral dimension or side of the T-section is 4in., the section selected for the rafter fulfils all requirements also in this respect. This T-steel section will be adopted in the rafter, the vertical pillar or shaft, and in the end or lowest diagonal compression bar in the half principal. A reference to Fig. 1 will illustrate our meaning. In practically putting the steel work of the truss together, there are, so far as the principal alone is concerned, four different joints to be arranged—that is, one at the apex A, in Fig. 1, a second at B and E, a third at C and D, a fourth at F and G, and a fifth at H, where the truss is attached to the steel basis. The intermediate joints and connections from the base to the summit of the spire are all similarly designed, with a slight allowance for the difference of the angles of the diagonal bars with the vertical. In Fig. 1 the horizontal lower member IJK is a T-steel, 6in. by 4in. by $\frac{1}{2}$ in., which is carried completely together the base of the spire, and connects together the two inclined rafters of each half-truss. It is riveted down to the upper flange of one of the rolled steel joists forming part of the "cradle" shown in plan and elevation in Article II.

In commencing the analysis and design of the different joints in the framework, we will take that at H, or where the sloping rafter and the horizontal member at the base meet. It is always desirable in building up either iron or steel work to use butt joints, where possible, instead of lap joints, for two reasons: One is, supposing that double wrappers or cover-plates are employed, as they always ought to be, that the jointed parts of the two or more members connected together are altogether free from any bending moment; and the other—which is of infinitely greater importance—is that all the rivets in the joint are in double shear. The term double shear is a little confusing, because when compared with the single shear belonging to lap-joints, it is usually regarded as being double as strong. In other words, this leads to the conclusion that in a double-covered butt-joint only one-half the number of rivets would be required as in a lap-joint for a similarly-sized bar-plate or other section. In examples like the present, where the parts to be jointed are of comparatively small dimensions, and where double-cover plates are used, each of a thickness equal to that of the thickest of the plates, bars, or other section to be jointed, the number of rivets necessary in a joint may be taken when in double shear as half that required

the net breadth—that is, the breadth of a bar or plate after deducting the diameters of all the rivets in the same line of section, N the number of rivets, A the net sectional area of the plate, and t its thickness, then first—

$$A = B \times t,$$

from which we obtain for steel joints in single shear—

$$N \times a = 1.5 \times A.$$

$$\text{Therefore—} \quad N = \frac{1.5 \times A}{a}$$

It is usual in joints in double shear to allow 1.75 the strength of those in single shear, so putting N_1 for the number of rivets for a double shear, and keeping the other quantities constant, the equation becomes—

$$1.75 \times N_1 \times a = 1.5 \times A.$$

Solving for N_1 , we have—

$$N_1 = \frac{1.5 \times A}{a \times 1.75} = \frac{.86 \times A}{a},$$

which gives a value for N_1 —

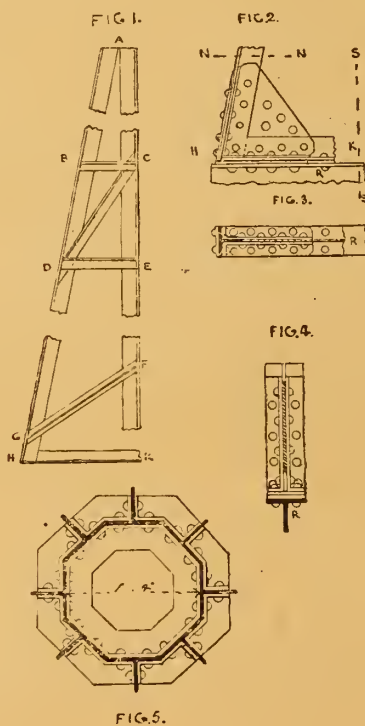
$$N_1 = \frac{0.86 \times A}{a}$$

This is another instance quite apart from that quoted in our last article, in which the adoption of steel as the modern constructive material has necessitated a complete alteration in the formula and equations applying to calculations made for the employment of the older material. Since the value of a $\frac{3}{4}$ in. rivet is equal to 0.44sq.in., the equation for the present example may be written—

$$N_1 = 2 \times A.$$

In Fig. 2 is shown the junction between the two T steels at the base of the half-truss. There are, in reality, two joints to be covered, one in the table and the other in the rib or tongue part of the section. Using the formula already provided, the number of rivets necessary on each side of the joints respectively, will be five and three. This calculation assumes that it is possible for the breadth of the table part of the T steel to be diminished by the diameters of two rivets, and the rib by not more than one diameter. One bent plate $\frac{1}{2}$ in. in thickness will form the outside cover for the table, and two gusset-pieces will act as wrappers for the rib, and being bent or forged with a rib on them will also serve as inside cover-plates for the joint in the table part of the rafter, as shown in elevation in Fig. 2. The T-base H K is riveted down to the rolled steel joist R, which forms the upper part of the steel cradle described in Article II. A plan, or rather a section of the whole junction of the several parts taken through the line N N in Fig. 2 represents the arrangement in Fig. 3. The hatched line in the latter figure is the filling plate, $\frac{1}{2}$ in. in thickness, inserted between the double gusset pieces. A section through the line S—S in Fig. 2 gives the elevation of the attachment shown in Fig. 4, which completes the plans, elevations, and sections necessary to enable the details of the work to be properly executed.

It has been already stated that when the vertical members of the half-trusses were erected, they would constitute a hollow octagonal column or shaft. It was not until the section of these members was decided upon that the dimension and proportions of the hollow column could be determined at the base or at any other part of the total height of the spire. It is now obvious that as the T-steel selected has the table portion 6in. broad, each side of the hollow octagonal column will be equal to the same unit. The first operation is therefore to describe an octagon upon a given side, which our younger readers will no doubt recognise as a simply particular application of the general geometrical problem, "To construct any polygon upon a given side." In Fig. 5 is represented a horizontal section of the hollow column, with all the T-steels facing inwards and the ribs projecting outwards. That to effect the whole building up of the steelwork shown in Fig. 5 will require some skilled workmanship, and some experience in skilled labour, there is no doubt; but all the parts to be put together are comparatively small, and it is a slight matter to manipulate sections of the moderate dimensions which the present example requires. Anyone who has seen the really enormous sections of steel employed in our great bridge and shipbuilding establishments, and the ease, rapidity, and dexterity with which they are handled by men accustomed to the work, would not for a moment hesitate to adopt a similar good and efficient style and class of work in all designs,



whether large or small. Referring to Fig. 5, it will be seen that the edges of the T-rafterers touch each other, or nearly so, at the angles of the octagonal shaft. Consequently they are disunited at these points, and it becomes necessary to connect them together. There is no difficulty in properly securing pair by pair; but in addition they must be all strongly bound together so as to constitute one solid compact ring. Mere strips, cover-plates, or joint-wrappers will not be sufficient; but it will be necessary to give a far greater amount of resistance and stiffness to the whole combination of component members. If the separate edges of the table part of each T-rafter could be adjusted with such precision as to form a kind of a wedge-joint, a very simple arrangement of cover-plates would suffice. But the action of the principal external force is to deflect the half-trusses inwards, and even if the edges of the contiguous rafter were planed, the fit could not be relied upon to prevent deformation. It is scarcely necessary to observe that the expense of planing the edges of so many T-steels, 100ft. in length, would be out of the question altogether. The separate rafters composing the whole column will be united by a series of annular rings, placed 8ft. apart in the length of the columns so as not to interfere with the jointing of the separate length of the T-steels, or of the junctions of the bracing of the truss with the same members. Their position may be shifted a foot either one way or the other if their attachment should be so near to that of other built-up members as to tend to impair their sectional area by the occurrence of too many rivet-holes in too close proximity to one another. The rings, which are double—that is, both on the inside and outside, are composed of angle-steel 3in. by 3in. by $\frac{3}{8}$ in. bent to the required shape and riveted to T-steels, as shown in Fig. 5, with rivets $\frac{3}{8}$ in. in diameter. The clear width between the backs of the rafters, or as that dimension might be termed, the internal diameter of the hollow column, is 1ft. 4in. The stiffening angle inside steel ring is, therefore, quite strong enough to obviate any chance of deformation or distortion. Were the shaft 3ft. or 4ft. or more in diameter, it would be advisable to brace the interior part of it by the introduction of angle steels of a light section, about 2 $\frac{1}{2}$ in. by 2 $\frac{1}{2}$ in. by $\frac{3}{8}$ in. In jointing the different lengths of the rafters and other members of the eight half-principals, care must be taken that no joint in the one must be nearer than 1ft. 6in. from another. In other words, the T-verticals shown in section in Fig. 5 must have their separate joints so arranged as to break joint with at least those verticals which are next to them on each side. A drawing of one of the joints will be subsequently given in detail. So far, the elevations, plans, and sections of the members of the half-truss have been assumed to belong to the last or lowest panel length of the spire, and consequently the T-steel has been allotted its maximum scantling, 6in. by 4in. by $\frac{3}{8}$ in. But this sectional area will not be continued the whole length upwards of the rafter, but will be diminished in a safe proportion in accordance with the corresponding diminution of stress which takes place in all the various members of the truss as their distance increases from the base or point of support towards the apex. The next joint calling for attention is that which secures the apices of the rafters—that is, where the inclined and vertical members of the half-principal have to be connected together.

ADAPTABLE SPECIFICATIONS.—XV.*

SMITHS' AND IRONFOUNDERS' SPECIFICATION
(continued).

IX. 10. CAST-IRON COLUMNS.—These are to be carefully and exactly cast according to the detail drawings, with all the bearings and fittings perfectly true, and are to be put together with all necessary bolts and screws. They are not to be in more separate pieces than the drawings indicate, unless the architect shall so direct, and are to be fixed truly upright, with a level and uniform bed on the [York stone] base or template nearest the ground. Should any difficulties arise in casting any part of them according to the detail, the matter is to be referred to the architect, and no deviations from the details are to be made on any pretext without his knowledge and consent.

IX. 11. CAST-IRON AIR-BRICKS.—Provide

and build in [where directed] [where indicated on the drawings] No. strong cast-iron air-bricks, each 9in. by 3in. on the face [and No., each 9in. by 6in. on the face] with plain rectangular grating pattern, each opening in the grating being not more than 1in. square.

IX. 12. IRON CIRCULAR STAIRCASES.—Provide and fix where shown on the drawings (including all necessary labour and materials and the trimming and inclosure of floors, and all other carpenters' and joiners' work) an iron circular staircase, 4ft. 6in. diameter, with stay-bar, balusters, newels, and half-round handrail complete; the staircase itself, which is to be selected by the architect, being of the prime cost value of [15s.] per step.

IX. 13. COAL-PLATES.—Provide and fix where shown [in the pavement over the coal-cellar] an illuminating self-fastening iron coal-plate and frame, value 10s. 6d. prime cost.

IX. 14. PAVEMENT LIGHTS.—Provide and fix [in the pavement] where shown, feet super. of Hayward's patent half-prism pavement lights complete [made to order at a p.c. cost of 8s. 6d. per foot super.] [of stock sizes, at a p.c. cost of 7s. 6d. per foot super.]

IX. 15. PATENT STAIR-TREADS.—Provide and fix complete to each step in the following staircases, namely and also to the margin of the landing at top of them for the width of the staircase, one of Hawksley's patent stair-treads, p.c. 3s. 6d. per foot super., and provide, and properly fill them in with, hard pitch-pine blocks, with the end of grain upwards.

IX. 16. CAST-IRON GRATINGS.—Provide and fix to the following places, namely stout cast-iron gratings [of plain bar pattern, with strong margin] [to detail] including all lugs, flanges, and tenons for fixing complete, and do all masons' work, including running with lead, and all bricklayers' and other works required, including cutting away and making good with hard bricks in cement.

IX. 17. WROUGHT-IRON GRATINGS.—Provide and fix to the following places, namely strongly-framed plain wrought-iron gratings made in the best manner, with margin of 1 $\frac{1}{2}$ in. by 1in. L iron, and with bars [2] inches apart, and [1 $\frac{1}{2}$ in. by $\frac{3}{8}$ in.] including all necessary fangs, lugs, and other accessories for fixing, and all masons', bricklayers', and other work required to be done in order to fix them in a thoroughly sound and durable manner. Provide the p.c. sum of £.... for ornamental grating, to be supplied by anyone whom the architect may appoint, and fix complete as above specified.

IX. 17. WROUGHT-IRON CASEMENTS.—Provide and fix to the various windows of wrought-iron casements and frames of the sizes shown or marked on the drawings. These casements and frames are to be of the p.c. value of [3s.] per foot super., and are to be made by a firm approved by the architect. They must be truly and exactly fitted to the openings, and well and neatly framed together at the angles, and must shut so as to be practically airtight. No. of them are to be open (of the sizes shown on the drawings), and for each of these the contractor is to provide a p.c. sum of [12s.] for brass hinges and opening and shutting gear, and is to fix these completely in the best and most workmanlike manner.

IX. 18. CAST-IRON SOIL-PIPES.—These are to be 4in. in internal diameter, properly socketed and jointed so as to be perfectly airtight, and are to weigh not less than 58lb. to the 6ft. length.

IX. 19. CAST-IRON STREET-LAMPS.—Provide and fix securely at each of the following places, namely a cast-iron street lamp-post, to be selected by the architect, value [35s.] p.c., and connect it with the gaspipe which will be provided to that spot. Provide and fix in it a lamp value [20s.] p.c., to be selected by the architect.

IX. 20. GRATES, STOVES, AND KITCHENERS.—Provide (to be set complete in all cases by the bricklayer, who is to supply all necessary bricks, firebricks, fireclay, and other materials, and who is to form, and, if necessary, to alter all flues and other brickwork, to set all tiles, and do everything required for the completion of the works) the following stoves, grates, kitcheners, &c.—namely, in each of the following rooms, that is in a stove value [£6] p.c.; in the a stove value [£4] p.c.; in the one value [£2] p.c.; in the a mantel register value [25s.] p.c., and in the [kitchen] a kitchener value [£10] p.c. All stoves, grates, mantel registers, and kitcheners are to be selected by the architect.

IX. 21. STABLE FITTINGS.—Provide, and fix complete, in each of the following places—namely,

..... a 3ft. angular enamelled manger, value [30s.] each p.c.; also at an iron enamelled manger 6ft. long, value [50s.] p.c.; also provide and fix where shown on drawings No. angular galvanised-iron hay-racks, value [11s.] each p.c., and likewise No. sets of stall division ironwork (to be filled in with woodwork as indicated on the drawings) including heel-pillar, moulded ramp-rail, and bottom sill, value 60s. p.c. per set; and provide and fill in all the necessary woodwork. All the ironwork to be selected by the architect.

IX. 22. STABLE GUTTERS, &c.—Provide and fix in feet run of wrought-iron stable gutter, value 2s. 6d. per foot run p.c., and No. 10in. sanitary trapped horsepots, value [6s.] each p.c. All to be selected by the architect, and properly connect them with the drains.

IX. 23. SHERINGHAM'S VENTILATORS.—Provide and fix complete at the points directed, in each of the following places—namely, a best Sheringham's ventilator, 12in. by 3in., and in each of the following places—namely, a similar ventilator 14in. by 6in., all with proper cords and balance-weights, and all to include an external iron grating of plain rectangular pattern, with openings not larger than 1 $\frac{1}{2}$ in. by $\frac{3}{4}$ in.

IX. 24. WROUGHT-IRON DOORS.—Provide and fix at, in the best and most secure manner, a wrought-iron fireproof door and frame, value [£7] p.c., the clear opening of the door being 6ft. by 2ft. 6in.

IX. 25. SOOT DOORS.—Provide and fix where [shown] any flue turns off at a smaller angle than that of 60° with the horizon, a proper soot-door and frame, value [3s. 6d.] each prime cost.

IX. 26. GALVANISED-IRON CISTERNS.—Provide and fix over a galvanised-iron cistern 3ft. 2in. long [of strong ordinary quality] [of $\frac{3}{16}$ in. full], holding 100 gallons. Provide and fix over a similar cistern, 4ft. 6in. long, to hold 300 gallons. Each cistern is to have all the necessary holes and appliances for plumber's work, and is to be carried by strong wrought-iron bearers, which the contractor is to provide.

IX. 27. CORRUGATED IRON ROOFING.—Carefully cover the roof of with galvanised tinued corrugated iron roofing of No. 24 gauge, in sheets 2ft. 2in. wide, including all cutting, fitting, shaping, and lapping, as well as all necessary bolts, nuts, rivets, washers [and galvanised tinued wrought-iron ridge cap complete].

IX. 28. DINNER LIFT.—Trim for, form proper deal boxing for, and do all other work required in connection with the dinner lift, and provide and fix where shown on plans a double dinner lift with a clear space inside the lift of 2in. by 18in., to carry 60lb., the lift being [20ft.] high [and of a p.c. value of £3 10s.].

IX. 29. LUGGAGE OR COAL LIFT.—Provide luggage or coal lift with clear space inside the lift of 3ft. 6in. by 2ft., the lift being [30ft.] high and being adapted to lift 3cwt. [The prime cost of this lift to be £30.] Fix the lift complete where it is shown on the drawings, providing stout deal boxing and all other materials and labour required.

IX. 30. HEATING APPARATUS.—Provide the sum of [£100] for a low-pressure hot-water heating apparatus, and set the saddle boiler belonging to it, providing all bricks, firebricks, and other materials, and all labour.

IX. 31. ROLLED IRON AND STEEL JOISTS.—Provide and fix all the rolled iron and steel joists and girders shown on the plans and details. Where not tested as the work goes on, they must in all cases be supplied by a firm approved by the architect, and where tested, they must be of the quality of iron or steel, as the case may be, which is described in the previous part of this specification. Except where specially directed otherwise by the architect, a clear space of 1in. is to be left between the end of each rolled joist or girder and the wall in which it is fixed, and that wall is not to rest on the ends of the joist or girder, but it is to be supported clear of them by 4in. hard York templates, or in such other way as may be directed. One end of every rolled joist or girder which is more than 10ft. long is to rest on a hard steel roller as long as the width of the lower flange or plate of the girder, and $\frac{1}{2}$ in. thick, and this roller is to be on a $\frac{1}{2}$ in. wrought-iron plate as wide as the length of the roller, and 9in. long [with the ends turned down $\frac{1}{2}$ in. into the York template provided for the girder.]

IX. 32. TESTING IRON AND STEEL.—Provide the prime cost sum of [£10], to be expended as the architect shall direct in testing the iron and steel.

Cut off, or cast, in the case of cast iron, all the samples and bars which may be required for this work. Finish them to exact sizes, and forward them as will be directed [to Mr. Kirkcaldy's testing works, Southwark-street, London, S.E.], and pay for packing and carriage.

IX. 33. PAINTING IRON AND STEEL.—All structural iron and steel work is to be properly cleaned from rust and scale, and is to have two coats of pure red-lead paint in linseed oil before being fixed.

IX. 34. IRONWORK IN BOLTS, STRAPS, &c.—Provide, for the carpenter to fix, all the wrought-iron work shown or implied in the drawings of roofs, floors, and other carpentry. Where not otherwise shown, straps are to be $\frac{1}{2}$ in. wide and $\frac{1}{2}$ in. thick, widened out round all bolt-holes and similar apertures in them, so that there shall be the same amount of metal round these holes as elsewhere in the strap. The bolts which pass through the straps are to be $\frac{1}{2}$ in. round bolts. All other bolts, except those figured larger, are to be $\frac{1}{2}$ in., and all bolts are to have proper heads, nuts, and washers. Each strap is to have one set of gibbs and keys for tightening it up.

IX. 35. ORNAMENTAL IRONWORK is in all cases to be made by the persons whom the architect shall appoint, but is to be fixed by the contractor in the best and most perfect way. Provide [for staircase balusters] the sum of £ . . . p.c. Provide for iron gates the sum of £ . . . p.c. Provide for iron grilles the sum of £ . . . p.c. Provide for wrought-iron railings the sum of £ . . . p.c.

IX. 36. SCRAPERS.—Provide for No. . . . scrapers and scraper-stones (to detail) the sum of [30s.] each, and fix where directed.

IX. 37. STAYBARS TO LEAD GLAZING.—Provide to all lead glazing, and fix as directed by the architect, horizontal wrought-iron staybars $\frac{1}{2}$ in. wide and $\frac{1}{2}$ in. thick, to average 14 in. apart in the height of each light. Provide and fix also to each light a $\frac{1}{2}$ in. by $\frac{1}{2}$ in. upright stanchion (to detail) about 3 in. shorter than the extreme height of the light and passing through each of the staybars in that light, which are to be neatly widened out and mitred round the holes through which it passes. Let in the staybars and stanchions to the brickwork or stonework adjoining, and securely fix them with neat Portland cement. Provide the sum of 3s. p.c. for shaping each stanchion head to detail.

GRAPHIC STATICS.—IV.

THE next thing to claim our attention is the proposition which is called the Polygon of Forces. The use of this will be found in many cases to greatly shorten the work of finding the resultant or the equilibrant of any number of forces which act through a point.

The Polygon of Forces.—If any number of forces acting through a point can be represented in magnitude and direction by the sides of a closed polygon, taken in order, they will be in equilibrium. Let any number of forces, P, Q, R, S, T, Fig. 12 (a), acting at the point O, be represented in magnitude and direction by the sides of the polygon ABCDEA, Fig. 12 (b), taken in order thus, A B, B C, C D, D E, E A. Join A C, A D.

Now A B, B C represent P, Q in magnitude and direction; therefore, by the Triangle of Forces, A C represents the resultant of P and Q. Therefore, A C, C D represent the joint effect of P, Q, R. Therefore, by the Triangle of Forces, A D represents the joint effect of P, Q, R, S. Therefore, A D, D E represent the joint effect of P, Q, R, S. Therefore, by the Triangle of Forces, A E represents the joint effect of P, Q, R, S. But A E represents a force equal and opposite to the force T (which is represented by E A), so then the resultant of the forces P, Q, R, S is equal and opposite to the force T, and, therefore, the forces P, Q, R, S, T must be in equilibrium.

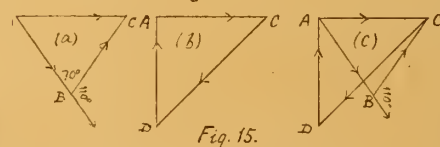
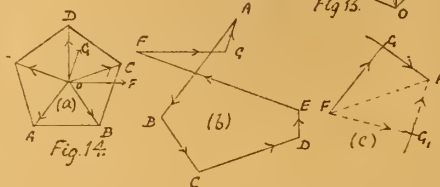
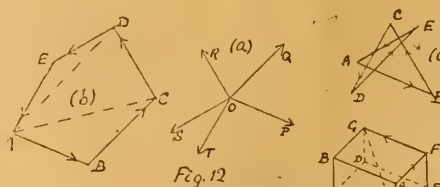
The remarks made as to the triangle of forces are applicable to the Polygon of Forces, and, in addition to these, a few other points may here be profitably considered.

The Polygon of Forces is not sufficient alone to enable us to deal with forces which do not all act through the same point.

The word *polygon*, as it is now used in mechanics, has a wider meaning than is popularly attached to it. It may mean a rectilinear figure of any number of sides, from one upwards. A *closed* polygon is one in which, starting from any angle, and passing along the sides in succession, we at last arrive again at the point from which we started. A polygon which lacks a side is said to be *unclosed*, and the side which will

complete the figure is called the *closing line*. The sides of any unclosed polygon cannot represent a system of forces in equilibrium.

It is generally stated that the order in which the forces are taken in drawing the Polygon of Forces is of no importance; but this statement requires considerable qualification, and must not be understood to mean more than that the proposition is true in whatever order the forces are taken. In fact, it will often be found in applying the Polygon of Forces, that the order in which



the forces are taken is an important matter. In Fig. 12 (c) the polygon of the forces in Fig. (a) is drawn again, taking them in the order P, R, T, Q, S.

The converse of the Polygon of Forces is true—that is, if a number of forces, acting through a point, be in equilibrium, they can be represented by the sides of a closed polygon taken in order. But it is not true that if the sides of any closed polygon, taken in order, represent the forces in direction, they will also necessarily represent them in magnitude.

It should be remarked that the Polygon of Forces holds true when the lines of action of the forces do not all lie in the same plane, in which case the polygon cannot be a *plane* polygon. In the enunciation and demonstration there is no limitation in this respect, either expressed or implied.

As a simple example of forces whose lines of action do not all lie in one plane, consider the rectangular solid OABCDEFG shown in the sketch, Fig. 13, and suppose three forces to act from O along the edges OA, OE, OC, and to be completely represented by these edges. Starting from O, we may take OAPG as the *unclosed* polygon of the three given forces; the diagonal GO of the solid will then be the *closing line*, and will, in this instance, completely represent the equilibrant of the given forces; and OG will, therefore, completely represent the resultant of the same given forces, because it is evident that both equilibrant and resultant must act through O, the point through which the given forces all act. Remember that we have here been referring not simply to the lines of the sketch, but to the actual edges and diagonal of the solid.

A few applications of the Polygon of Forces will now be given, and the reader is advised to work these out each more than once, taking the given forces not always in the same order, and carefully comparing the results obtained, for a little work done in this way is often of more value than much mere reading about such a subject as this.

Fig. 14 (a). Forces of 13lb., 7lb., 11lb., 3lb., 18lb. act from the centre O towards the angles A, B, C, D, E respectively of a regular pentagon: find two forces which shall act along lines parallel to AB, BC respectively, and shall balance the five given forces.

The solution of this is shown in Fig. 14 (b), where ABCDEFG is the unclosed polygon of the given forces, taken in the given order, and the polygon has been completed by drawing FGA parallel respectively to the given directions; then these lines, measured to the scale used for the others, will give the magnitudes of the two required forces.

With the same five forces given as in the last example, find the directions in which two forces of 9lb. and 6lb. must respectively act to produce equilibrium.

Fig. 14 (c). Draw the unclosed polygon ABCDEF (not shown in the figure) as before, from the points A and F; with radii representing 6lb. and 9lb. respectively, describe the arcs intersecting at G and G₁; join FG, GA, FG₁, G₁A; then either FGA, GA, or FGA₁, G₁A will show the directions in which the two forces must act, and we thus obtain two solutions to the question. If A be taken as the centre of the arc of radius representing 9lb., and F as the centre of the arc of radius representing 6lb., and the work otherwise carried out as above, two solutions will again be obtained; but it will be found that they are the same as before, the only change made being in the order in which the forces occur in the force polygon.

It should be noticed that the Polygon of Forces enables us to find two things, and no more. We may find:—(1) The magnitude and direction of the single force which will balance the given forces. (2) The magnitude of two forces whose directions are given, and which will balance the given forces. (3) The directions of two forces of given magnitude to balance the given forces. (4) The direction of one force and the magnitude of the other of two forces which will balance the given forces. Those cases which have not here been worked out are left as an exercise for the student.

In any problem proposed for solution we have a right to expect all the necessary conditions to be placed at our disposal. In many questions the conditions are not all of them *explicitly* given; some are merely *implied*, but must not, on that account, be ignored by the person working the problem. The missing conditions are sometimes *unconsciously* made use of by students; but this should never be. The habit should be formed of observing what assumptions are made, and what warrant there is for these assumptions.

It will be instructive to work out the following question, which is taken from the last "Practical Plane and Solid Geometry" exam. paper, set by the Department of Science and Art:—The wire passing round the top of a telegraph-pole is horizontal, and the two directions make an angle of 110° with one another. The pole is supported by a wire stay inclined 45° to the horizon. Given the tension of the telegraph-wire to be 200lb., find that of the stay?

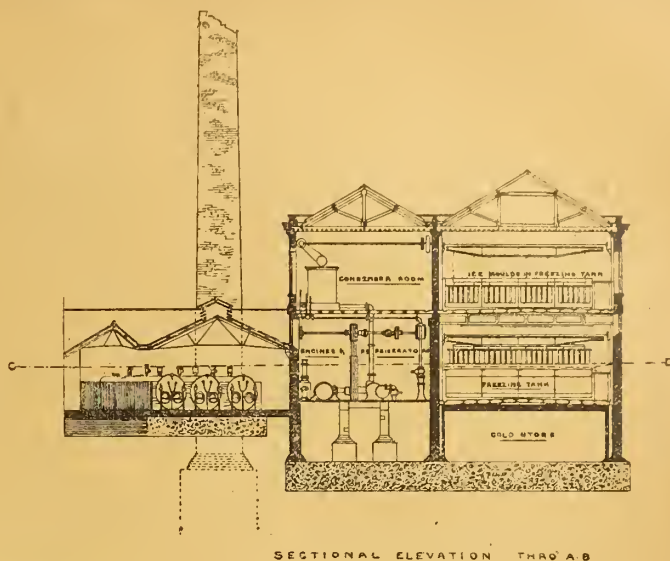
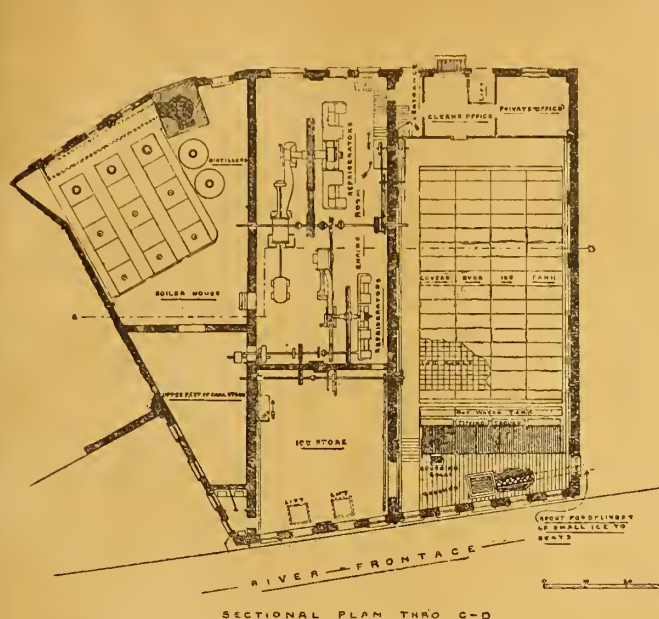
In this example it is clear that the pull of the wire stay alone cannot balance the effect of the pulls of the two telegraph wires, since the three wires are not in the same plane. We may assume that the pole is vertical, and that the arrangement is such that it is not subjected to any bending force. Thus, the force supplied by the pole must be vertical, and the forces exerted by the pole and stay must be in equilibrium with the pulls of the telegraph wires, and, therefore, with the resultant of these pulls. Hence the resultant of the forces exerted by the pole and stay must be equal and opposite to the resultant of the pulls of the telegraph wires, and we thus see that the wire stay must be in the same (vertical) plane with the axis of the pole and the resultant of the two given pulls.

In Fig. 15 (a) the work is shown for finding, by the Triangle of Forces, the resultant of the two given pulls. Here AB and BC are each made to represent 200lb., and the angle ABC is made 70° (180°—110°). AC is found to represent a force of about 229lb., and we know that this resultant of two horizontal pulls must be in the same plane with them, and, therefore, horizontal. In Fig. (b), AC is made equal to AC in Fig. (a), CD is drawn so that ACD is an angle of 45°, and DA is drawn at right angles to AC. Then, evidently, by the Triangle of Forces, CD represents the required tension (324lb.) in the stay, and DA represents the upward force (229lb.) exerted by the pole. In Fig. (c) the whole of the work is combined.

This question has been discussed at some length, the conviction of the writer being that more is to be learned by the thorough examination of a few questions than by simply going through the solutions of a large number of problems.

J. C. PALMER.

At the first meeting of the newly-formed joint hospital board for Fiverton and neighbourhood, held last week, it was agreed to purchase three acres of land as a site. Mr. Siddals was appointed as architect, and was instructed to prepare plans.



FACTORY CONSTRUCTION AND FACTORY ACTS.—X.

By GEORGE H. BIBBY, F.R.I.B.A.

ICE FACTORIES.

IN certain factories apartments are frequently required for the purposes of cold storage, refrigeration, and ice-making, particularly in connection with candle and stearine-making factories, breweries, dairies, margarine factories, chemical works, sugar refineries, factories for tinning meats and vegetables, chocolate factories, india-rubber works, and for an increasing variety of other buildings.

In the planning and arrangement of buildings for refrigeration and ice-making purposes, the necessity for efficient ventilation is frequently of serious importance, and is, in fact, as desirable as for buildings artificially heated. A rapid circulation of the cold dry air carries off from the cooling-rooms all free moisture and deleterious vapours, thus keeping the rooms not only dry, but free from smell; further than this, the rapid circulation of the cooled air enables the goods or manufactures in any apartment to be chilled or frozen very much more quickly than with the stagnant air of some cooling systems.

Amongst the more important considerations for architects of such buildings may be named an accurate measurement of the capacities of the rooms that require to be cooled, and of the lowest temperature to be maintained. It is also of importance that there should be an accurate knowledge of the average temperatures of goods to be brought into the room (if the same have not been already refrigerated), and the quantity of warm goods per day to be refrigerated, and to what temperature.

The refrigerating machines for air are frequently so arranged as to provide a current of pure dry air through the rooms, there being no apparatus in the rooms beyond the ducts for distributing the cooled air, the construction of the rooms providing for proper insulation from sources of atmospheric or artificial heat.

One of the most important ice factories in the world is shown in Fig. 21, which gives a section and ground plan of the buildings wherein 150 tons of ice may be made daily (and with a cold store in the basement). This factory is at Lower Shadwell, London, E., and has a frontage to the River Thames, and was erected under arrangements by Professor Linde, of Wiesbaden, whose system of cold production, or, rather, heat elimination, has been successfully followed by the Linde British Refrigeration Company, Limited, by whom I have been courteously permitted to reproduce these drawings of the buildings forming their refrigeration works at Shadwell, where the plant consists of one machine capable of producing in regular work 100 tons of ice per twenty-four hours, and of another independent machine capable of making 50 tons of ice in the same time, together with the ammonia condensing arrangements, ice-making tanks and stillers, refrigerator for providing the supply of cold brine for the cold

stores, and the boilers and steam-engines for driving the compressors.

The boiler-house contains three ordinary Lancashire boilers, of steel, of such capacity that one of them may be held always in reserve for emergencies, and are worked at a pressure of 100lb. per square inch; the boiler-house is also planned to contain two stillers, which, together, are capable of producing about 30 tons of distilled water per day. The steam used in these stillers is obtained from the main boilers, and as the distilled water is cooled by means of water afterwards used for feeding the boilers, the waste of steam is limited, therefore the cost of the ice produced from distilled water is not much in excess of that made from the water company's direct supply.

A full description of the mechanical appliances and chemical and other contrivances provided for in these ice-making factories, although most interesting, is more suitable for the columns of the *English Mechanic* than for these pages; but the plan and section of the buildings given in Fig. 21 require some such explanation as is here given (by permission of the Linde Company).

The ice generator generally adopted consists of a wrought-iron rectangular tank filled with brine, and containing in its bottom part the refrigerating coils, the ice-moulds being suspended in the brine above. The moulds are placed in suspended frames running on wheels along horizontal rails, and are so arranged that they can be simultaneously moved forward by gearing. The forward movement of the moulds is towards that end of the tank at which the fully-frozen moulds are taken out, and thus a space is continually left at the opposite end of the tank in which to place moulds just filled with fresh water. When one row of moulds is frozen up it is lifted from the tank by means of a travelling crane worked by power, and it is lowered into a vessel filled with warm water, called the thawing tank. In this the moulds are allowed to remain for a few seconds until the ice is detached from the sides; the moulds are then lifted out of the thawing tank, and tilted over by means of a tipping table, so as to allow the blocks of ice to slide out. The empty moulds are at once taken to the other end of the tank, when they are simultaneously filled with measured quantities of water and replaced in the brine for a renewal of the freezing process; only one workman is required for the whole of these operations, hand labour being entirely avoided." In the section shown on Fig. 21 it will be seen that on the first floor level the moulds are shown dipped into the tanks, while on the ground floor the moulds have been raised from the tank. The cold storeroom in the basement is shown with a cavity in the walls. As a matter of fact, the actual ice-producing power at this factory is only 130 tons, the remaining capacity of 20 tons being applicable to refrigerating the cold storeroom.

The engines, besides providing the refrigerating power, also drive the lifts, cranes, ice-crushers, dynamos, fans, &c. This factory, being placed on the river-banks, is provided with special facilities

for the delivery of ice to steamers and boats, and for supplying ice to the fishing-boats and barges that come alongside the premises, or are berthed at the neighbouring fish quay. The ice used for this purpose is made in the upper tanks on the first floor (see Fig. 21), from whence it is passed direct into crushers after it is delivered from the moulds, and then crushed and discharged automatically (by means of a screw) into the spout which shoots it into the boats (see plans).

A most important matter for the consideration of the architect and engineer for ice factories is the water supply. When this factory was first designed, the intention was to obtain all water for cooling purposes (and, if possible, for ice-making also) from a deep well to be sunk on the premises. This well actually was sunk at a cost of some thousands of pounds, but unfortunately it proved to be almost dry, though carried to a great depth. It became necessary, therefore, to make arrangements for taking the cooling and condensing water from the river, for a time, as well as from the water companies' mains. There are, however, obvious drawbacks to the use of river-water, not the least of which is the mud which may be drawn into the pipes in large quantities, particularly at low tides. To avoid these disadvantages, the Linde Refrigerating Company, Limited, erected an apparatus for re-cooling the cooling water, according to a plan which for some time has been extensively adopted in situations where water is scarce or dear.

The cold stores, which have a capacity of about 60,000c.ft., are situated in the basement; they are insulated in the usual way, and are maintained at the desired low temperature by means of overhead pipes, through which cold brine is circulated, as well as by means of a current of air, which latter is cooled to any desired temperature in a special apparatus, and circulated through the rooms by a fan. This is the system now recommended, as it not only dispenses with all brine or other pipes amongst the storage, but, by creating thorough ventilation, keeps many perishable goods in better condition; and in all modern installations, except where brine pipes are specially desired, some system of air cooling, external to the storage-rooms, is adopted. The air is conveyed in suitable trunks into all, or only one, of the cold storage rooms, as may be required, very much upon the principle observed in the reverse operation of heating any or all rooms at will, as adopted in hospitals, asylums, and other large buildings.

A considerable number of factories are now provided with refrigerating apartments or buildings for the purpose of hastening cooling in various processes, and solidifying materials in course of manufacture, such as chocolate, candles, india-rubber goods, &c. In the first instance, refrigerating factories were only provided for cooling water in breweries and other places, and for the manufacture of ice, and for many years later these were almost the only purposes; but in this year of 1896 more ice factories have been fitted up by one firm than the same firm erected during the ten years from 1875 to 1885, and for

many extended purposes. There can be little doubt that in course of time that in many factories new processes will come into general use, rendering refrigerating apartments absolute necessities for the purpose of the economical manufacture of certain goods. The German factory owners appear to be greatly in advance of those in this country as regards the number and variety of institutions and factories supplied with freezing apparatus and buildings; but there are now large numbers of these in America and in our colonies, and an increasing number in all parts of the world, for the production of artificial cold for various purposes.

The number of persons employed in the ice-making factories being but few (as a result of modern labour-saving appliances), many of the provisions of the Factory and Workshop Acts do not apply; but the heavy nature of the work to be done and the substantial machinery employed render the sound and strong construction of such buildings a great necessity.

The question of the insulation of walls, floors, and ceilings for the purpose of protecting ice and goods from the effect of undesired temperatures of the atmosphere is a matter with which I propose to deal in connection with another branch of the subject with which it is allied.

(To be continued.)

THE SOCIETY OF ARCHITECTS.

THE anniversary meeting of the Society of Architects was held at St. James's Hall, Piccadilly, on Tuesday evening last, Mr. Edwin J. Hamilton, of Brighton, the retiring president, occupying the chair. The scrutineers announced that for the election of committee and officers for the ensuing session 95 voting papers had been sent in, of which seven had been rejected as invalid. The result was: Elected unanimously—President, Robert Walker, J.P., of Cork; hon. secretary, Ellis Marsland, of London; hon. corresponding secretary, Major F. Seymour Leslie, R.E., War Office, Whitehall; hon. treasurer, H. Goodall Quartermain, Merton; and hon. auditor, W. R. Mallett, London. For the Vice-presidents (2): Henry Lovegrove, A.R.I.B.A., London, 55, and T. Walter L. Emden, J.P., London, 52. Not elected: Silvanus Trevail, J.P., Truro, 38. Members of Council (12): Robert Keith, President Dundee Institute of Architecture, 77; George Thomas, hon. local secretary, Cardiff, 76; Edgar Farman, London, 74; George Henry Phillott, B.A., Cheltenham, 73; A. J. Lacey, Norwich, 70; Arthur R. Finch, London, 69; Henry Lovegrove, A.R.I.B.A., London, 67; J. W. Walmisley, F.R.I.B.A., Southsea, 67; J. W. Fraser, F.R.I.B.A., Newcastle-on-Tyne, 66; Thomas R. Richards, London, 66; R. W. Coventry Dick, London, 62; Alfred M. Ridge, London, 64; and Herbert J. Jones, Bristol, 59 votes. The President remarked that of the thirteen gentlemen who had been nominated as members of council, one, as they would see, Mr. Lovegrove, had been elected to the higher office of vice-president; consequently the other twelve were elected.

A list of twenty nominations for membership having been read, Mr. ROBERT WALKER, president-elect, in hearty terms proposed a vote of thanks to Mr. Hamilton for his energetic and assiduous services in the chair during the past two years. Although living at a distance from London, he had attended every general and council meeting except one, and had only missed two meetings of the finance committee, while he had done his best to increase the interest among provincial members by convening meetings of the profession at Bristol and Cardiff. What was needed was greater enthusiasm among their members, and he urged all to attend the meetings as regularly as possible, and so support the council. Mr. MAXING seconded the motion, which was carried by acclamation. In replying, the PRESIDENT said the past year had been a busy one, but he had been well supported by the members of council. He should ever retain a vital interest in the society's welfare, and would continue to do all in his power to promote its interests. Mr. H. LOVEGROVE proposed, and Mr. S. C. JOHNS seconded, a vote of thanks to the retiring vice-presidents, Messrs. Emden and Trevail, and this was also adopted unanimously. A similar vote of thanks to the retiring members of council was moved by Mr. G. A. T. MIDDLETON, seconded by Mr. CONDY, and agreed to. The PRESIDENT then proposed a hearty vote of thanks to Mr.

Ellis Marsland for his untiring and most efficient services as honorary secretary, remarking that Mr. Marsland not only come down to that hall every week and sat on committees, but he was ever ready with fresh schemes for the advancement of the interests of the society and of the profession generally, and had accompanied him to the Bristol and Cardiff conferences. Mr. MIDDLETON seconded the motion, which was carried with much heartiness. In acknowledging it, Mr. MARSLAND said he wished to correct an erroneous impression which seemed to have gained currency outside, that the Society was antagonistic to the policy of the Royal Institute of British Architects. This was a mistake, for he had never heard in that room an unfriendly word spoken of the Institute. Indeed, the aims and objects of the Institute and Society were identical, but they differed as to the best methods for promoting that end. The members of the Society believed in the Federation and Registration of all architects, but the Institute had thus far only pronounced in favour of Federation; but it was evident that the Institute would never have taken the step of allying itself with provincial bodies had it not been for the action of the Society. Even now they found representative provincial men like Mr. Bradbury, in his recent address as president of the Liverpool Architectural Society, expressing the opinion that alliance with the Institute would not be beneficial to country bodies unless the Institute bestirred itself and did more for them. He should like to see the R.I.B.A. go a step further, and support

the movement for the Registration of all practising architects. Still, the adoption of Federation was a distinct step in advance, and he, for one, should see no objection to a federation of the Society with the Institute.

The PRESIDENT endorsed Mr. MARSLAND'S views, and proposed a vote of thanks to Mr. QUARTERMAIN for his services as hon. treasurer. This was seconded by Mr. WALKER, carried unanimously, and duly acknowledged by Mr. QUARTERMAIN.

SUSPENSION BRIDGES—A STUDY.

By GEO. S. MORISON, Past-President Am. Soc. C.E.

(Continued from page 587.)

VARIOUS special appliances must, of course, be worked out. It may even be necessary to use fillers under the socket bearings, and adjust each rope by itself. This description, however, shows the main features of the work. It is believed that at least three ropes can be laid daily, and that a cable can be completed in three months where everything is organised and ready. As the small tie-bars at the top cannot be put in until the cable is completed, it is necessary to hold the broad lower bars so as to overcome the bending strain due to the centre of these bars being below the centre of horizontal strain. This is accomplished by the use of 36 bars, 28in. by 2in. in size, which pass between the 19 bars and anchor those bars down to deep cross girders which connect the separate tower-posts, as shown in Fig. 5. These vertical ties serve during erection to

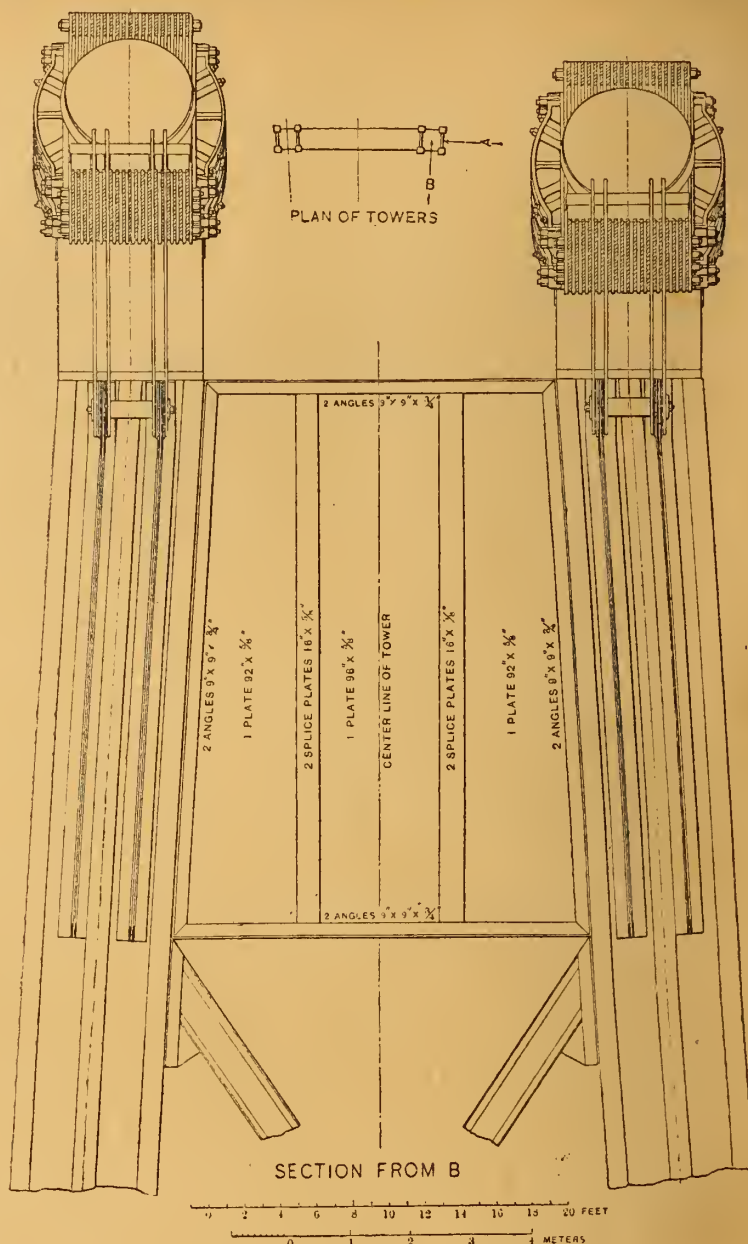


FIG. 6.

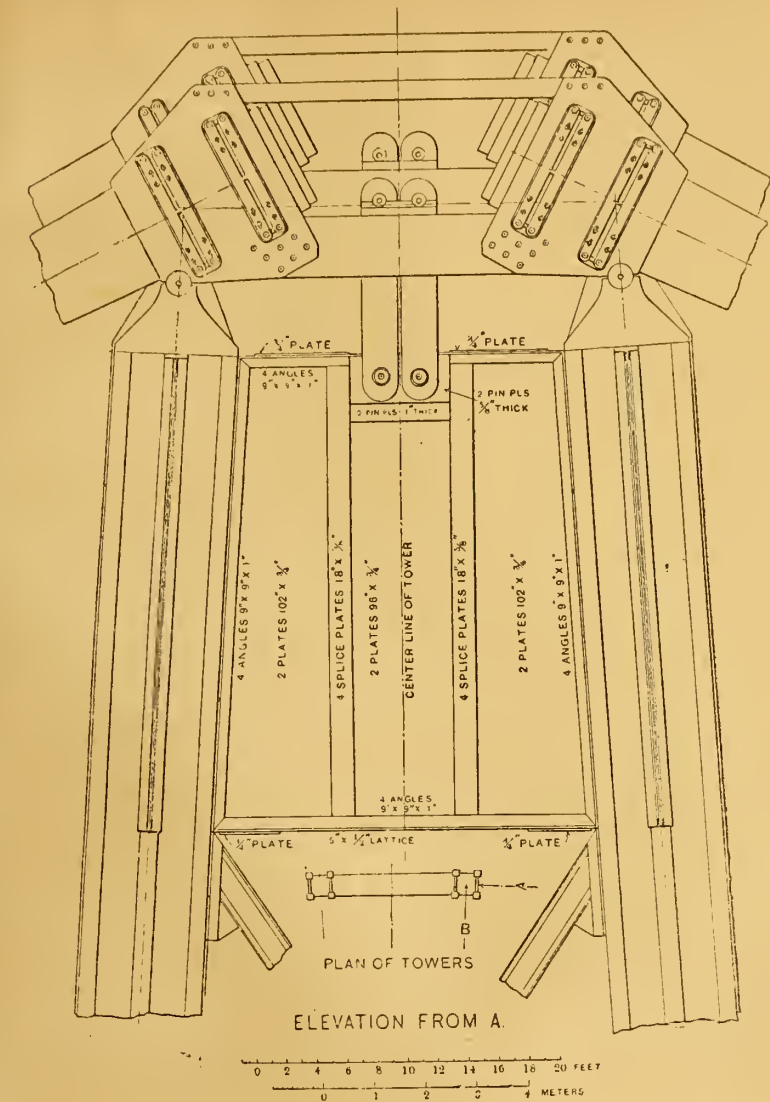


FIG. 5.

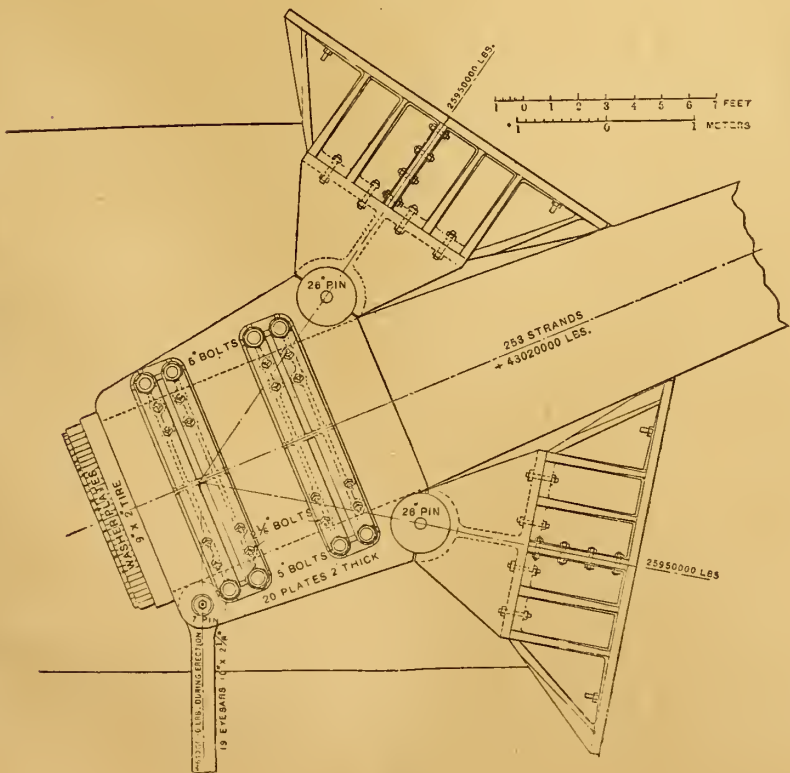


FIG. 7.

top of the tower are lower than the inner bearings, as appears in Fig. 6. Though the backstays are of the same dimensions as the main cables, they carry no weight but themselves, and run in approximately straight lines (being deflected from absolutely straight lines by their own weight) to and through the anchorages, each anchorage having two tunnels in it through which the backstays run. At the lower end the ropes of the backstays are spread between plates in the same manner as at the top of the tower, though the details are different because of the direction in which the strains must be transferred. These details are shown in Fig. 7. The strain in the cable is divided into two equal strains, on lines making equal angles with the axis of the cable, and transferred through 26in. pins to steel castings which bear on closely cut granite masonry, which is built into the coarser material of the anchorage. The lower pin and castings are put in position before placing the cables, but the upper one must be omitted so as to slip the ropes between the plates. To compensate for the omission of this pin, nineteen 10in. by 2 1/4in. eye-bars, coupling on a 7in. pin, pass down a hole sunk into the rock foundation of the anchorage, and are anchored at the bottom of the hole in the manner shown in Fig. 8, these eye-bars serving only a temporary purpose. When the cables are completed, the upper pins and castings are put in position, the granite masonry built up on the castings and the anchorage completed. By this arrangement the cables take hold at once on the anchorage in straight lines without the intervention of eye-bars, and the strains are transmitted in the simplest possible way without the complicated curves commonly used. The cables run through tunnels sufficiently large to walk through conveniently, and the detail at the lower end is in a room about 20ft. in each direction. The only portions of the work which will not be permanently accessible are the eye-bars which form the lower anchorage, and these are only depended on for temporary use. The calculations referred to above are based on the assumption that the inclination of the cables at the top of the towers is everywhere one vertical to two horizontal; in point of fact, it would be slightly flatter than this, so that the strains in the cables and the reactions on the towers are a little less than has been estimated. The actual inclinations at the top of the towers are according to the following table:—

Main cable	1 in 2'196
Backstays	1 in 2'030

The actual length of the cables measured from out to out of the sockets, with an allowance for elongation under strain, is as follows:—

Main cable	3,342ft.
Two backstays, 1,178ft. each	2,356ft.
	5,698ft.

As there are 253 ropes in each cable and four cables, the total length of rope will be 5,766,376ft., which, at 10lb. per lineal foot, makes a total weight of 57,663,760lb. To this must be added the sockets, of which there will be 6,072; each socket will weigh 36lb., making the total weight of the sockets 218,592lb. The weight, therefore, of the ropes all socketed and ready for erection may be estimated at 57,882,352lb. When the cables are completed the clamps which carry the suspenders will be put on. The form of clamp proposed is shown in Fig. 9, and is quite unlike that commonly used in suspension bridges. The clamp is formed of two steel plates pressed into shape and bound together by eight steel bolts; the lower half is a perfectly plain steel plate, but the upper half has two auxiliary plates riveted on, to hold the saddles which carry the suspenders. By means of cast-iron fillers the irregularities in the cables are filled out, and the whole is then surrounded by a sheet of thin metal about 6in. longer than the clamp plates, this thin metal being simply for protection against weather. The clamp plates are then put on and screwed up tight so that the full friction which can be produced by the bolts is obtained. Two bent saddles of soft metal are then placed on top of the clamp and everything is in readiness to attach the suspenders. Each clamp complete weighs 1,800lb., and there are 84 clamps on each cable, making 336 in all. There will also be clamps of different form, but about the same weight at the points where the separation of the ropes begins, 50ft. from the end of each cable, 24 clamps being required for this purpose. The total number of clamps will, therefore, be 360, the estimated weight of which is 648,000lb.

take out the bending strain in the lower horizontal tie, and, after erection, to bind the whole arrangement rigidly to the top of the tower. The backstays are of the same dimensions as the main cables and connected at the top of the towers in precisely the same way, the plates to which the backstays are attached being tied to those to which the main cables are attached. In order to keep the cradled cables of precisely the same length, the outer bearings on

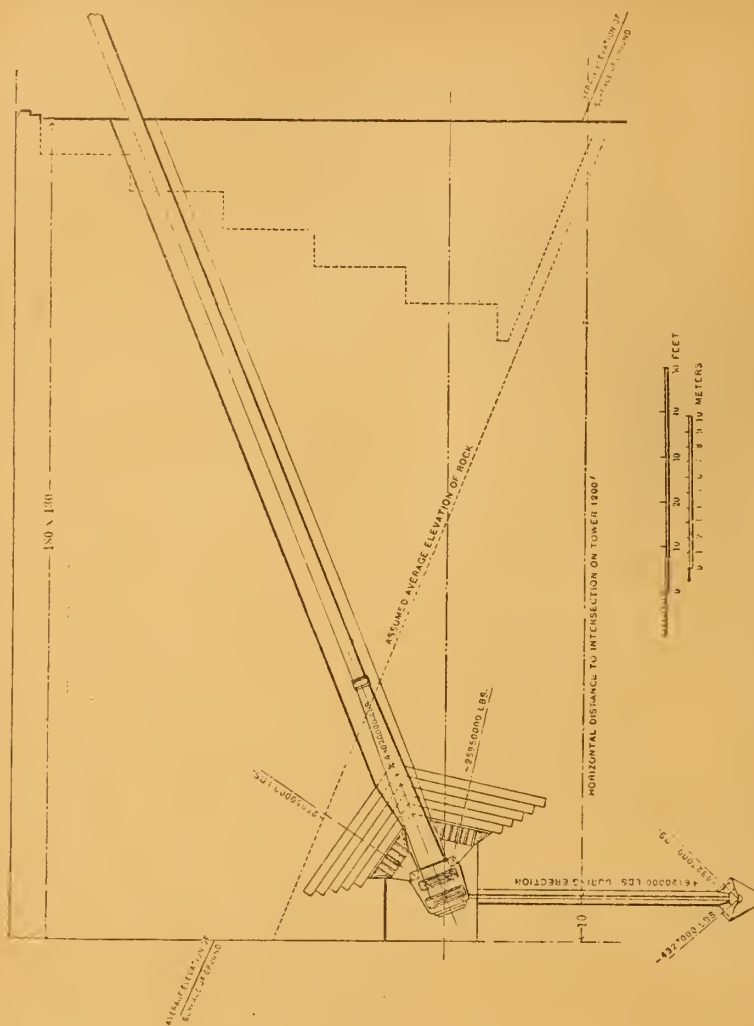


FIG. 8

The weight of cables and clamps complete will, therefore, be 58,530,352lb. It is thought best not to wrap cables of this size, made of independent ropes, with soft wire as is usually done, but to cover them with a thin layer of some non-conducting substance, which will allow the heat from the sun's rays to reach the metal of the cables no faster than it will be dissipated through the whole volume of the cable. It is premature to say just what the constitution of this non-conducting covering should be; it would probably be finished with a painted canvas surface, and it is not likely to weigh more than 50lb. per lineal foot of cable. It would extend from clamp to clamp, covering the projecting ends of the thin metal under the clamps. It must be remembered that it can be easily removed and repaired at any time. As the cables are first made they will hang in parallel curves between the towers, and as the backstays diverge from the towers there will be a slight transverse tension between the tops of the towers; this, however, is not enough to require any special provision.

(To be continued.)

EXHIBITION OF WORKS IN WOOD AND WOOD-CARVING.

THE exhibition now open at Carpenters' Hall under the auspices of the Company of Carpenters and the Company of Joiners is larger and more comprehensive than on previous occasions. Prizes were offered in each of several divisions, the first division being models in constructive carpentry. Those who compete are required to exercise their skill in combining strength with the least expense of material and labour. Several classes are specified—roof-trusses, including those in which iron is used only in straps, bolts, &c., for uniting the parts, those where principals are not less than 16ft. apart; hammer-beam roofs, centring, scaffolding, shoring, staging, &c. The first prize in this division is awarded to Joseph Fisher for a queen-post roof-truss, with details. The model is constructed in mahogany, and shows not only one

framed truss, but parts to a large scale, the mode of covering, &c. A second prize is awarded to H. Turville for the same subject, showing framed angle, with drawings. Both are skilfully-executed models. We also notice a model of a square-hipped roof with centre lantern, the principals of which cross and are of queen-post type. It is by Silas Evans. Other models are exhibited of a hipped mansard roof, with details, by T. J. Perry; one by A. Sewell takes a second prize, and is made to eighth the full size. A dormer is introduced on each side, and different heights of story are shown on the model. The workmanship and details are excellent. We also notice a very creditable model of a hammer-beam roof of the Hampton Court type, by J. J. L. Oakey, which is awarded the first prize; it is in walnut. Another, from measured drawings of one of the roof-trusses of Hampton Court Great Hall, is by Daniel Bryant. A special prize is given to E. Fillis for a circular hammer-beam truss or domed roof with lantern. We notice also a model of a trussed beam in Class 4, about 4ft. long and 4in. deep, by G. H. T. Smither, which has been tested and broke at 262lb. In Class 5 a prize is given to C. T. Aston for a framed centre for arches with groins; a first prize to John Perrin for a model of a grand stand. Several excellent models are to be seen, one of a centre for bridge (No. 22); another of an elevator, by G. H. T. Smither, who also shows a good model of shoring (24). Models of horizontal, flying, and raking shores, by C. T. Aston, are also interesting exhibits in this class. In another class the first prize goes to G. H. T. Smither for a model of staging for carrying a steam crane, showing a knowledge of the trussing necessary and the joints, and a second prize is given to Jas. White for a like model. The models in ornamental carpentry are few. A second prize is awarded to J. J. T. Oakey for an open-timber or trussed rafter roof suitable for a church, in which cross-braces, collar curved ribs are introduced; another prize is given to Ernest Moserius for a spherical roof with louvre ventilator. The models illustrating joinery are few. A second prize is

awarded to A. J. Roskey for model of handrail in mahogany, illustrated by drawings of wreaths. The other essays are for the same subject. We do not find any very artistic work in window-frames, sashes, and shopfronts. One of these (51) is a very commonplace treatment, and we should like to have seen a few more efforts in the subject. Second prizes are won by J. T. Hall, E. Hebbelthwaite, and W. A. Cross for models of circular work, doors in mahogany—one for a circular corner and a window-frame, showing much technical skill and good craftsmanship. In other classes we notice a combination school desk (63) of good design, models of meeting rails of sashes, a few small cabinets, but of ordinary design.

More interesting work is to be seen in division V., devoted to carving and handwork (Harben's Gift). The first prize is won by Charles Milson, for a frieze for doorway, and the second for a chestnut frieze by Alfred Yeomans. In Class 5, for a frieze for chimney-piece, the carving not to be less than 7in. deep, we find no prize work. T. Weston wins a second prize for two oak pilasters or jambs. For a carved panel of given size, with trophy symbolical of sculpture, Arthur J. Osmond takes a second prize for a panel rather crowded, but distinctly spirited. It is a pity to see such misdirected aim and waste of labour in carving as is to be seen in Class 9: a carving of birds and foliage, as in 102, and some leaves of the cuspidate bramble (109), by the same skilful carver, who might be using his talent more usefully. A prize goes to Chas. Stephens for a carved oak mirror-frame of elegant design; the pilasters and frieze have flat, but well-designed, ornament. The carved clock-frame, by Mark Rogers, jun., which takes the first prize, is boldly conceived, but somewhat in too high relief. Much life and skill in carving is seen in Horace Mann's carved female figure in the nude (136), and in an oak panel by C. Maytum, which receives a prize—a flat treatment of grotesque animals and foliage; also in a walnut frame by Miss F. Bartholomew (127). The case of carvings (146) by J. Osmond, is interesting. The font covers are of indifferent design, and in one the figures round the cover and centre figure of the Saviour are almost grotesque, the student priding himself on his mechanical skill and the number of pieces inlaid. An extra prize and medal is given to W. S. Marks for this subject. These works are done by pupils under 16 years of age.

The loan exhibition contains several objects of interest. The collection of specimens of wood destroyed by insects, lent by W. C. Phipps, of Norwich, is a noticeable exhibit, and of much interest to the profession. The specimens of damaged woods, piles, leaves, barks from various places, "from the wreck of the *Royal George* to the Canadian forest"; the case of boring insects, larvae, and the accompanying notes are instructive to all interested in timber preservation and decay. A very beautiful carved oak cabinet of 15th-century workmanship, with the "linen-pattern" panels, lent by Mr. Guy Francis Laking, is especially valuable; the metal hinges and locks are also excellent. We also notice the fine carved oak chimney-piece of James I.'s time, taken from a hunting lodge of that monarch at Bromley-by-Bow, lent by the S.K.M., and lately illustrated by us; also an upper part of a chimney-piece from Coleman-street, lent by Messrs. Colls and Sons; several objects, including a carved Greek cross, lent by Professor Banister Fletcher, F.R.I.B.A.; a panel of choice examples of 15th-century Devonian rood-screen carvings, lent by Mr. Harry Hems. The works of carving by the Carpenter Company's students at King's College indicate the steady advancement made in the classes under W. H. Howard. We notice the nice hanging cabinet by T. Amsworth, of the King's College Day Classes, the flat leaf panel ornament by J. Dann, who receives the first prize, also his arabesques; panels by Walter Curtis, Miss Permain, and others. In the vestibule are several models and specimens of workmanship by the students of classes in the Great Titchfield-street School, whose influence on the exhibition and that of the King's College classes have been considerable.

The memorial-stone of a new United Presbyterian church was laid at Coatsdyke, N.B., on Saturday. The building is of stone, and will seat 650 persons. At the rear are a hall seated for 60 people and a vestry. The total cost has been £2,750. Mr. Thomas Smith, of Coatbridge, was the architect.

THE "DAVID LEWIS" NORTHERN HOSPITAL, LIVERPOOL.

[WITH LITHOGRAPHIC ILLUSTRATIONS.]

THE Lady Mayoress of Liverpool, the Countess of Derby, last week laid the foundation-stone of the "David Lewis" Northern Hospital—the building which is to take the place of the existing Northern Hospital founded some 63 years ago, and which is about to be replaced by a larger and more scientifically-arranged structure, of which we give an illustration to-day. The original hospital was erected from plans selected in competition, and designed by Mr. Welch, and in May, 1845, the foundation-stone of the hospital was laid by the mayor (Mr. Thomas Sands), and in September, 1845, it was formally opened. That building has long been inadequate in spite of additions, and in 1892 two legates of the late Mr. David Lewis, generously decided to devote a large sum of money, left to them by that gentleman, to purposes of charity for the benefit of the poorer classes in Liverpool and Manchester, and for this purpose they formed what is known as the "David Lewis Trust." A sufficient area of land was secured, partly by a grant of lands and money from the Corporation of Liverpool, adjacent to the existing site, and the trustees voted a sum of £60,000 for the purpose of building a new hospital. The committee issued instructions for the preparation of plans for the erection of the proposed building. Four selected firms of hospital architects, Messrs. Keith D. Young and H. Hall, Mr. Rowland Plunbe, Messrs. Pennington, Son, and Harvey, and Mr. T. W. Aldwinckle, were then invited to submit designs in accordance with those instructions. Three sets of plans were, in pursuance of the invitation, forwarded to the committee in April last, and ultimately those submitted by Messrs. Pennington, Son, and Harvey were adopted. The intended site (about 12,000 square yards) is bounded on the north and east sides by premises belonging to the Lancashire and Yorkshire Railway Co., on the south by Leeds-street, and on the west by Great Howard-street. The hospital has been designed to accommodate 200 patients, which are classified as follows:—

	Male.	Female.	Total.
Surgical cases.....	72	36	108
Medical cases.....	48	24	72
Children.....			20
			200

The above is exclusive of four beds for erysipelas cases. This accommodation has been obtained by the provision of three pavilions, each three stories in height, one circular and two rectangular, in which the patients are distributed in the following manner:—The 72 male surgical beds occupy the three wards of the south pavilion. The 36 female surgical beds are placed in the ground and first-floor wards of the circular pavilion, and the 20 children's beds are on the top floor of this block. The 48 medical beds occupy the ground and first floors of the north pavilion, the second floor containing 24 beds for female medical cases. As the ward with its necessary adjuncts forms an important unit of hospital construction, the main object kept in view in planning these has been the efficient attendance upon the largest possible number of patients by a given number of nurses, and as, in the architect's opinion, 24 patients could be supervised by one nurse and her assistants, they have arranged the wards for this number. The dimensions of these wards are as follows: Width, 26ft.; length, 94ft.; height, 14ft. The circular wards have a diameter of 50ft., and are the same height as the other wards. The roof is a concrete flat, with a shelter erected on it, and forms a playground for the children on the top ward. The walls of all wards are lined to a height of 4ft. 6in. with tinted glazed bricks, finished above with Parian cement painted and varnished. All angles, and the junctions of walls with floors and ceiling, are rounded. Each rectangular ward has a light iron verandah on the sunny side, wide enough to admit of beds being wheeled out on to it, and the ends have a similar verandah connecting the two turrets, which contain the "sun" or day-room and the w.c., sinks, &c., respectively. Access to the verandahs is obtained by means of French windows on each floor. Adjoining each large ward is the nurses' kitchen, fitted up with cooking-range, sink with hot and cold water, dresser and plate-shelf for crockery, and an inspection window overlooking the ward. On the opposite side of the small corridor, leading from the main corridor to the wards, is placed the bath room and lavatory, with its entrance placed outside the ward,

so avoiding the possibility of steam entering the latter; a separate w.c. has been provided for the use of the nurses, and stores for ward linen and patients' clothes; isolation and pay-wards, and dining-room for convalescent patients, occupy the remaining space. These wards are placed over the Leeds-street entrance, on the second floor, and are isolated from the rest of the hospital. Two small receiving-wards are arranged on the first floor, immediately below the above. These rooms, designed for a special treatment, are isolated from the main corridor, but have access to same. The operating theatre occupies the first floor of a block of buildings in the rear of the main corridor with direct communication from same, and is provided with abundance of light from the sides, in addition to a large ventilating top light. The floor is formed of Terrazzo, with a rounded skirting of the same material. The walls and ceiling are to be faced with Parian cement, painted and varnished, and all angles are rounded. Communicating with the theatre are the anæsthetic and recovery rooms, and on the opposite side of the main corridor are the photographic and analysis rooms. This, with its adjuncts, is on the ground floor, immediately below the operating theatre, and, like the latter, has direct communication with the main corridor. This is arranged in the basement under the lecture theatre, and contains cooling, shampooing, and hot rooms, Russian and electric bath, lavatory, w.c., stokery, and heating apparatus. In addition to the above, the basement floor contains concert-room under north pavilion, medical officers', nurses', servants', and porters' dining-room, together with service-room, stores, office, bedrooms for engineer and porters, drug store, &c. The front portion of the building, on the west side of the main corridor, is devoted to the use of the officials and executive of the hospital. It is entered by a wide flight of steps leading into the vestibule, which is fitted with oak screens having the upper panels glazed; passing through these a handsome entrance hall, treated with faience work, is reached. The secretary's office, house physician's room, waiting-room, porters' and telephone rooms open out of this hall, which is connected with the main corridor by a passage 7ft. wide, the sitting-rooms of the medical officers occupying one side, and the secretary's office, waiting-room, and committee-room the other. The latter are arranged *en suite*, affording ready access to the telephone-room. The first floor of this portion of the building is arranged to give sleeping accommodation to the medical staff, and over the entrance hall the space is utilised as a conservatory or small winter garden. The second and third floors contain the servants' cubicles, and accommodate 24 persons. In the back portion of this block the following rooms are provided:—In the basement are located the entrance for stores, various store-rooms, office for clerk, wine-cellar, and service room. On the ground floor are the linen, mending, and blanket rooms, and a store-room. The first floor contains the bedrooms of the housekeepers, laundress, and cook, together with bath-rooms, w.c., &c. The whole of the second floor is devoted to the kitchen, scullery, larder, and service room, the latter being connected with a similar room in the basement by means of lifts, which have openings on every floor, thus insuring easy distribution of food to the wards. The kitchen is thoroughly lighted and ventilated by means of a large lantern light, in addition to external windows the side and end of which open; thus any unpleasant odours which may arise from the cooking operations are avoided. The nurses' home is connected on the ground floor only with the hospital, and is entered from the main corridor through a large conservatory, from which a central corridor traverses the entire length of the block, terminating at the entrance porch fronting Great Howard-street. On either side of this corridor are bedrooms and the necessary bath-rooms; sinks and w.c. are placed in an isolated turret on the north side of the building, and at the junction of Leeds-street and Great Howard-street is a spacious octagonal sitting-room. There are two upper floors, the arrangements of which are similar to the one just described, providing in all accommodation for 66 nurses, &c. The larger portion of the basement is occupied by a space intended ultimately to be fitted up and used as a chapel and library, and with this object the ground floor has been raised above the general level of that of the main structure, in order to obtain the increased height for this purpose intended. The remainder of the basement is utilised as a small cookery school

and various store-rooms, and is connected by a stone staircase to the ground floor. Separate staircases have been provided at each end of the building, and a coal lift to all floors from the basement. The out-patients' department has been arranged to form a separate and distinct building; but for the convenience of the medical officers, it is connected with the main corridor by means of a private passage from which the dispensary and consulting-rooms are entered. The out-patients' entrance is situated at the east end of the block, and the patients, after passing the vestibule and registration office, enter the large waiting-hall, on three sides of which are grouped the consulting-rooms, surgical, medical, and ophthalmic rooms. Abundant light and ventilation is obtained by three large windows; in addition, there is a spacious lantern-light with side and end windows hung to open for ventilation. Adequate sanitary arrangements for both sexes are provided in convenient positions. A special feature in the planning of this block is that the patients are enabled, after being treated in the consulting-rooms, to proceed directly to the dispensary, procure their medicine, and leave the building without again passing through the waiting-hall. The laundry buildings have been carefully considered, with a view of obtaining easy communication with the hospital, and are approached externally from the main corridor at the basement level; a stone staircase connects the laundry with the linen stores on the ground floor. The boilers for driving the machinery of laundry, and for the provision of steam, hot water supply, and heating arrangements throughout the building, are placed in a sub-basement under the drying-closet and ironing-room. It is intended to heat the various parts of the building by means of ventilating hot-water radiators on the low-pressure system, which has been found eminently successful for hospitals, air warmed by a large surface at a comparatively low temperature, being considered more healthy than that heated in any other manner. In addition to the hot-water heating, the wards will have central fireplaces back to back, it being a recognised fact that these are the best and most powerful agents as regards ventilation, inasmuch as they draw and consume, and carry off vitiated air, thereby greatly accelerating the influx of pure air through the inlet ventilators in walls. The architects will adopt the "natural system" of ventilation for the large wards, the windows being placed opposite to each other, with fanlights hung to fall into hopper, with glazed sides and the lower sashes double hung. On each pier a Sherringham ventilator is fixed at the ceiling level, and under each bed is a brass hit-and-miss grid, the vitiated air being extracted by means of flues formed in the chimney shafts passing through the roof, with a Bunsen burner in each to cause a proper action in summer. It is intended to face the whole of the buildings externally with deep-red Ruabon bricks, and dressings of buff terracotta, and to cover the roof with green Westmoreland slates. Steel and concrete floors are provided throughout, and are finished as follows: The wards with narrow oak boards, secret-nailed and fixed to fillets, bedded in the concrete, and wax-polished, all other floors being finished with deal boards, terrazzo or granite paving, according to the use of the various rooms in which they occur. The whole of the sunk airing courts and yards will be concreted, and finished with granitic, or other suitable paving. The walls of wards, turrets, bath-rooms, lavatories, and corridors will have a dado of glazed bricks set in putty, and the joints painted with enamel paint. The upper part of ward walls will be finished in Parian cement painted and varnished, other walls with plaster and distemper.

The proposal for a Tudor Exhibition in Manchester has now taken definite shape, and arrangements are being made to hold one in the spring and summer months of next year at the City Art Gallery.

A new reredos, presented to St. James's Church, Astou Park, by the Rev. H. Flory, Vicar of Holy Trinity, Leamington, was on Saturday unveiled and dedicated by the Bishop of Coventry. The reredos, which originally belonged to Holy Trinity, Leamington, has been reconstructed and fitted by Messrs. Roddis and Nourse, of Astou-road North, Birmingham, Mr. W. J. King, artist, of Albert-road, in that city, having promised to fill in two extra panels with emblems of the Four Evangelists and sprays of lilies and passion-flowers.

OBITUARY.

WE regret to record the death of Mr. ROBERT WALKER, F.R.I.B.A., F.S.I., late district surveyor for St. Martin-in-the-Fields and St. Anne, Soho, also a member of the Strand Board of Guardians and St. Martin's Vestry, at the age of 59, at his residence, 85, Marquess-grove, Canonbury, N., at 7.30 a.m. on Wednesday last, from cancer of the throat, after a lingering illness of nine months' duration. He was a pupil of the late Mr. Bell, and afterwards managing assistant to Messrs. Chatfield Clarke and Son, and in 1871 commenced business in King's Arms Yard, Moorgate-street, as an architect and surveyor. In 1875 he was appointed by the Metropolitan Board of Works district surveyor for St. Martin's and St. Anne, Soho, and since then has been well known as an expert authority on ancient lights, vibration compensation, and assessment cases. Amongst some of the most important buildings erected by him may be mentioned Roan's Schools, Greenwich; St. Martin's Town Hall; St. Martin's Free Library; Kensington Town Hall, won in competition, and illustrated in our pages on Dec. 13, 1878; all Draper's-gardens, E.C.; Manchester Conservative Club, carried out in conjunction with Messrs. Horton and Bridgford, of Manchester, and illustrated in the BUILDING NEWS, August 27, 1875; a suite of Turkish baths in Northumberland-avenue, for Mr. Nevill; Rochester Schools; Soho Girls' Club; Dollar's Stables, Bond-street; British Empire Mutual Assurance Co.; Metropolitan Electric Supply Co.'s Stations at Manchester-square, W., South-mews, W., Sardinia-street, W., and Rathbone-place; Australian Meat Co.'s Warehouses, Limehouse; Strand Board of Guardians' Offices; Barbican Repository; Messrs. D. H. and O. Wills' Warehouse, Holborn Viaduct. Mr. Walker joined the Royal Institute of British Architects as an Associate in 1871, becoming a Fellow five years later; he had been a Fellow of the Surveyors' Institution since November, 1891. The funeral is fixed for Saturday next at Abney Park Cemetery, at 12 o'clock.

MR. WILLIAM DANIEL ALLEN, who died at Endcliffe, Sheffield, on Saturday last, aged 72, greatly helped Sir Henry Bessemer in his early experiments and in conquering the difficulties which arose in the development of the Bessemer process. In 1857 it was decided to erect steel works in Sheffield, and Mr. Allen became resident managing partner. The works were erected to demonstrate practically the process and to test its commercial value. Practical and commercial successes were soon established, and the works became a school frequented by those about to adopt the process. Mr. Allen patented some valuable inventions for heating furnaces, and for hydraulic machinery for manipulating steel. His services to the steel trade were recognised by the Iron and Steel Institute in 1890 by the award of the Bessemer gold medal.

Two men named James Kellow and Richard Radcliffe were killed on Thursday evening in last week by the falling of a rock at Old Delabole quarries, North Cornwall.

The parish church of Carlton, Minniott, was consecrated last week after rebuilding, from plans by Mr. C. Hodgson Fowler, F.S.A., of Durham. The outlay has been £1,300.

Lord Windsor proposed as mayor at a public meeting held on Wednesday evening at the Town Hall, Cardiff, to consider the steps to be taken for the restoration of the fine Perpendicular tower of St. John's Church in that town. It was reported that the upper portion of the tower was now unsafe, and would be positively dangerous if left for another month. The cost of restoration was estimated by Mr. Fowler, architect, at £2,596. Promises of help were given, and the restoration committee were instructed to take the work in hand.

The members of the York Architectural Society visited on Saturday afternoon Micklegate House, York. This old family residence, which contains many interesting features, especially wrought-iron work, will shortly become the offices and warehouse of a firm of wholesale chemists. Probably it was designed by John Carr, the famous York architect. It consists of a basement with three stories above, is about 60ft. long by 50ft. wide, and there is stabling accommodation for eleven horses. The front area is protected by wrought-iron railings, with beautiful wrought-iron hand gates. The fall pipes are of lead, and bear the device "I.M.B. 1753," the letters being the initials of John and Mildred Boucher, and the windows are dated 1756.

COMPETITIONS.

CASTLEFORD.—In response to an invitation from the Primitive Methodist Chapel Trustees, the local architects submitted designs for new Sunday-schools in Bradley-street. The trustees decided to adopt the plans submitted by Mr. Arthur Hartley, C.C., Carlton Chambers, Castleford. The plan approved shows central hall with galleries, separate entrance, with lavatories for boys and girls; classrooms on ground floor and first floor, and kitchen, heating apparatus, &c.; also storage-room for forms, tables, &c., in basement.

EDINBURGH.—The subscribers to the proposed memorial to the late John Walker, for many years manager of the North British Railway Company, recently decided that the funds should be devoted to a statue of Mr. Walker, to be erected in the reconstructed booking-hall of the Waverley Station, and designs were invited from a number of Scottish sculptors. Seven of these took part in the competition, and the committee have now selected the design of Mr. Birnie Rhind, A.R.S.A., and have intrusted him with the commission of carrying it into effect. The late Mr. Walker is represented seated on a chair of Old English design, in a slightly-recessed niche formed in one of the bays in the booking-hall of the reconstructed station. The moulded rectangular pedestal supporting the statue projects 3ft. 6in. from the wall, and is 5ft. in height. On the two front angles are bronze acanthus ornaments, which terminate on a shaped base with lion's claws, while in front under the cornice will be placed a bronze panel bearing an inscription. The niche behind the figure is elliptical on plan, with semicircular top enriched with clam-shell. The pedestal and niche will be executed in yellow Prudham freestone, the material of which the hall is being built. The statue, which is to be in bronze, will be 5ft. 3in. high, and the pedestal will be 5ft., giving together a total height of 10ft. 3in. The cost will be over £1,000.

SCARBOROUGH.—At a meeting on Monday of the Scarborough School Board, the general purposes committee recommended the appointment of Mr. E. R. Robson, F.S.A. (architect to the Education Department) as assessor of competitive plans and consulting architect for the erection of the new Higher Grade Schools at Westwood. It was explained that within the next few days the board would enter into legal possession of the site. The motion was carried unanimously.

Messrs. Wordsworth and Co., organ builders, Leeds, have just completed the erection of a new organ at Arncliffe Hall Church. The organ has a pitch-pine case, to harmonise with the chancel, and is surmounted with decorated pipes. In all there are 28 stops and 1,226 pipes.

Hanover chapel, Regent-street, designed by the late Professor Cockerell, has for some time been in process of demolition. The ground floor was supported on vaults, and on Saturday morning three of these arches gave way, and the ruins fell upon some men who were at work. One of them, named Green, was killed, and three or four others were injured.

In connection with the present dispute at the Penrhyn slate quarries, it may be mentioned that the dispute in the Dinorwic quarries in the year 1885 cost the North Wales Quarrymen's Union £10,207 5s. 4d., besides a large sum collected from the general public, and a loss in wages of upwards of £50,000.

The Primitive Methodists of Cirencester opened their new church and schools, which have been built in Ashcroft, on Thursday in last week. The architect was the Rev. W. Wray, of London, and the builder Mr. W. F. Green, of Cirencester.

The late Sir James Naesmyth of Posso, Bart., has left a bust in white marble of his father, Sir John Murray Naesmyth, by Hiram Power, of Florence, to the Chambers Institute Museum at Peebles, as also an André Ferrara Jacobite sword and a hawking lure presented to an ancestor by King James VI. To the Scottish National Portrait Gallery, Edinburgh, is left an original portrait of Mary Queen of Scots, as well as an original portrait by Jamieson (the Scottish Vandyke) of King James VI.; a portrait of his eldest son Henry, Prince of Wales; and a portrait of the testator's father, by the Baron de Keyser, President of the Academy of Antwerp.

The down, or High-street, side of the railway station at Newport, Mon., is about to be reconstructed at a cost of £5,000. The contractors are Messrs. A. S. Morgan and Co., of Newport, and the work has just been begun.

ARCHITECTURAL & ARCHÆOLOGICAL SOCIETIES.

BIRMINGHAM ARCHITECTURAL ASSOCIATION.—The first general meeting of the session was held on Friday evening, when Mr. W. Henman, F.R.I.B.A., delivered an address as President of the association. He referred to the appointment of a new city surveyor in Birmingham, and to the changes that were likely to ensue in relation to some matters in which architects were interested. He was at liberty to state that in the approaching reorganisation of the city surveyor's department, the appointment of building surveyor might fall to an architect. There was in that cause for congratulation, because they would have to deal with a gentleman of experience; but, on the other hand, he had one little fear, which was that in making such an appointment, some members of the city council, whose ideas of economy were not always on strictly business lines, would think that because they had an architect in their employ he would, in addition to the daily routine duties of his office, be able to undertake works of a truly architectural character. To such he would say: Look around, even in this city and neighbourhood, or elsewhere, and let them answer whether any one building designed under such conditions had ever been carried out either so economically or so satisfactorily as the average of similar works by individual architects. Although during the past year no new architectural works of great importance had been taken in hand within the city, it had been a time of building activity. He wished to impress upon his hearers that mere piling of bricks and mortar was not architecture, and that without architecture it was impossible to have a city of any importance. Englishmen seemed incapable of realising that it was almost entirely due to the appreciation of architectural effect by their inhabitants that Continental cities acquired their importance. In England there was plenty of individual good taste, and there were any number of architects capable of designing excellent buildings; but there was an utter lack of collective appreciation of architectural effect. He looked to the influence of the Architectural Association as a means of fostering a greater appreciation by the public of the value of architectural effect.

CHIPS.

At Monday's meeting of the managers of the Edinburgh Royal Infirmary it was reported that contracts to the amount of £12,121 18s. 6d. for the several works in connection with the erection of the new laundry offices in Lauriston-lane had been accepted by the managers, and that the work of erection would be commenced without further delay.

The Central School of Arts and Crafts at Morley Hall has now been opened by the London Technical Education Board. The interior of the building has been completely renovated, and such structural alterations introduced as were necessary to adapt it to the purposes of the school; the building has been fitted throughout with electric light. The school has started with about 80 students, drawn from various trades, especially those more or less connected with the building trades.

The Camberwell Vestry have decided to spend £11,800 for granite pitching in Hill-street and Peckham Park-road.

New public offices are being erected in Merthyr, from the designs of Mr. E. A. Johnson, architect, Abergavenny. Special consideration has been given to ventilation, which will be carried out on the Boyle system.

The Mayor of Stockton-on-Tees laid, on Monday, the foundation-stone of the new almshouses, which are being built in Dixon-street, Stockton. The old almshouses, situated in the High-street, were purchased from the trustees of the charity by Messrs. Levy Bros., of West Hartlepool, and the purchase-money will not only permit the trustees to erect cottages for the accommodation of poor people, but to endow the charity with a sum of about £2,000. The new cottages, which will accommodate 18 people, have been designed by Mr. T. W. T. Richardson, architect, Stockton, and the contract is in the hands of Messrs. Perks and Son, of Stockton.

The Middlesex County Council have accepted the tender of Mr. George Bell, at £1,450, for the widening of Finchley county bridge. There were eight tenders, the highest being £2,931, or more than double that of Mr. Bell.

The Local Government Board has given its sanction to the purchase by the Metropolitan Asylums Board of 136 acres of land at West Croft Farm, Carshalton, as a site for a southern convalescent fever hospital for about 700 patients.

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ILLUSTRATIONS.

BELFAST CATHEDRAL.—THE "DAVID LEWIS" NORTHERN HOSPITAL, LIVERPOOL.—THE NEW ENTRANCE TO THE ALHAMBRA THEATRE.—PROPOSED HOUSE AT GRAYS.—SKETCHES FROM THE ARTS AND CRAFTS EXHIBITION.

Our Illustrations.

THE NEW CATHEDRAL FOR BELFAST.

THE want of a stately and commodious central church for the united diocese of Down and Connor and Dromore, and for the great and growing city of Belfast, has been long and generally admitted. A large committee was appointed at a public meeting held a short time since, and the movement is principally due to the efforts of the vicar of Belfast, the Rev. Canon Hy. O'Hara, and the sub-committee subsequently nominated Mr. Thomas Drew, R.H.A., of Dublin, and Mr. W. H. Lynn, R.H.A., of Belfast, joint-architects to the proposed cathedral. Mr. Lynn, however, while expressing his willingness to advise generally in the matter, elected to leave the more responsible duty of preparing the design for the building in the hands of Mr. Drew; having done this, he particularly requested, as a point of professional etiquette, that Mr. Drew's name alone should appear in connection with the drawings and report: hence the omission of Mr. Lynn's name. The first instalment of the work will be the nave with north and south aisles; this, with the lower portion of the central tower, which can be roofed in so as to form a temporary chancel or choir, will serve as a commodious parish church, and also supply to a great extent the more elaborate wants of a cathedral. The cost of this instalment Mr. Drew estimates at from £25,000 to £30,000, exclusive of foundations. The building which it is proposed to erect will be technically the parish church of Belfast; but it will be so arranged, even in its incomplete state, as to accommodate the deans and chapters of the three united dioceses, and in other respects to be capable of supplying all the proper functions of a cathedral. From an æsthetic point of view, the acquisition of such a building will be a great advantage to Belfast on the site, which is about the very centre of the city. The architect, in his report, says the choir is set in the centre of the cruciform plan at the crossing, in view and hearing of the congregation, who would be chiefly massed in the spacious nave and transepts. The organ has grown in modern days to be of such size and importance in church worship as to become a very weighty consideration in planning, and has been a subject of much debate among modern architects and musicians. Practically the chief considerations appear to be:—(1) That there should be ample and sufficient floor area provided for a church organ of the most ample modern scale known, or that any liberal and enthusiastic donor might possibly arise to bestow on the cathedral. (2) It should have ample and clear space around it and above it to allow of its clear "speaking," unimpeded and without reverberating confusion of tone, and to admit of access to the instrument at all sides, and

internal planning without complication and crowding of stops. (3) Its position should be at a moderate distance from the choir at the east end of the church, on the north or south side. A special chapel, or spacious and lofty organ aisle to the north-east, is a feature of the plan proposed. The position of the organist relatively to choir and organ is a question of great practical importance and debate. Its difficulties appear to be solved, in these days of modern pneumatic or electric action for organs, by planning a place for the organist a little apart from his organ, where he can realise its effects, and in view and hearing of the choristers, as has been accomplished at Lichfield, Worcester, and other places. It seems to be capable of being done better by finding a special place for the console of the organ under one of the north choir arches, in an inclosure of light traceried stone-work (suggested by the "chantry chapels" of Exeter, Winchester, and Salisbury), where the organist would command a view of his choir, without being too much in evidence himself. For the chancel east of the choir, ample area must be allowed. The growing custom of the resort of great bodies of communicants to their cathedral on Christmas and Easter days, and other special occasions, must be counted with. After much consideration of many cathedrals, the architects have laid down a plan that appears to them to give the best disposition of the elements of a cathedral as adapted for choir, congregation, chancel, organ, and organist. For the style of the traditionally-used Pointed architecture, dedicated by consent to church uses, this design is influenced in its modern adaptation by the type classed as English Decorated, or of the Early 14th-Century, in ancient examples associated with the incomparable details of Lincoln or Westminster Abbey. A limit of cost prescribes a certain limit of size. A cathedral of first rank is beyond the wants and capability of Belfast. Cathedrals on the small scale of St. Finbar's, Cork, or Christchurch, Dublin, would be beneath its wants. St. Patrick's, Dublin, a cathedral of second rank in size, and holding 2,000 people, appears a fair model for scale in Belfast, and its symmetrical and well-proportioned original plan has afforded some suggestion for a model cathedral plan. Foundations for towers are a serious consideration in Belfast. A central and two western towers are features of many cathedrals. There are several considerations why western towers might be dispensed with here. The western front of a cathedral with a 30ft.-wide nave is essentially moderate in scale. Western towers proportionate would be but petty crowded features, and serve no practical end. The necessity that advances the west front so close to Donegall-street renders it an ineffective position for such features. These considerations, weighed in conjunction with the difficulties of foundations, point to the desirability to concentrate effort and resources on a central tower of dignified scale. The situation is low-lying, and Belfast town is very flat. The tower of the cathedral should dominate the city, and it would furnish a fit belfry for the finest peal of bells yet introduced into Ireland. A set of bells of this character have already been munificently offered. For such, the floor area of the tower designed (about 28ft. square) is no more than is wanted for bells and ringers. The tower would be 42ft. 6in. square outside measurement on plan, and about 200ft. high to the battlements. For foundations, it is proposed to sink circular iron caissons under each of the four great crossing piers to an unyielding foundation filled with concrete, giving an unmovable support to any tower that could be erected, and at no extravagant cost. It is fortunately possible to begin building on the present site and curtilage of the old parish church.

THE "DAVID LEWIS" NORTHERN HOSPITAL, BIRMINGHAM.

(SEE description on p. 629.)

THE ALHAMBRA.

THIS building, now being erected in the Charing Cross-road, will shortly be completed. The ground floor will be used as entrances to the boxes and reserved fauteuils to the Alhambra Theatre, with additional scene-dock and stage entrance. The upper floors are reserved as board-room and offices of the company. The style chosen by the directors is to harmonise with the present interior. The works are being carried out by Mr. Holloway, of Deptford, general contractor. Doulton stone is being used for the front. The whole of the works are being carried

out under the personal superintendence of the architect, Mr. W. M. Bruton, 171, Queen Victoria-street. It is intended to shortly publish the interior designs for decorations to the corridor, vestibule, board-room, &c.

SKETCHES AT THE ARTS AND CRAFTS EXHIBITION.

THE further sketches from the above exhibition which we give in our present number form a fair sample of the variety in design to be found amongst the furniture. The Book-Case Cabinet, designed by Mr. George Jack for Messrs. Morris and Co., is not wanting in two features of that firm's productions—viz., freshness of idea and fine quality of workmanship, for which latter character Mr. Wm. Thatcher is largely responsible. There are, however, one or two points which seem to us elements of weakness in the design. One is the want of harmony and true union between the main body of the cabinet and the two wings, suggesting the idea rather of two separate existences, and giving somewhat the effect that the central portion is forcing itself out of line with the sides. This is in no small measure due to the manner in which the bold and beautifully-carved cornice returns against one of subordinate interest, as well as to the way in which the shaped bearer-like feet to the octagonal posts disappear under the bottom rail. Another point is the want of scale between the three thin balusters under drawers, the four tiers of spindles to the wings, and the substantial framing and heavier character of the doors and other portions. But the admirable finish of every part, the run of the drawers, and the fit of doors, and the solidly-panelled back, are worthy of admiration. There are two side cupboards in lower portion fitted with shelves. The total height is 8ft. 2in., the width of central portion is 4ft. 6in., and the wings project 8in. on either side. The Arm Chair, by Mr. A. Wickham Jarvis, is by no means the least original piece in the exhibition, and is carefully made, the legs being nicely shaped. The back (perhaps rather bordering on the fragile) is formed of six thin laths, set slightly crescent-wise, to accommodate the back of a sitter. They come down behind the padded seat, which stops short of back framing 2in. or 3in., thus forming a kind of sinking which would harbour dust, we fear. The "gesso" to wide top rail and carving to sides merit attention. The height is 4ft. 4in., the width 1ft. 10in., and the depth 2ft. The seat is covered with a biscuit-coloured canvas, with design in green and red silk, matching the coloured "gesso" above. The joinery is by Mr. Stephens. The Oak Sideboard, by Mr. E. Prioleau Warren, while running on the lines of some of our old buffets and Court cupboards, has some attractive individualities, is admirably finished, and solidly made. The wooden top over the lower cupboards is inlaid with little sprays of coloured woods at the angles. The inlay round small panels and the spindles to the open ones above make a central feature. The bead and reel moulding and ebonised bevels to the panels add considerably to the richness of this fine piece of furniture; but the central baluster supporting the upper cupboards strikes one as being somewhat incongruous with the carved consoles. The gun-metal fittings are substantial and have nice character. The canted sides in both lower and top portions are fitted with shelves. This piece stands about 7ft. high, has a total width of 5ft., and projects 2ft. from wall. It was executed by Messrs. Holloway Bros., with the assistance of J. Dutch, G. H. Silbiboer, R. Manhire, and F. Singleton.

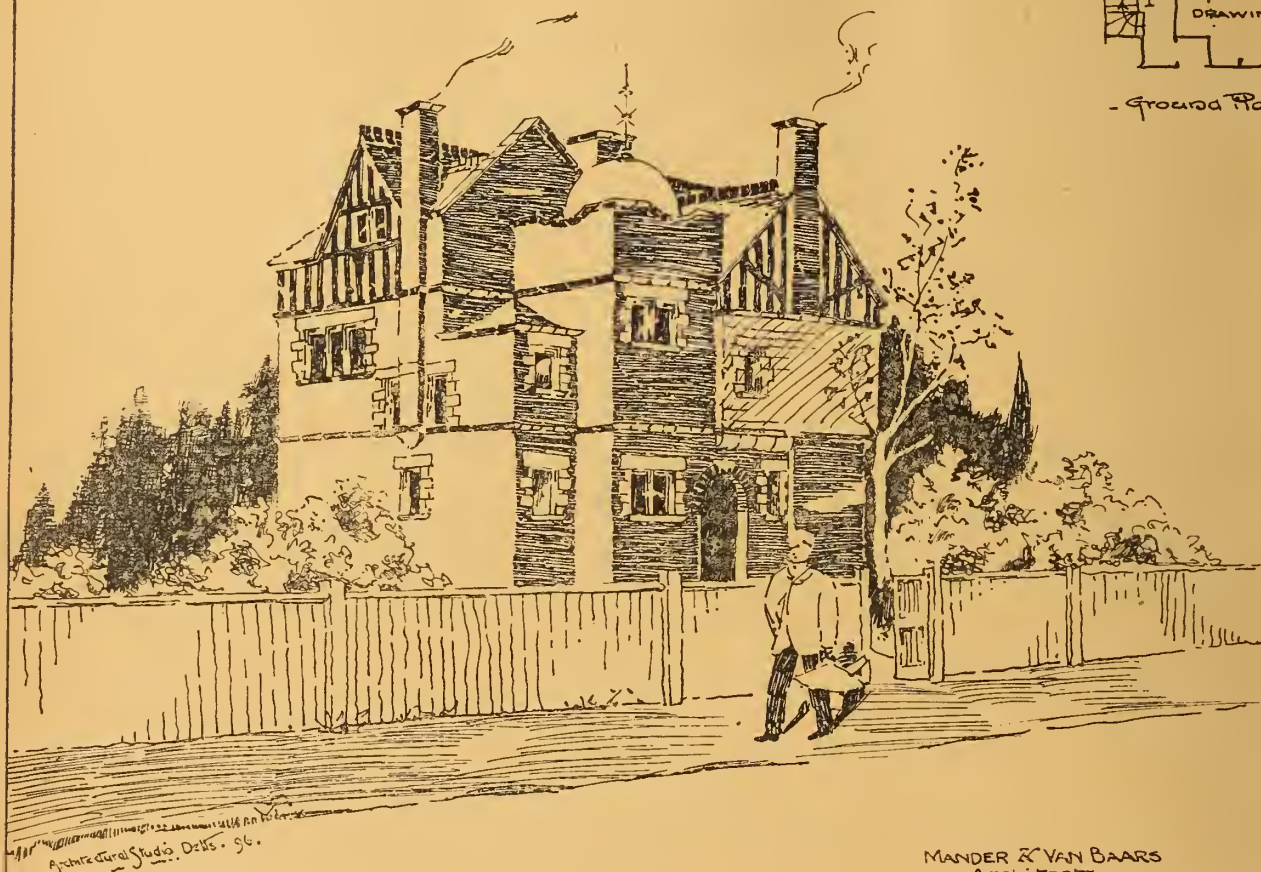
A meeting of the Liverpool City Council will be held on November 18th to consider a scheme for the improvement and extension of tramways. The extension includes a number of new double lines, which will form junctions and greatly improve the system. It is proposed to apply for power to work these lines, and to apply new methods of haulage to all the other tramways. It will also seek powers which will enable the corporation to lease the new lines or operate them itself.

Major-General Crozier, R.E., Local Government Board inspector, held an inquiry at Blackpool on Thursday in last week into the corporation's application to borrow the following amounts:—£11,565 for widening and improving Church-lane, Cow Gap-lane, and Cow Gap Bridge; £140 for improving Adelaide-street; £9,385 for improving Bank Hey-street and Back Victoria-street; £9,280 for works of sewerage; £5,115 for the purposes of the town's yard; £750 for leasehold interest in part of the new municipal offices; £225 for branch police-station in Ash-street; and £550 for additions to the Isolation Hospital.

PROPOSED HOUSE AT GRAYS



- Ground Plan -



MANDER & VAN BAARS
ARCHITECTS.

PROPOSED HOUSE AT GRAYS.

THIS house is to be erected at a cost of £956. It will be built in red brick, with local stone dressings, with half-timbered gables and tiled roofs, as shown in the perspective. The house stands 15ft. distant from the roadway, and has a south-west aspect. The architects are Messrs. Mander and Van Baars.

CHIPS.

To-day (Friday), a Local Government Board inspector will hold an inquiry at Egremont into the application of the Wallasey District Council to borrow £17,500 for electric-lighting purposes, and £1,000 for the establishment of a fire-brigade station at New Brighton.

The County-court offices in Full-street, Derby, being inadequate to the requirements of the town, are about to be superseded by new buildings adjoining the Y.M.C.A. premises in St. Peter's churchyard. The contractor is Mr. William Eaton, of Derby.

The foundation-stone of a new Volunteer Drill Hall at York Town, Camberley, was laid by the Hon. Frances Wolsley, only child of the Commander-in-Chief, on Wednesday week. The building will cost £2,500, and will consist of an assembly room, store-rooms, and cloak-rooms. On an upper floor at one end of this building are rooms for the sergeant-instructor.

The new Market Hall at Goole, rebuilt on the site of one burnt down in 1891, was opened on the 22nd inst. The reconstruction has cost £4,000, and has been carried out for the urban district council (who bought the site and ruins of a private company after the fire), from plans by Mr. W. J. Tennant, of Pontefract.

For the ventilation of the additions now being made to the Counties' Lunatic Asylum, Larbert, Stirlingshire (Messrs. A. and W. Black, architects, Falkirk), the "Climax" patent direct-acting turret ventilators are being supplied by Messrs. Cousland and Mackay, ventilating engineers, Glasgow.

Mr. Edwin Heaton, head of the firm of Messrs. E. Heaton and Sons, estate agents, Endon, Staffs, died at his residence in that village on Friday at the age of 80. Mr. Heaton retired from any personal participation in the business of which he was the principal, about 15 years ago, and it has since been, and is now, carried on by his two sons, Messrs. G. H. and F. G. Heaton. After building Basford Hurst, Staffs, where he lived for a number of years, he sold the estate and took up the residence at Endon, which he retained up to his death.

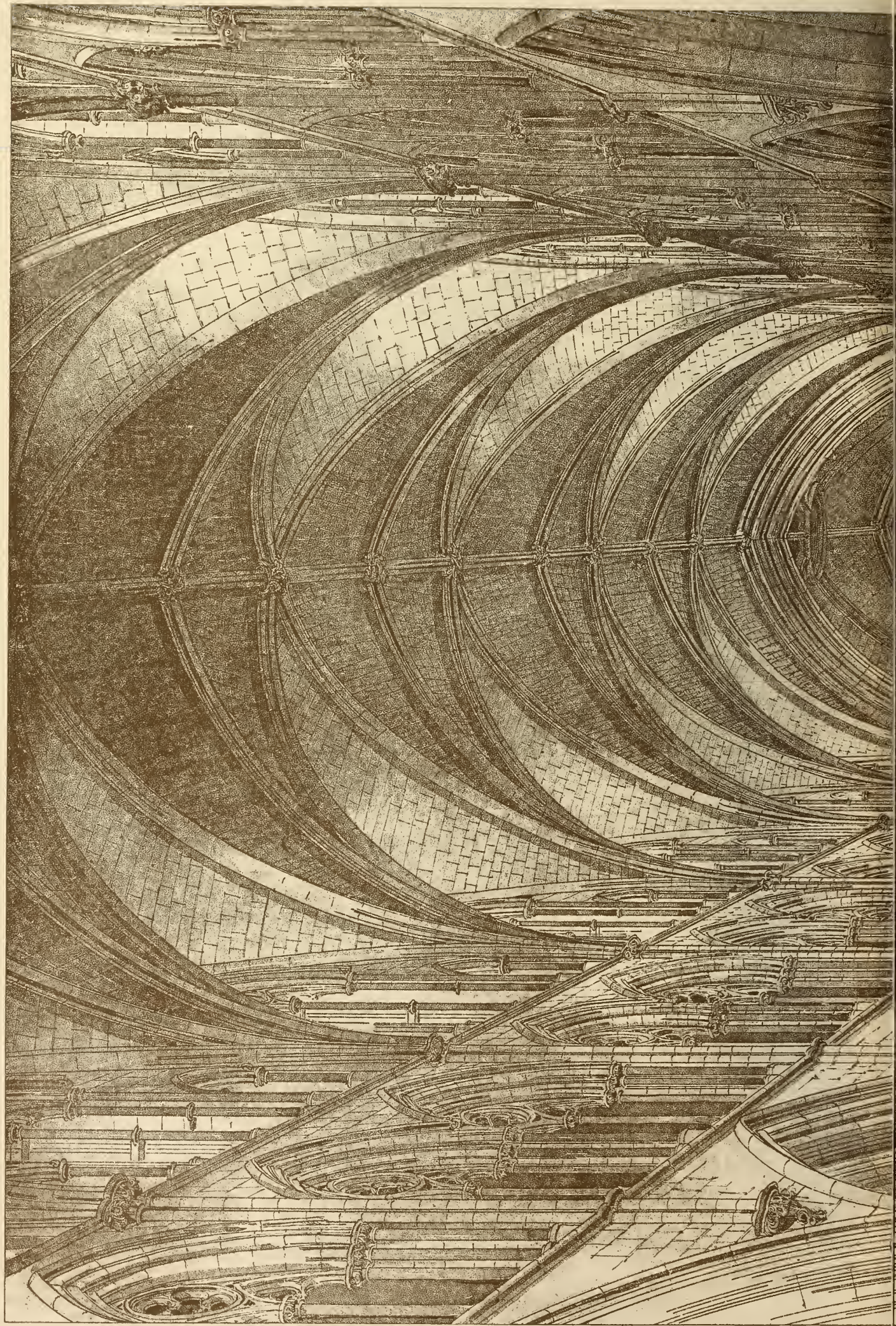
The well-known "Weale's Series" is being re-issued by Messrs. Crosby Lockwood and Son, of 7, Stationers' Hall-court, in a new cloth binding and in a handier form. These recent issues include some half-dozen new volumes, covering such ground as "Constructional Iron and Steel Work," "Elementary Marine Engineering," "Cements, Pastes, Glues, and Gums," "Laundry Management," "Plastering," &c.

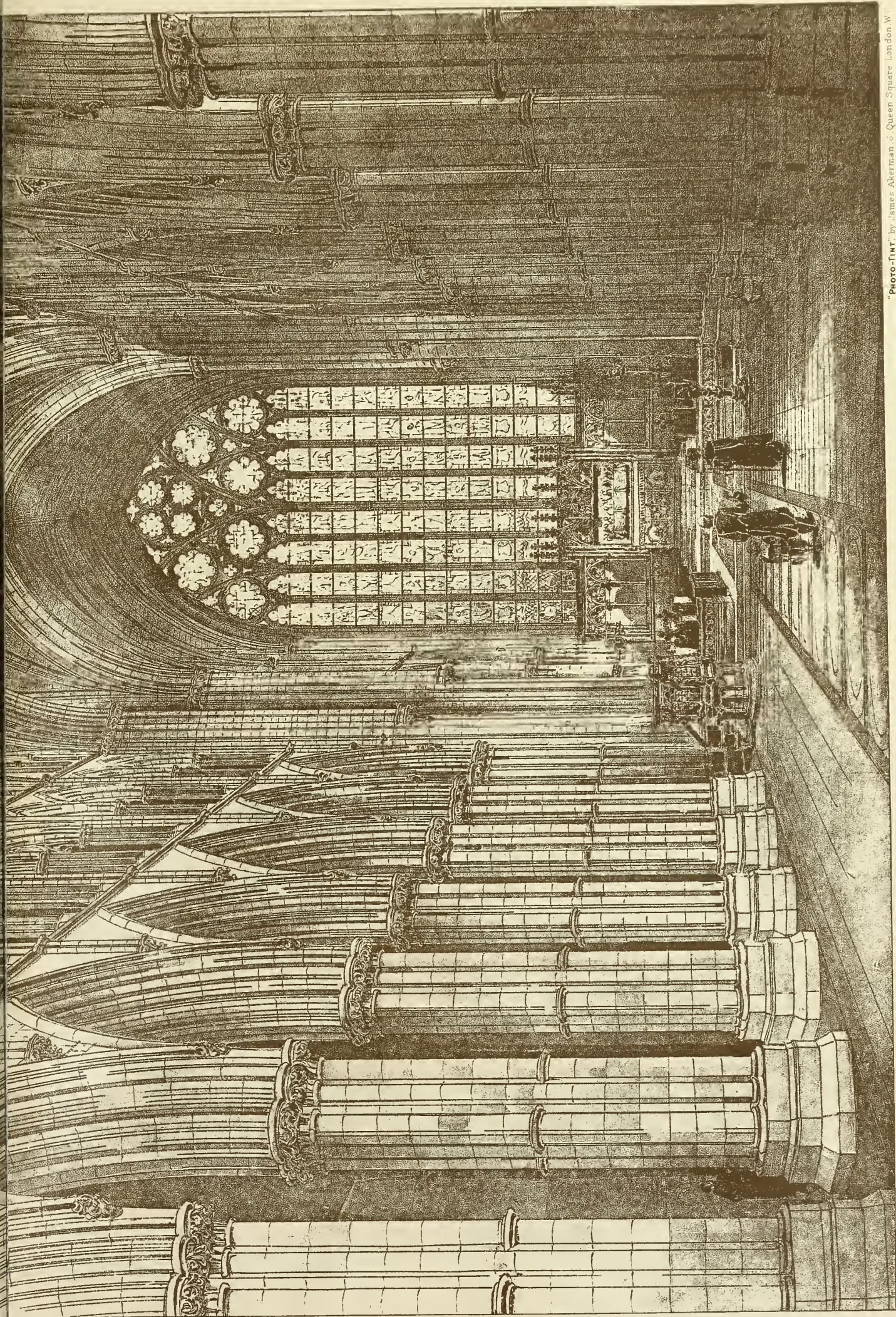
Sir J. H. Puleston on Saturday afternoon laid the foundation-stone of St. David's Welsh Church, to be erected in St. Mary's-terrace, Paddington-green. The church, which is being built from plans by Mr. C. Evans Vaughan, of the Lowther Arcade, will seat 400 persons, and will cost £3,500, exclusive of fittings.

The dedication of the Robert Champion memorial chancel screen at St. James's Church, Bristol, took place on Sunday. The screen, which is 16th century in character, is of wrought iron, and has an arcading of nine arches, the centre one being surmounted by a pediment, the circle of which contains an emblem of the Trinity. On the lower portion are eight shields, the four on the left hand bearing representations of saints of the Old Testament, and those on the right saints of the New Testament. The screen is decorated, the ground colour being chocolate, pricked out with gold, blue, and green.

A new stained-glass window in the south aisle of St. Mary's parish church, Whickham, was unveiled on Saturday. It is Decorated in style, and consists of four lights, the subject being the "Sermon on the Mount." Messrs. Wailles and Strang, of Newcastle-upon-Tyne, whose design was selected in competition, were the artists.

Mr. Rienzi Walton, Local Government Board inspector, held an inquiry at the town hall, Liverpool, yesterday (Thursday), to hear evidence with respect to the application of the city council for powers to borrow £50,000 for the purposes of acquiring property which has been condemned as unfit for habitation.

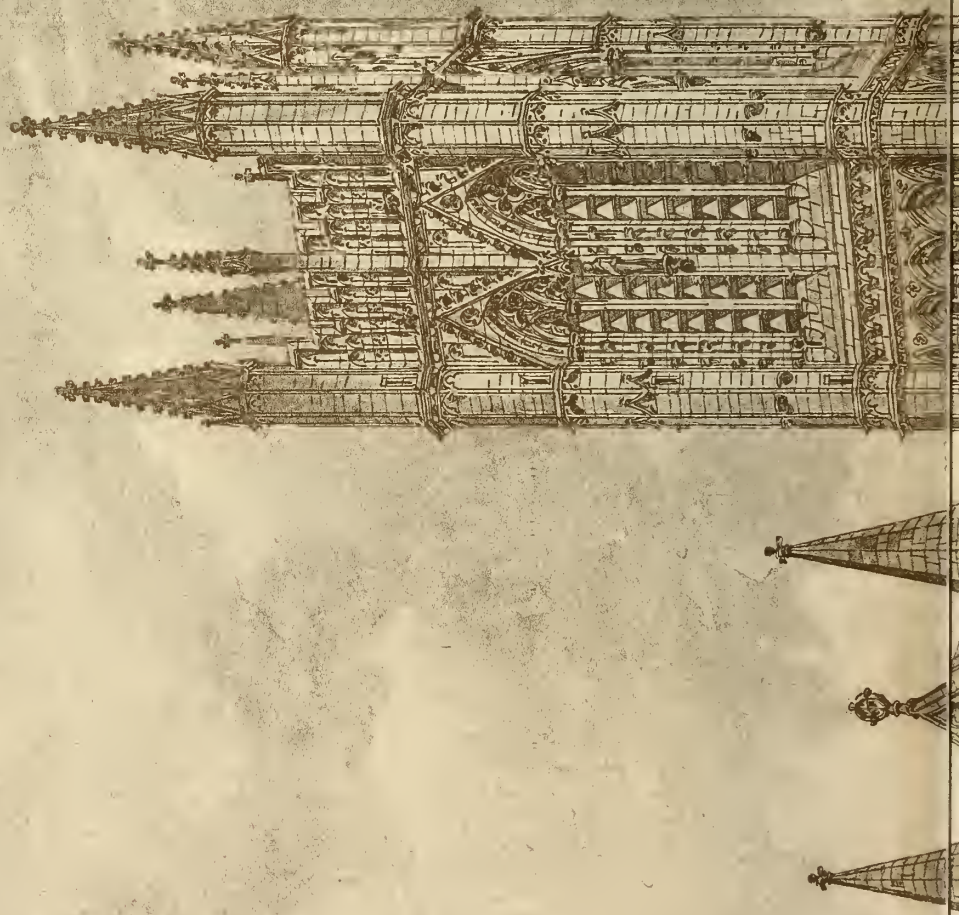




"PHOTO-FIN" by James Akerman & Co. Queen Square London, W.

BELFAST NEW CATHEDRAL, THOMAS DREW, R.H.A., F.R.I.B.A., ARCHITECT.

THE BUILDING NEWS, OCT^R 30, 1896.



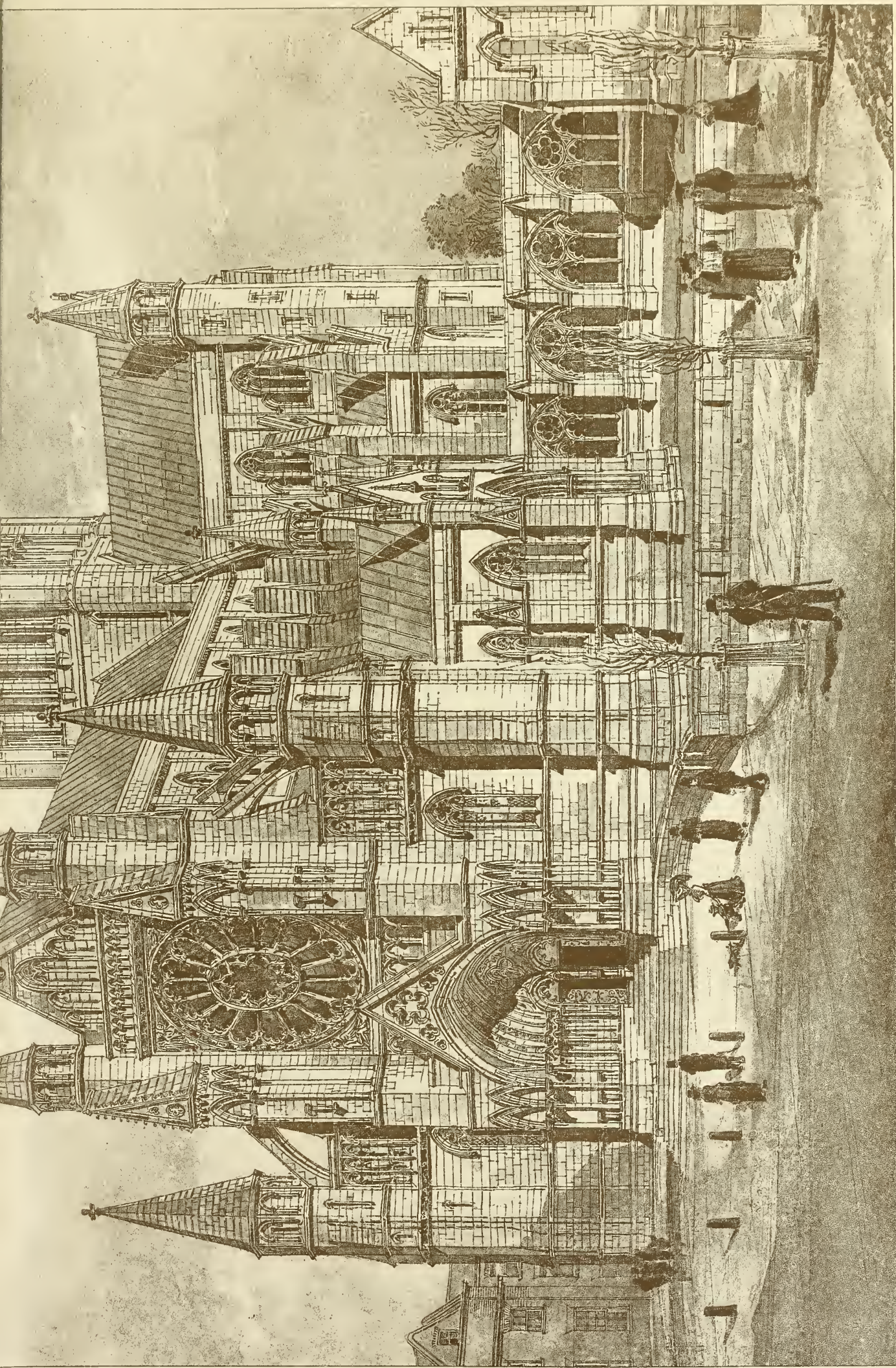
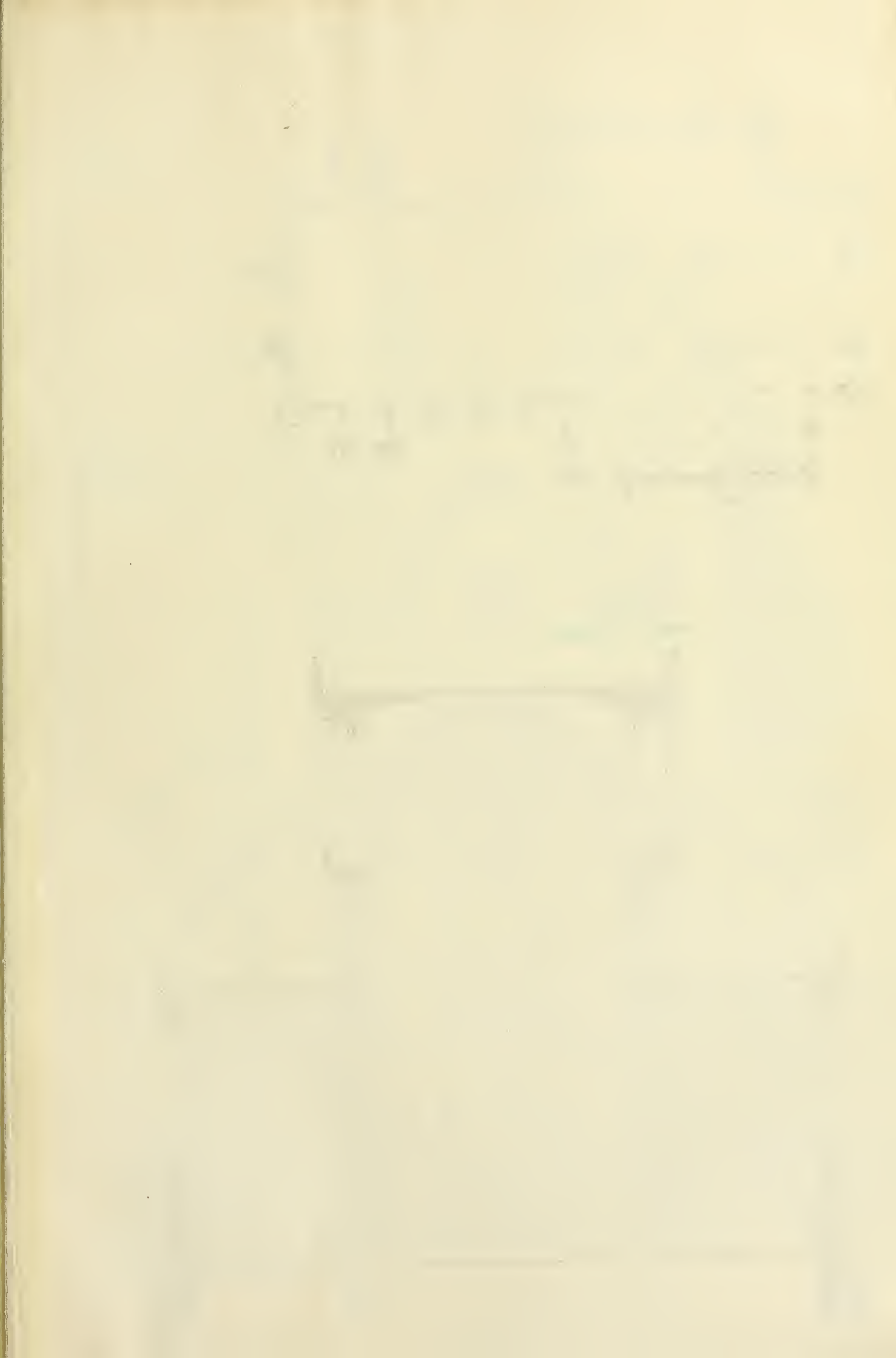
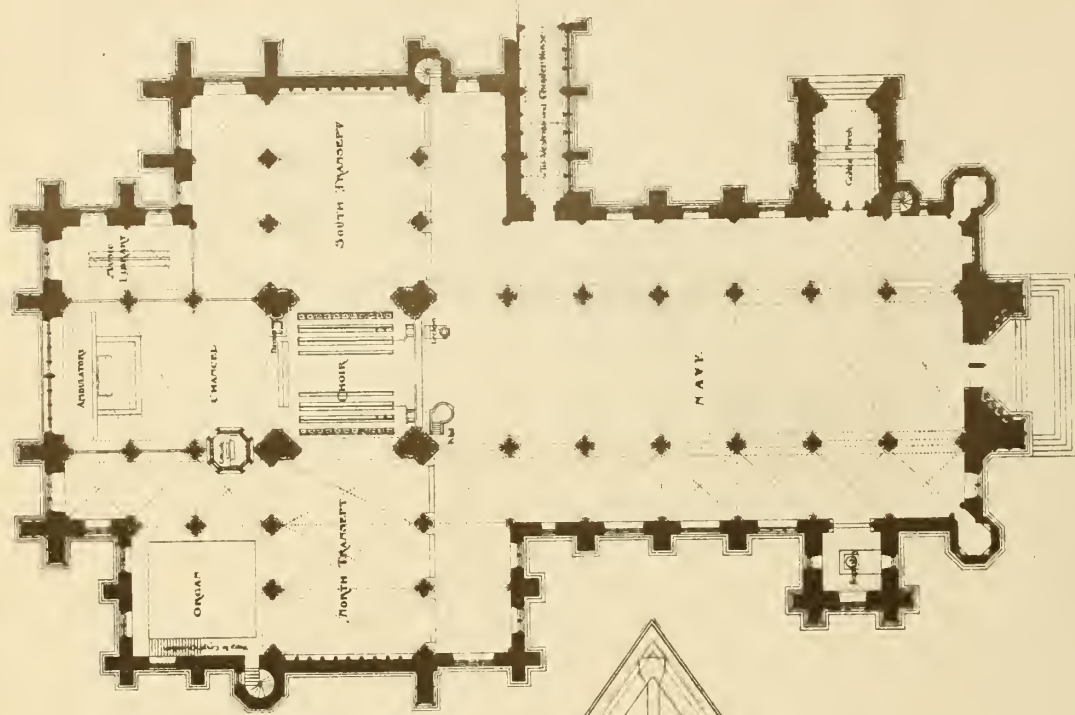


PHOTO-TINT, by James Akerman, Queen's Square, London W.

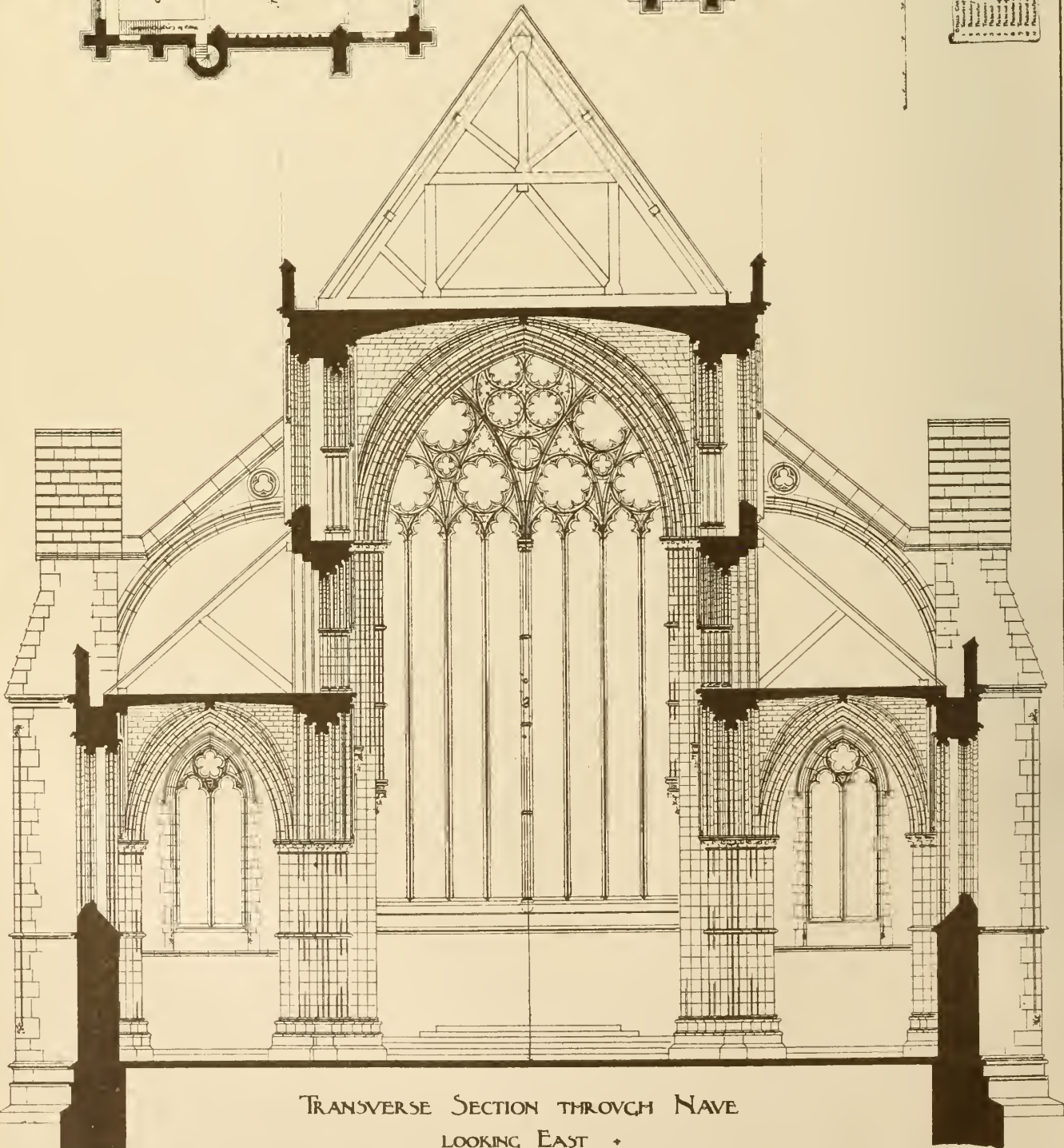
BELFAST NEW CATHEDRAL, THOMAS DREW, R.H.A., F.R.I.B.A., ARCHITECT.





- Scale: 1/4 inch = 1 foot
1. Choir of 18th Century
 2. Choir of 19th Century
 3. Choir of 19th Century
 4. Choir of 19th Century
 5. Choir of 19th Century
 6. Choir of 19th Century
 7. Choir of 19th Century
 8. Choir of 19th Century
 9. Choir of 19th Century
 10. Choir of 19th Century

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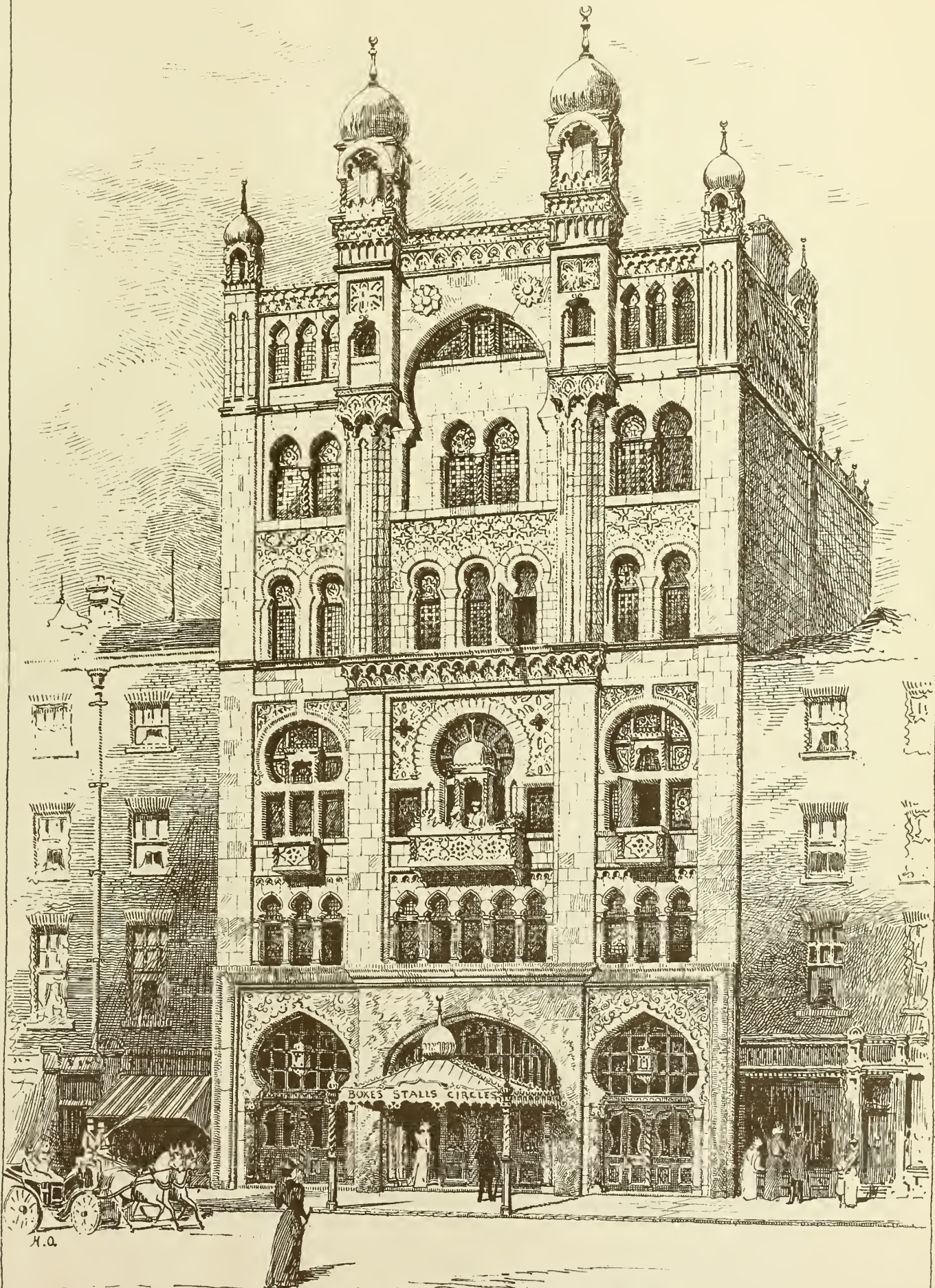


TRANSVERSE SECTION THROUGH NAVE
LOOKING EAST

Photo-Lithographed & Printed by James Akerman, 6 Queen Square, W.C.

The Alhambra.

W. M. Brutton Archt.





"PHOTO-TINT," by James Akerman 6 Queen Square London, W.C.

THE DAVID LEWIS
LIVER

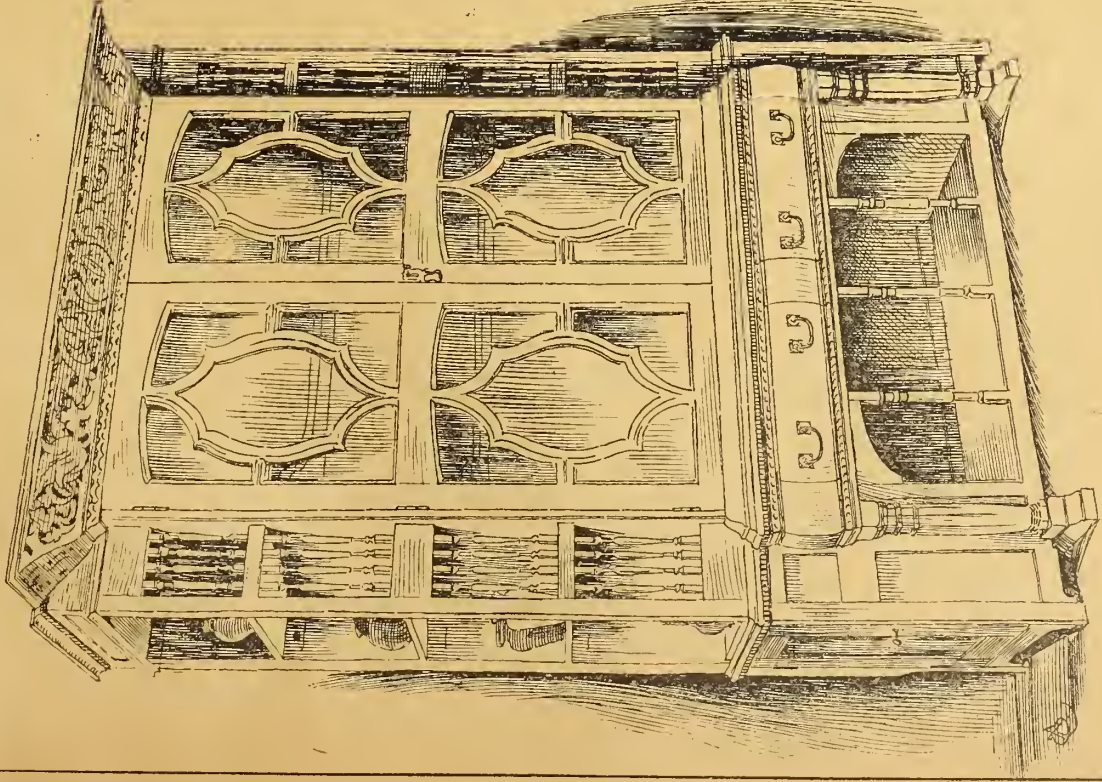
OCT 30, 1896.



PENNINGTON SON & HARVEY
Architects,

NORTHERN HOSPITAL.
LIVERPOOL.

DESIGNED BY GEORGE JACK
EXECUTED BY WM THATCHER

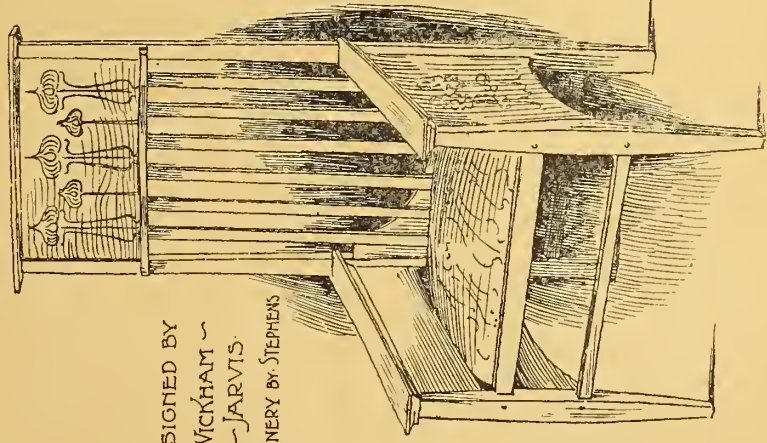


BOOKCASE · CABINET (BROWN OAK)
BY MORRIS & CO

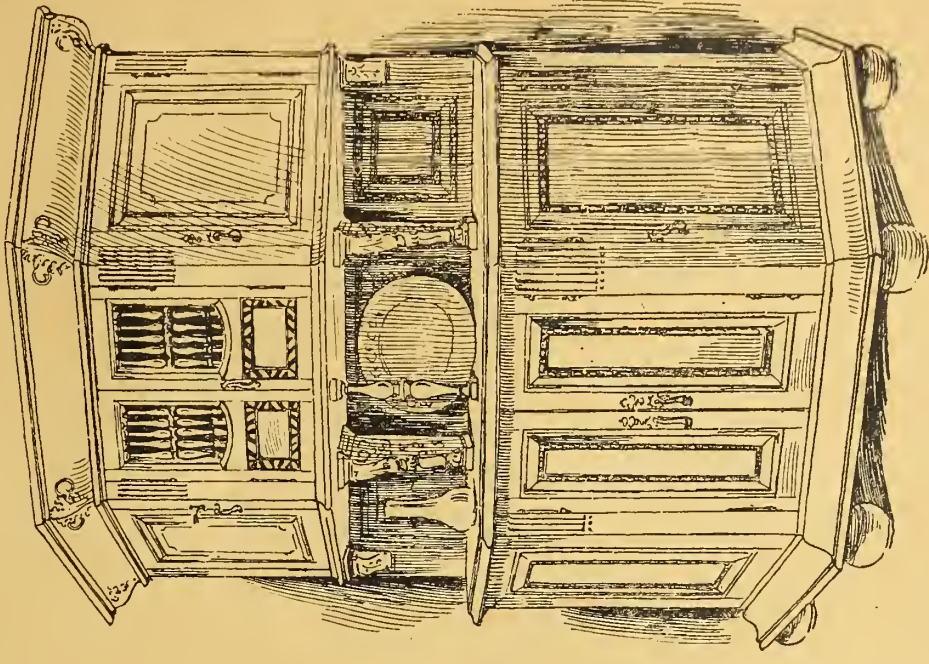
A Ernest Gwynne illustration

SKETCHES FROM THE ARTS & CRAFTS · EXHIBITION
AT THE NEW GALLERY · REGENT ST.

ARM CHAIR WALNUT & GESSO



DESIGNED BY
A WICKHAM &
- JARVIS
JOINERY BY STEPHENS



OAK · SIDEBOARD
DESIGNED BY E PROJEAU WARREN
EXECUTED BY HOLLOWAY BROS

Building Intelligence.

BEMERTON.—St. Andrew's, Bemerton, near Salisbury, has been under restoration for the past two years, from the designs, and under the direction of, Mr. Charles E. Ponting, F.S.A., architect, of Marlborough. The practically finished work was dedicated on the 20th inst. The walls, which before the renovation had nearly fallen in, have been straightened. The nave roof, formerly plastered, has been reconstructed of open oak. The altar is of Devonshire marble, with mosaic inlaid, and there are new altar-rails of oak. The font cover, of Jacobean design, is by Messrs. Harry Hems and Sons, of Exeter. The carpentry generally is by Mr. G. Powell, of Bemerton; and Mr. Barrett, of the same place, carried out the masonry. The total cost has been about £520.

CHELMSFORD.—After the disastrous fire last November at Messrs. Crompton and Co.'s electric lighting factory in Moulsham hamlet, by which the premises were destroyed, the directors decided merely to restore temporarily the old workshops, and to endeavour to obtain a site for the new factory in a more convenient position. A site of about nine acres was secured in Writtle parish, close to the Great Eastern main line, and the new factory is now rapidly being constructed there. The buildings will consist of factory and workshops, and a separate block of offices facing the Writtle-road and immediately opposite the entrance to Chelmsford Cemetery. The factory will be entirely on the ground floor, instead of being of three stories, as at Moulsham, and will comprise a block of main shops 260ft. by 150ft., shut off from which by iron doors is a store 140ft. by 20ft. The boiler economiser house measures, with the coal bunkers, 70ft. by 50ft. All the buildings are arranged so that they can be easily extended if required. The main shop is divided into eight bays, all of which are provided with overhead travelling cranes, many of these being driven electrically. The office block measures 156ft. by 32ft., and is faced with picked stocks and red brick dressings. It contains drawing office, 41ft. by 30ft.; general office, 31ft. by 30ft., with top lights; a fireproof room for books, drawings, and patterns, 31ft. by 11ft.; with managers' rooms, directors' rooms, waiting room. The factory buildings were mainly designed by Mr. Brunton, the works manager, and the office block by Mr. John Slater, B.A., F.R.I.B.A., of 46, Berners-street, London, who also acts as consulting architect for the whole of the work. The contractors are, for the main factory buildings, Mr. J. Bray, of Yarmouth; for the chimney shaft and offices, Mr. Frank Johnson, of Chelmsford; and for the iron and steel work, Messrs. Dorman, Long, and Co. Mr. H. F. Sheppard is clerk of the works.

EAST RADDON.—At East Raddon, a hamlet two miles from Thorverton, Devon, the ancient chapel of St. John the Baptist was rededicated by Archdeacon Sandford on Wednesday week. "No Man's Chapel" was founded in 1421, but for many years had been disused for service, and has for some generations been occupied as a dwelling. At the cost of Sir John Shelley it has been refitted and renovated, and will now be used as a chapel of ease to Thorverton Church. The plans were prepared by Mr. E. H. Harbottle, of Exeter, and the work has been carried out under the supervision of Mr. G. Homeyard, clerk of the works, for Sir John Shelley. The building has been restored as nearly as possible on the lines of the old structure. A portion of the tracery on the ancient windows has been worked out on the original lines, and everything that remained of the ancient building has been utilised again. In the east window a portion of the original stonework has been preserved, while the west window is entirely constructed of the old material. The massive oak roof is in a good state of preservation, and has been used in its entirety. The additional stones which have been used were taken from the Thorverton Quarry. An unusual feature in the east and west windows is the coping on the top of the mullions. The chapel inside is 25ft. by 12ft. 6in., and is capable of seating only about three dozen people. The tracery has been done by Mr. Berry, of Crediton, and the lead lights supplied by Mr. Thomas, of Crediton. Lady Shelley has given the altar cloths, chalice, and cross, and the vicar of Thorverton undertook the provision of the internal fittings.

LEEDS.—Emmanuel Church was reopened after internal decoration, on Sunday. The decoration

consists mainly in a series of frescoes, which have been painted upon the walls of the chancel, nave, and south transept, by Messrs. Powell Brothers, of Park-square, Leeds. The outlines are in strong Egyptian red, richer colouring being used only in the chancel and nave. The chief subjects on the chancel walls are the Expulsion from Eden, the Annunciation, and the Adoration of the Magi. Upon the large space above the chancel arch is shown the Saviour under the symbol of the Lamb, holding the banner of the Resurrection, and surrounded by a choir of angels adoring and playing musical instruments. On either side of this picture are life-size figures of the Twelve Apostles, these being carried upon both sides of the nave walls; and in the clerestory, between the windows, a series of niches contain many representatives of the prophets and martyrs—there being in the clerestory alone 25 figures. In addition to these frescoes, Messrs. Powell have painted upon the tower roof the Hand of God in blessing, and angels bearing scrolls with the words "Holy, holy, holy," upon them, and upon the east side of the south transept a processional subject of Christ's Entry into Jerusalem—this last measuring some 19ft. by 7ft., and the figures being nearly life-size. The work has been executed under the personal supervision of Mr. Henry Walker, architect, of Leeds.

LINLITHGOW.—St. Michael's parish church, adjoining Linlithgow Palace, which for the last two years has been undergoing restoration, was opened on Saturday. The work connected with the restoration embraced the removal of the stone partition which used to separate the chancel from the nave of the church, and the entire removal of the galleries, and stairs leading thereto, these alterations opening up the church from end to end, and leaving open to view the massive stone pillars and the groining of the vault. The church has also been refloored with stone, and has been re-seated with oak pews, and an oak pulpit was among the special gifts. The architect for the restoration was Mr. John Honeyman, R.S.A., of Glasgow.

MAIDSTONE.—The foundation-stone of the new church of St. Luke was laid last week by Mr. F. S. W. Cornwallis. It is cruciform in plan, and will seat about 600 persons. A large vestry for parochial meetings and an organ-chamber are also being built. The committee have, in instructing their architect, sought to provide a church which should be perfect for hearing, and in which there should be as little interference as possible in the view of the pulpit and chancel from all parts of the church. The nave columns are, therefore, very widely spaced; the roof will be kept low, and there will be no clerestory, the roof being continuous from the nave ridge to the eaves of the aisles. It is anticipated that this treatment will also have the effect of preventing a down-draught of cold air so often experienced from clerestory windows. The architecture is Gothic, freely and simply treated, with details of a Late character. The arches generally are segmental in form. As there are no clerestory windows, the west end of the nave above the porches consists of one great window with Perpendicular piers and mullions. A choir of about thirty will be seated in the chancel. The church can be enlarged at any future time by extending the south transept and part of the south aisle. Funds will not allow of a tower, but there will be a bell-turret above the north transept porch which will group picturesquely with the main roof. The material of the walls will be of local rag stone, dressed with Monk's Park Bath stone from the best beds of the quarry. The columns and arcade of the interior will also be built of this stone, as well as the mullions and the tracery of the windows. The roof will be of Broseley tiles. The architect is Mr. W. Howard Seth-Smith, F.R.I.B.A., of 46, Lincoln's Inn-fields, London, and the builders are Messrs. Wallis and Sons, of Maidstone.

PETERBOROUGH CATHEDRAL.—Sir Arthur W. Blomfield, A.R.A., has made an examination of the west front of Peterborough Cathedral, for the Restoration Committee, who desired to be fortified with a second opinion before proceeding with the additional works recommended by Mr. J. L. Pearson, their architect. He confirms the opinion of Mr. Pearson, and says that, with the exception of ordinary weather-wear and dilapidation easily dealt with and repaired, the whole of the mischief which has occurred is undoubtedly attributable to original defects in the foundations. There are clear indications that an outward

movement to the west must have first shown itself at a very early period, and various expedients were subsequently adopted from time to time to arrest the further progress of this inclination. Some of these works had the effect of materially retarding for a time the approach of a dreaded collapse, but hitherto none of them has succeeded in stopping the movement altogether and in thus placing the west front in a condition of permanent stability. The most important of these attempts was made in the erection of the central porch and the chamber over it (now the library) in the 15th century. In that building more care was taken with the foundations, which were carried deeper, but even in this case they were not taken down to the limestone rock, and so rendered absolutely secure. In consequence of this omission a gradual downward and outward movement has long been going on in the western wall of this building, which was intended to aid and buttress the earlier work, and signs are observable of comparatively recent increase. Now, for the first time, the origin of the evil has been attacked, and, so far as the work has gone, has been effectually dealt with. The west wall of the porch has been recently carried down in cement to the limestone rock, and the two great triangular piers have been carefully underpinned and rendered secure in a similar manner. Sir Arthur Blomfield strongly advises that the foundations of at least the west walls of the north and south towers should also be examined, and, if found necessary, underpinned in cement down to the solid rock. When this is completed no further movement from the same cause need ever be apprehended, and under ordinary circumstances the necessary repairs of the upper part of the west front might be proceeded with and satisfactorily carried out without taking down and rebuilding much, if any, of the old work as it stands. But, unfortunately, the initial defects in the foundation have been left so long undetected, in the only manner that could be permanently effective, that much of the superstructure has in itself become rent and disintegrated in such a manner and to such an extent as to bring the whole into a most dangerous condition, and to render substantial and lasting repair quite impossible without taking down and rebuilding some of the existing work above the caps of the great piers. Sir Arthur Blomfield adds:—"As I do not suppose that the committee wish me to go beyond a general statement of my opinion and advice, I refrain from entering into questions of detail which, I conclude, will be left unreservedly in the hands of their own architect, whose knowledge and experience of such cases is probably greater than those of any man now living."

PORT ELIZABETH, S.A.—The restoration of St. Mary's Collegiate Church, Port Elizabeth, being sufficiently complete for the conduct in it of Divine service, it was formally opened on the 6th September, and on the 13th the bishop of the diocese consecrated the entirely new parts, such as the chancel, organ-chamber, vestries, cloisters, &c. The tower only has yet to be finished. When this is accomplished, St. Mary's will be regarded as the premier parish church of the country; £8,000 has been expended in its restoration from designs by Mr. Sidney Stent, F.R.I.B.A., of Cape Town, the work being carried out by Messrs. Kohler and Ponsonby, a firm of local builders. The stained-glass windows are by Messrs. Heaton, Butler, and Bayne, of London; the incandescent gas fittings are by Messrs. Singer and Sons, of Frome; the font, which is of Caen stone with Vienna marble shafts and four carved medallions on the bowl, is by Messrs. Harry Hems and Sons, of Exeter. The walls and roof throughout have been treated with distemper (Dureco), the scheme adopted being somewhat "Bodleyan" in effect. The nave provides sitting accommodation for about 600 persons, and the choir, which is 60ft. in length and 27ft. in width, for about 100; this includes stalls for all the bishops of the province, and for the diocesan chapter, as well as for the clergy of the parish and its choir. The church was built between 1825 and 1832, was reroofed in 1835, and completed, so far as the original plan was concerned, in 1842. In 1848 the tower was added, and in 1858 the church was enlarged from plans by Mr. William Butterfield, F.S.A. In March, 1892, the church was gutted by a fire, and even the walls have had to be reconstructed.

The Emperor-King laid, on Sunday, the final stone of the new Museum of the Mechanical Arts, which has been built at Buda-Pesth.

TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. All communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondents.]

It is particularly requested that all drawings and all communications respecting illustrations or literary matter should be addressed to the EDITOR of the BUILDING NEWS, 332, Strand, W.C., and not to members of the staff by name. Delay is not unfrequently otherwise caused. All drawings and other communications are sent at contributors' risks, and the Editor will not undertake to pay for, or be liable for, unsought contributions.

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Advertisements for the current week must reach the office not later than 3 p.m. on Thursday. Front-page Advertisements and alterations in serial advertisements must reach the office by Tuesday morning to secure insertion.

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NOTICE.

Bound copies of Vol. LXIX. are now ready, and should be ordered early (price Twelve Shillings each), as only a limited number are done up. A few bound volumes of Vols. XXXIX., XL., XLI., XLVI., XLIX., LI., LII., LIV., LVIII., LIX., LX., LXI., LXII., LXIII., LXIV., LXV., LXVI., LXVII., LXVIII. may still be had, price Twelve Shillings; all the other bound volumes are out of print. Most of the back numbers of former volumes are, however, to be had singly. Subscribers requiring any back numbers to complete volume just ended should order at once, as many of them soon run out of print.

RECEIVED.—G. R. Fowley.—N. L. and Co.—Subway.—Jas. Symonds.—E. B.—R. E. and Co.

G. T. C. (Sorry; but we really do not remember the book.)

BAC. (Batsford, 94, High Holborn, W.C., will know of a book if there is one. We do not recall the name of any.)

H. D. P. of B. (Thanks; held over till next week.)

"BUILDING NEWS" DESIGNING CLUB.

J. GILBERT REYNOLDS. (You will find the rules and first subject, with all other useful particulars about our Club, in the BUILDING NEWS for Oct. 15 last.)—EARLY WORKER. (We cannot recommend any book of designs of recent date; those who make up collections of this kind do not usually publish the most suggestive work. That is best found in the pages of the BUILDING NEWS, as the most representative designs of the day are generally therein reproduced.)

Correspondence.

A CORRECTION.

To the Editor of the BUILDING NEWS.

SIR,—I notice in a paragraph appearing in your issue of October 16, 1896, respecting the Measured Drawing and Sketching prizes offered by the Leeds and Yorkshire Architectural Society, that you have added the words (with reference to two of the sketches, Selby Abbey and Campsall Church), "these sketches were reproduced in our pages on Oct. 5 and Nov. 4, 1894," thus conveying the erroneous impression that I had submitted my old sketches as new ones, and, therefore, breaking the conditions.

Will you kindly insert this letter in your next issue, in order that I may publicly deny any such action, and may assert that every one of my sketches sent in for this competition has been done during the latter part of this summer, and especially for this prize?

The sketches which appeared in your journal

were reproduced from pen-and-ink drawings done a few years ago.—I am, &c.,

R. A. EASDALE, A.R.I.B.A.

Carlton Chambers, Castleford, Yorks, Oct. 24.

[We are also informed by the Secretary of the Society that our paragraph was "unauthorised." We can only say the information was sent us by Mr. Easdale himself, and that if we always waited for the secretaries of societies to send us news, it would be rather stale. We are happy, of course, to state, as asked by the secretary, that the Leeds and Yorkshire Architectural Society's prize for Design was awarded to Mr. H. Ambler, of Leeds, for his design for shop premises as a corner site, and that there were two other competitors for that prize. We apologise, of course, to Mr. Easdale for adding to the announcement that "these sketches" were previously published by us. It is evident that he has redrawn them.—ED. "B. N."]

ILLICIT COMMISSIONS.

SIR,—Apropos of the recent discussion about illicit commissions, which I have always regarded in the light of an imaginary evil, I was somewhat startled the other day on receiving an estimate from an eminent Scotch firm for goods to the value of several hundred pounds, to read at the close of their letter:—"We would put in the price at £— with 5 per cent. commission to you off that price. It is customary to include architect's commission, but you did not mention it, and we did not include it in the other price." Comment is unnecessary.—I am, &c.,

W. E. PINKERTON, M.R.I.A.I.

8, Diamond, Londonderry, Oct. 24.

AUSTRALIAN HARDWOODS FOR STREET PAVING.

SIR,—In No. III. of my articles "The Timbers of Australasia" (Vol. LX. p. 233), in speaking of spotted gum (*Eucalyptus maculatus*), under the head of "Hardwoods of New South Wales," I mentioned that such conflicting testimony existed as to the suitability of the timber for wood-paving, that a committee of experts had been appointed by the Minister of Agriculture of New South Wales, to inquire into the matter. The committee consisted of Mr. J. H. Maiden, F.L.S., F.C.S., President of the Royal Society, N.S.W., &c., &c., Mr. G. S. Cowdery, Engineer for Tramways, and Mr. J. V. de Coque, Timber Inspector to the Public Works Department; and their Report, in the shape of a 46-page closely-printed pamphlet, is now before me. The importance of a decision in the matter is first pointed out, in view of the great abundance of spotted gum in New South Wales, and the capability of the colony to supply the markets of the whole world with this timber; and the report enumerates a variety of hardwoods possessed of other characteristics which are liable to be mistaken for the spotted gum of New South Wales, including the inferior grey gum of Victoria (*E. goniocephala*), which in that colony is often designated "spotted gum." The specific advantages of (N.S.W.) spotted gum are stated to be its durability, strength, toughness and elasticity, capacity for bending, lightness, ease of working, evenness of quality, the large sizes readily obtainable, and comparative freedom from pipe. On the other hand, the disadvantages alleged, in a portion of the evidence, to exist with reference to this timber are refuted with considerable success; and the report, while asserting that "no more suitable timber can be used for railway waggon building in Europe," and that "railway engineers at home continually ask for suitable hardwoods of less weight than ironbark," distinctly "recommends its use for woodblocking in Sydney, as well as for export, but subject to strict supervision as regards quality." The particular points with regard to which such supervision should be exercised are, of course, matters which principally concern the colony. The report is published in Sydney by the Government printer, and no doubt copies may be had by those who have occasion for them from the Agent-General at Westminster, Sir Saul Samuel, C.B., K.C.M.G.—I am, &c.,

Sydney, August 28.

J. G. DE LINBA.

The body recently formed at the suggestion of Mr. Alfred Waterhouse, R.A., and hitherto known as the National Society for Checking the Abuses of Public Advertising, has adopted the shorter title of the Advertisement Regulation Society.

Intercommunication.

QUESTIONS.

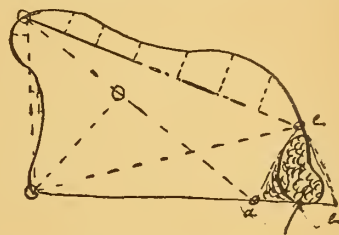
[11579.]—Breweries.—Can any reader recommend a good work on this subject—one giving plans and sections preferred? Have any articles ever appeared in the "B.N." on the subject?—H. L. T.

[11580.]—Damp in Walls.—Will some of your readers kindly give an opinion and their experience upon the following? In the summer of last year a villa was completed, and inhabited in the autumn. Walls, 14in. thick, solid, and in bricks; eaves overhanging; foundations good; cement concrete; and site covered throughout with a 6in. layer of same material. A proper damp-course in all walls. When a succession of two or three days' rain, the plaster strikes out in damp places. Have been told by plasterer that he thinks it is the bricks which are saltpetring. Fires have been kept on. Will this plaster simply dry up through time?—A. B. C.

[11581.]—Figuring Doors on Plans.—In the cases of internal doors in brick walls and quarter partitions, where they are figured on the plans thus, "7ft. by 3ft. 3in.," what, in the absence of special explanatory on plans, or in specification, is the usual interpretation?—i.e., are the doors to be of those dimensions, the openings to be as much larger as required for linings, or are the openings to be of that size, the doors to be as much less as the thicknesses of the linings work out?—E. W.

[11582.]—Green Growth on Stone.—Will someone kindly say what is the best kind of wash that will assist in the removal of the green growth on a gravestone? A wash that will not injure the flag as does the constant rubbing with a piece of stone.—E. C.

[11583.]—Chaining Out Field.—Would some reader please say which would be the best way to chain



out a large field to the accompanying sketch? *abc* is a mound of refuse which I thought of inclosing in an equilateral triangle. An answer will greatly oblige.—A STUDENT.

CHIPS.

Mr. Owen Williams, late of the firm of Messrs. Williams and Co., estate agents, Liverpool, who developed Llandudno half a century ago for the Mostyn estate, is lying in a critical condition at Plas Lodwig, Upper Bangor. Last Friday he was seized when in bed with a paralytic stroke, and since Sunday has been unconscious.

The first section of the restoration of the parish church of Poundstone having been completed, re-opening services were held on the 21st inst. The work has been carried out at a cost of £1,800, from plans by Mr. G. H. Fellowes Prynn, of London. Mr. Wiffen, of Holsworthly, was the builder.

The new main drainage works constructed for the urban district council of Walton-le-Dale, were formally opened on Wednesday week. The sewers are 13 miles in length, and with the exception of one village, where pumping is necessary, the sewage is conveyed to the outfall works by gravitation. The engineer is Mr. F. E. Dixon, A.M.I.C.E., and the contractors were Messrs. S. and J. Bentley. The outlay has been between £34,000 and £35,000.

Hepworth's Clothing Factory in Claypit-lane, Leeds, which was almost completely destroyed by fire some months ago, is now being rebuilt. The plan in the main follows the lines of the old premises; but instead of there being a large central open well as formerly, there will be an open space at one side. The whole of the offices will face Providence-row, and be fireproof. It is also arranged to divide with brick and other fireproof partitions the large area of flooring in each story. Two fireproof staircases will be placed at angles of the building. The architect is Mr. W. S. Braithwaite, of 6, South-parade, Leeds.

A meeting was held in the Macclesfield Town Hall, on Monday, of the general committee having in hand the arrangements for the restoration of St. Michael's parish church, Macclesfield. Mr. P. P. Brocklehurst wrote offering to contribute £500. It was decided to obtain the opinion of a leading church architect, to prepare a scheme for the restoration, together with the probable cost, and to report to a full committee. An executive committee was appointed.

During the past week a stained-glass window has been placed in the east end of St. Catherine's Chapel at Gosberton Church. The window, representing "The Resurrection Morning," has been executed by Mr. T. W. Camm, of Smethwick, Birmingham.

LEGAL INTELLIGENCE.

ARBITRATION AT BOURNEMOUTH.—At the Municipal Offices, Bournemouth, on Tuesday week, the arbitration proceedings began as to the compensation to be awarded to Mr. J. Dent, of Burwood Glen, Bournemouth, on account of the laying of a sewer by the Bournemouth Corporation through the grounds of Burwood Glen. Mr. Dent claimed £1,060 as compensation, which the corporation declined to pay; hence the present arbitration. The arbitrators were Mr. W. J. Fletcher (Dorset County Surveyor), chosen by the corporation, and Mr. Charles Roberts (surveyor, Gray's Inn), by Mr. Dent. Mr. J. Dent, the owner of Burwood Glen, Mr. F. H. Hankinson, Mr. J. R. Crickmay, and Mr. Tom Stevens, architects, were called for by Mr. Dent. Mr. Crickmay estimated the compensation at £420. Witnesses having been called for the corporation, the arbitrators adjourned the Court till Monday next, November 2.

IN RE MAYNER AND HANDFORD.—At the London Bankruptcy Court on Monday a receiving order was made in this case, the debtors being described as sanitary engineers and builders' merchants, at St. James's-street, Westminster, and the Brighton Works, Redhill. The liabilities were stated at £3,500, and the assets at £2,800.

DILAPIDATED BUILDINGS NOT "DANGEROUS TO PASSERS-BY."—At North London Police Court, on Wednesday, the case of the "London County Council v. The Owner of an unoccupied house, Cassland-road, Hackney," came before Mr. Cluer. The case was heard by Mr. Bros last week, as reported by us in our last issue, p. 612, and the magistrate then expressed the opinion that the summons, which was for a dangerous structure, should have been taken out under the neglected buildings sections. The case, in the absence of Mr. Bros, was now gone into *de novo*. The contention raised in answer to the summons was that as the house in question—which was admittedly in a deplorable condition—stood back from the road in its own grounds, and was unoccupied, it could not be a dangerous structure to either passers-by or inmates. On the other hand, it was urged on behalf of the County Council that persons might go to the building on business, and it was quite possible for the brickwork to collapse on them. He quoted the case of the "London County Council v. Herring" in support of his contention. Mr. Preston, for the owner, quoted the same case from another report, which, he said, contained the additional information that the houses in question were occupied, and that, he argued, explained the Judge's ruling. Mr. Cluer decided in favour of the County Council, holding that the building would be a source of danger to a policeman who might enter the grounds, or to other persons who might have occasion to go there. The building would have to be made secure within two months.

PARTY-WALL DISPUTE.—Judge Granger held a special court at Camborne on Saturday, for the hearing of an action brought by Mr. C. H. Dovey, plumber, [Camborne, with the object of obtaining from Mr. A. Dunkin, builder, of the same town, damages, alleged to have been sustained by interference with the wall between his house and property purchased by Mr. Dunkin. The effect of defendant pulling down the property he purchased was said to be that he exposed plaintiff's rooms, furniture, and shop fittings to the weather. Evidence was given by the plaintiff, Messrs. S. Trevail, J.P., M.S.A., W. H. Heath (former occupier of Dovey's tenement), Richard Bennett (grocer), Richard Pascoe (present occupier of Dovey's tenement), and Sarah Pomeroy; whilst, for the defence, testimony was borne by Messrs. W. G. Martin (managing clerk to Messrs. Grylls, Hill, and Hill, the agents of Sir Vyell Vyvyan), Joseph Vivian (the Camborne agent of Sir Vyell Vyvyan), J. Eva (surveyor to Sir Vyell Vyvyan), James Trezise and Phillip Perrin (clerks at Messrs. Grylls, Hill, and Hill), A. Dunkin (defendant), James Caldwell (architect, of Penzance), W. Richards (builder, Camborne), and Frank Turner (mason, who pulled down the wall). The Judge gave judgment for the plaintiff for £1 damages, remarking that the party-wall must be rebuilt by the defendant, and, if built beyond the plaintiff's premises, that wall must still be considered as a party-wall, so that in case plaintiff wishes to lengthen his premises he will be entitled to do so, and to use the wall as a party-wall. Costs on C scale were given. Mr. Thomas applied for a special fee, upon which his Honour said he would consider the scale of costs to be given.

The dedication of St. Peter's Church, Bentley, Doncaster, was performed by the Archbishop of York on Friday. The church was built by the late Mr. C. E. S. Cooke. Exclusive of land, the cost was between £6,000 and £7,000. The church is in the Early Decorated style. It consists of nave and chancel and side aisle, and has a tower and spire. It is built of Derbyshire stone, and has accommodation for between 400 and 500 hearers.

STATUES, MEMORIALS, &c.

GLASGOW.—On Saturday afternoon the Sir Charles Cameron memorial fountain, in Glasgow, was inaugurated. The fountain, which occupies a prominent site on the north side of Sauchiehall-street, at its junction with Woodside-crescent, is designed in the French Renaissance style. A base of unpolished Peterhead granite supports the structure, which is of Doulton terracotta, octagonal in shape, hollow, and open on four sides, the water flowing from a sculptured urn in the centre. The walls, rising to the height of about fifteen feet above the top of the base, are buttressed by Corinthian columns, and the whole is surmounted by a carved cupola. Immediately under the cupola is a four-dialled clock, and, lower on the north and south faces, there are medallions in bronze of Sir Charles Cameron, executed by Mr. George Tinworth.

CHIPS.

The Fulham Vestry have agreed to carry out street widenings and improvements to the extent of £9,321 in Fulham-road, North End-road, and Munster-road.

A Local Government Board inquiry has been held at Derry into the application by the corporation for power to borrow £5,750 for the purchase of the bishop's garden for increasing the market accommodation.

The committee of the memorial to the late Prince Henry of Battenberg, K.G., have decided that it shall take the form of new roofs, floors, and stairs to the interior of the gatehouse at Carisbrook Castle.

At Bideford, on Monday, Mr. Capern, eldest son of the late Edward Capern, the postman poet, presented to the borough a painting in oils of his father, which was given to him (the son) by Mr. Rock, the poet's great friend and patron, upon his twenty-first birthday. The gift will be hung in the public library.

The London County Council adopted, on Tuesday, a recommendation of the Asylums Committee for the erection of temporary iron buildings to accommodate 400 additional patients on a freehold site adjoining Hanwell Asylum at an estimated cost of £30,000. It was agreed to set back certain premises in Millbank-street, Westminster, at a cost of £6,250, in connection with the proposed rebuilding of Lambeth Bridge.

At Tuesday's meeting of the Gloucester Board of Guardians the Local Government Board's sanction of a loan of £7,500 for purchasing the Tuffey Court estate as the site of a new workhouse was announced.

A new Salvation Army Citadel, which occupies a prominent site at the junction of Brigstocke and Ashley-roads, Bristol, is rapidly approaching completion. The main frontage is to Ashley-road, and is of red brick with freestone dressings, and the embellishments and style of treatment are in harmony with the name given to the structure. The meeting-hall will provide accommodation for nearly 2,000 worshippers, and there is a small hall giving accommodation for 500 children in classes, in addition to smaller compartments to be utilised for various branches of work. The total cost of site and building is about £6,000. The contractor is Mr. T. Morgan, of London, whilst the architect is Major Gordon, of the Salvation Army.

At a meeting of the general purposes committee of the London County Council held on Tuesday, a proposal to recommend the Council to appoint Commander L. de L. Wells as chief officer of the Metropolitan Fire Brigade was carried unanimously, and the Fire Brigade Committee have passed a similar resolution.

The export of timber, masts, and spars from Sweden from January to August this year was 85,600 cubic metres, as compared with 82,100 cubic metres in the corresponding period of last year.

The contract for the building of the Newcastle Electrical Exhibition has been secured by Messrs. Bruce and Still, of Liverpool.

At the Carlisle Consistory Court, Chancellor Ferguson has granted faculties for the erection of two memorial windows in the parish churches of Brampton and Windermere.

Messrs. Spiers and Co., of Glasgow, are now erecting, to the order of East Berwickshire County Council, an iron infectious diseases hospital, situate about one mile and a half from the town of Ayton, on a slight eminence near Millerton Hill Farm. The building consists of a framework covered on the outside with a special galvanised corrugated steel sheeting. The interior will be lined throughout with a specially-prepared stoved matchboarding, which can be washed and disinfected. A special feature about the building is the patented system of air-spaced walls. The main block consists of two wards, to accommodate twelve patients in all, and separated from each other by the administrative portion.

WATER SUPPLY AND SANITARY MATTERS.

NORTH WOOLWICH.—On the recommendation of the Main Drainage Committee, the London County Council will be asked at its next meeting to sanction a scheme for providing efficient drainage for that portion of the parish of Woolwich which is situate north of the Thames. The cost of the whole work, excluding the boilers and machinery in the proposed pumping station, has been estimated by the engineer at £48,000. The land on which it is proposed to erect the pumping-station had a river frontage of 70ft., and for that a sum of £3,500 had been asked by the owners. The cost of the boilers and machinery and of supervising the work, together with the amount of compensation that might have to be paid for easement, was not likely to exceed £15,500. The total asked for the scheme is £67,450. It is proposed that the work shall be carried out by the Works Department of the Council without the intervention of a contractor. At the same time, the Council will be asked to sanction the expenditure of £34,350 for the construction, delivery, and erection at the Crossness outfall of two triple-expansion, vertical-cylinder engines.

With a view to improving the navigation of the Thames above Oxford, the Thames Conservators have just completed a new lock and weir near the village of Grafton, in Oxfordshire, about one mile above Radcot Bridge. The first lock on the river is at Lechlade, 144 miles above London Bridge, and the new lock will be the third in order from the source.

The Gloucestershire County Council decided at their meeting on Monday to raise the salary of the county surveyor, Mr. Robert Phillips, of Gloucester, from £500 to £600 a year.

Mr. J. Passmore Edwards was presented on Wednesday with the freedom of the Borough of Liskeard, in recognition of his munificent gifts of public institutions to his native county of Cornwall, and especially to Liskeard, to which he has given a cottage hospital and free library, each costing £2,000. Mr. Edwards opened the free library, which has been built by Messrs. John Symonds and Son, of Blackwater, Cornwall, and was illustrated in our issue of Feb. 14 last. Messrs. John Symonds and Son were also the builders of the cottage hospital in the same town, which was designed by the late Mr. James Hicks, M.S.A., of Redruth, and of which a double-page perspective was given in the BUILDING NEWS for March 29, 1895.

A full peal of eight bells was dedicated on Wednesday week at St. Kentigern's Church, Aspatria, by the Bishop of Carlisle. The bells have cost over £500, and the alterations necessary to receive them another £100.

In the ventilation of St. Margaret's Roman Catholic school, Ayr, Mr. William Kerr, architect, the "Climax" patent direct-acting invisible roof ventilators are used, and have been supplied by Messrs. Cousland and Mackay, ventilating engineers, Glasgow.

A large clock with quarter chimes has just been erected in the parish church of Stockland, near Honiton. It is fitted with all modern improvements. Messrs. Smith and Sons, Midland Clock Works, Derby, carried out the work.

Mr. Sibley, master builder, of Peterborough, committed suicide by hanging on Thursday in last week. Deceased, who was 59 years of age, had suffered from mental depression, and a verdict of temporary insanity was returned.

The foundation and memorial stones of new school buildings which are being erected in Benacre-street, Birmingham, in connection with Bristol-road Wesleyan Chapel, were laid on Monday. The scheme comprises the demolition of the old schools in Benacre-street, and the substitution of a new building, included within the walls of which will be a schoolroom 61ft. by 41ft. (accommodating 1,000 children), a gymnasium of similar dimensions in the basement, a young men's institute, lecture-hall, nine vestries, and a range of kitchens. In addition, the roof of the chapel is to be stripped and re-slatted, new ventilators and windows will be fixed, a lobby entrance added, and the present communion and choir arrangements modernised. This work will cost £5,764.

At the Essex Quarter Sessions last week, Charles James Clare, 52, builder, Writtle, pleaded guilty to obtaining credit to the amount of £136 12s. 5d. from Messrs. Brown and Son, timber merchants, Chelmsford, and £33 7s. 9d. from Mr. Harrison, ironmonger, Chelmsford, he being an undischarged bankrupt at the time. Prisoner formerly traded at King's Lynn, where in 1883 he filed his petition, 5s. in the pound being paid. He went through a similar proceeding in 1890 at Chelmsford, and in neither case had a discharge been applied for or obtained. Prisoner continued to obtain credit without acquainting people with the state of his affairs. Prisoner was sentenced to three weeks' hard labour.

Our Office Table.

ALL admirers of English Domestic architecture will regret the destruction by fire, on Saturday last, of the picturesque half-timber and brick mansion known as Severn End House, some six miles from Worcester, together with most of the ancient furniture, pictures, manuscripts, and books which it contained. Severn End, the seat of the Lechmere family, was, prior to Saturday, one of the most perfect examples remaining of Late Elizabethan architecture. Extensive additions were made to the entrance front in Queen Anne's time, converting the buildings into three sides of a quadrangle, which was approached from the road through a pair of lofty and handsomely-wrought iron gates, hung on brick piers, surmounted by the rampant lion and talbot, the supporters of the Lechmere arms. Over the portal is painted the crest of the family—pelican, azure, vulning herself, with the motto, "Christus Pellicano." A view of the main front of the house, by Mr. Walter Niven, was given in our issue of August 19, 1881, and on May 10th, 1889, we published a drawing by Mr. Maurice B. Adams of the other or garden façade, with its timber gables, bay windows, and massive multiangular brick chimneys. In the garden of Severn End is a summer-house, erected in Charles the Second's reign by Judge Lechmere, and this was sketched by Mr. Adams in the BUILDING NEWS for July 5, 1885.

THE Manchester Museum at Owens College has just received some extensive additions to the Egyptian department of the museum from Professor Flinders-Petrie and Mr. Jesse Haworth. They include a large granite Sekhet-head, a foundation deposit from the temple of Amenhotep II., sculptured and painted slabs from the temples of Tahutmes I., Amenhotep II., and Tahutmes IV., and a set of iron tools, including saws, rasp, file, and drills, remarkable for their resemblance to modern types. The bulk of the large collection of Egyptian objects deposited in the museum some months ago by Mr. M. E. Robinow has now been displayed in the Historic Room, and includes vases of clay and alabaster belonging to the "New Race" discovered by Professor Petrie between Ballas and Nagada, a large number of signet-rings and of bronze statuettes of all ages, several mummies, and some fine pieces of Coptic painting on canvas.

UNDER the auspices of the Glasgow Institute of Architects an exhibition of metalwork has been opened this week to the public in the rooms of the Institute at 187, Pitt-street, Glasgow. The display embraces both ancient and modern art. Some of the examples of the former are of outstanding merit, such as a large German graveyard cross of wrought iron. There are also Flemish and Italian processional crosses, representing the Crucifixion, the work of the early 17th century. Among the modern works are overmantels, panels, sconces (two of peculiar patterns by Glasgow ladies), lamps, flagons, and dishes of all kinds. There is a large rosewater dish of gold, silver, copper, brass, and other metals. It was designed for the Paris Exhibition. Most of the exhibits are ornamental, but there are also shown a variety of fireplace, &c., and interesting specimens of hand-wrought rain-water heads in lead, sent by Mr. Thomas Elsley, London. The exhibition will remain open until Saturday, November 14th.

At the meeting on Monday of the Liverpool City Council, a discussion took place on a recommendation of the library and museum committee, "That Mr. Edwin C. Pinks, 45, Parliament-street, Westminster, quantity surveyor, be appointed to take out the quantities for the extension of the museum buildings and new technical schools, at the remuneration of 1½ per cent. on the cost thereof." Mr. Beloe said that a local quantity surveyor was capable of doing the work, and protested against an order to the value of £1,308 going out of Liverpool. He moved that the matter be referred back. Sir William Forwood explained that they had selected Mr. Pinks because the architect, who was a London man, had said it would greatly facilitate the work, as Mr. Pinks had prepared the estimate attached to the designs. After more discussion, the recommendation was taken back for further consideration.

THE movement for the registration of architects is making steady progress in public favour in Canada and the United States. At the con-

vention of the National Association of Building Inspectors just held at Buffalo, the following resolution was passed on the subject: "That it is the opinion of the National Association of Building Inspectors that public safety demands that persons practising the profession and trade of architect, civil engineer, and builder should do so under license, to the end that those who practice such responsible professions and trades should first show their fitness to do so; therefore, we recommend the passage of State laws leading to the accomplishment of this end."

THE American *Railway Review* gives the following recipe as a durable method of painting glass. The material is thoroughly cleaned with acidified water and fossil meal, and a solution of 10 parts of stale beer and 1½ parts of potash water glass is poured over it. After drying, the glass is heated moderately and as uniformly as possible, when it is ready to receive the following coat of paint:—100 parts by weight of Cologne glue are allowed to soak in cold water for several hours. The water is then poured off, and the glue is put into a pot and melted. While the glue is melting, 200 parts of linseed oil is heated until the temperature of both substances is about equal. As soon as no more air bubbles can be observed in the glue, the linseed oil is added gradually under continual stirring. The mixture has to be kept hot over a slow fire for an hour and stirred without interruption. For stirring, a round stick is the best, as an angular one will produce bubbles. Then 200 parts of slightly heated turpentine or camphor oil is added, and at last the colouring substance, and 150 to 200 parts of water. All these additions have to be made slowly, while stirring must not be neglected. The paint is spread on lukewarm, and is dry within six hours.

Mr. E. F. Willson, late assistant surveyor to the Ashford Urban District Council, has been appointed surveyor of Cheriton.

The Great Western Railway Company have a staff of engineers in the country surveying for a first-class railway between London and High Wycombe, leaving the main line on the east side of Acton Station, passing through the district of Perivale, Greenford, Northolt, Ickenham, Ruislip, Denham, Gerrard's Cross, and Beaconsfield. Besides shortening the present distance from High Wycombe to London by eight miles, the new line would open out a residential district. A loop line near Woodburn in the direction of Bourne End will be included in the scheme.

Skipton Workhouse has just been almost entirely retrained, in accordance with plans prepared by Mr. Malcolm Paterson, M.Inst.C.E., Bradford. The contractors for the works were: Messrs. B. Jackson and Son, Bradford, drains, &c., and Messrs. Thos. Hill and Sons, Bradford, internal fittings. Every pipe-joint was tested with smoke and water before being covered by Mr. Darling, afterwards succeeded by Mr. Braithwaite, as general clerk of works under Mr. Ascough Rodwell, sanitary inspector to the Skipton Rural District Council.

The Bishop of London, Archbishop-Designate of Canterbury, on Wednesday dedicated the mission buildings of St. Mark's Mission, Wadson-street, Cambridge-road, South Hackney. The building consists of two floors, with a church house at the side. The upper floor is entirely devoted to the mission church. The whole cost of the building and the site, amounting to over £5,000, has been borne by Miss Pope in memory of her brother. The fittings of the church, which are almost entirely in oak, have cost an additional £500, but the pulpit and the marble font are presents.

In the Lord Mayor's Court, on Wednesday, the case of "Augener v. the Central London Railway Company" was called on for hearing before the Recorder and a special jury. It was a compensation case arising out of the construction by the defendant company of a railway station in Newgate-street. In the exercise of their powers, the company had taken the premises, 86, Newgate-street, for the purposes of the station, and the claimants, Mr. W. E. F. Augener and Mr. G. P. W. Augener, music publishers, sought to have determined the amount of compensation to be paid to them in respect of their interest in the premises. When the case was called on it was announced that a settlement had been arrived at, and by consent a verdict was returned for the claimants for £6,200.

The Bradford Corporation have carried out the widening of the New Morley-road, near the centre of the town, at a very reasonable figure. The cost of land and buildings was £14,562, and the surplus land has just been sold in 24 lots by public auction for £12,072, being a net deficiency of £2,490. But against this 2,674 square yards have been thrown into the width of the road, so that the outlay has been less than a sovereign per yard.

MEETINGS FOR THE ENSUING WEEK.

SATURDAY (TO-MORROW).—London and Provincial Builders' Foremen's Association. "The Manufacture of Portland Cement," by Mr. Silvester. Memorial Hall, Farringdon-street, E.C.

MONDAY.—Society of Engineers. "The Effects of Admixture of Kentish Rag with Portland Cement," by D. R. Butler. Royal United Service Institution, Whitehall. 7.30 p.m. Royal Institute of British Architects. Opening Address by the President, Professor George Aitchison, A.R.A. 8 p.m. Liverpool Architectural Society. "Sir Christopher Wren and his Work," by Arthur Stratton, F.R.I.B.A. 6.30 p.m.

TUESDAY.—Institution of Civil Engineers. Inaugural Address, by J. Wolfe Barry, C.B., president. 8 p.m.

WEDNESDAY.—Royal Archaeological Institute. "Uriconium," by Geo. E. Fox, M.A., F.S.A. 4 p.m.

FRIDAY.—Architectural Association. "Roof Coverings," "Lead Copper, and Zinc," by G. Ewart; "Tiles," by F. Walker. 7.30 p.m.

CHIPS.

On Tuesday last, the 27th inst., two new and important railway lines in the Asiatic dominions of Russia were opened for regular traffic—viz., the Western Siberian line from Cheliabinsk to the river Obi (889 miles), together with the branch from Cheliabinsk northward to Ekaterinburg (158 miles), and the new section of the Transcaspien railway from the port of Krasnovodsk.

A bust of the late Sir Joseph Barnby was unveiled on Monday night at the Royal Albert Hall. The bust, which is in bronze, is by Mr. Herbert Hampton.

The death is announced at his residence, Owensville, Kingswear, of Mr. William Francis Owens, aged 72, for many years past superintendent engineer to the Great Western Railway Company for the Kingswear district.

On Thursday in last week the Archbishop of York dedicated a new church at Bentley, near Doncaster, erected at a cost of between £7,000 and £8,000 by the late Mr. C. L. S. Cooke, of St. Catherine's.

Mr. Charles Barron, J.P., chairman of the Cowpen Council, will, at the forthcoming meeting of that body, bring forward a scheme for providing the whole of Eastern Northumberland with an adequate supply of water. Mr. Barron's proposal, if properly carried out, will involve an outlay of £100,000. All the local authorities in East Northumberland will be invited to co-operate. The scheme embraces the conveyance of water from Tosson springs in the Rothbury hills. About 21 years ago a project of a similar nature was formulated by Mr. Hugh Taylor, of Chipchase Castle, but was abandoned.

On Wednesday last an official inquiry in reference to the application of the Fareham Urban District Council to borrow £1,900 for the purpose of electric lighting, and £415 for street improvements, was held at Fareham by Mr. F. H. Tulloch, M.I.C.E., an inspector under the Local Government Board.

The vestry of Islington will take a poll of the ratepayers, on January 15th next, on the question of adopting the Free Libraries Acts. Mr. J. Passmore Edwards has offered to give a donation of £15,000 for the foundation of a central and two branch libraries in the parish if the Acts are passed.

A new organ was opened at Immanuel Church, Broad-street, Birmingham, on Friday, the preacher being the Bishop of Coventry. The organ has been built by Mr. W. J. Bird, of St. Luke's-road, in that city, and in its present state has cost £350.

An agitation has been in progress in the Isle of Man for some time with the object of securing tree planting in the island, it being felt that a greater abundance of timber would improve the Manx landscape and climate. A number of landed proprietors interested in arboriculture waited upon Lord Henniker, the governor of the island on Friday. A society to promote tree planting was formed, with the governor as president and the Bishop of Sodor and Man as vice-president, and a strong committee, with power to add to its number, was chosen.

Portman Chapel, Baker-street, was greatly damaged by fire on Sunday. The greater portion of the gallery was consumed, and the fine organ upon it was greatly injured.

A new font has just been placed in All Saints' Church, Wolverhampton, the materials employed being a combination of red Dumfries and yellow Mansfield stone, the colours forming a very effective contrast. The font is quatrefoil on plan, the bowl being supported by columns rising from a base of the same shape. Around the bowl is the inscription, "Suffer Little Children," &c. The work has been well executed by Messrs. Jones and Willis, of Birmingham, London, and Liverpool.

LIST OF COMPETITIONS OPEN.

Bootle—North Board School for 1,000 children (local architects only)	No premium	F. K. Wilson, Clerk, Balliol-road, Bootle	Nov. 11
Sunderland Corporation—Artisans' Dwellings (for 450 persons)	£50, £30, £20	Fras. M. Bowey, Town Clerk, Sunderland	" 14
Stamfordham and Hawkwell Drainage Plan	£10	Geo. Wilkinson, Clerk, 27, Mosley-street, Newcastle-on-Tyne	" 14
Sunderland—Workmen's Dwellings	£50, £30, £20	Fras. M. Bowey, Town Clerk, Sunderland	" 14
Darlington—Laying-out Southend Estate	£35, £15	R. C. Pearce, Estate Agent, Darlington	" 20
Douglas, I.M.—Municipal Buildings (£10,000 limit of cost)	£10, £20, £10	T. H. Nesbitt, Clerk to Guardians, Gateshead	" 21
Shotley Bridge, Co. Durham—Cottage Homes for Children	No premium	Geo. Craighill, Town Commissioners' Office, Darlington	" 23
Peel, Isle of Man—Approach Road to Shore-road	£20, £10, £5	J. K. Stone, Secy. 39, High-street, Newport	" 30
Newport, Mon.—Hospital (£16,000 limit of cost)	£100, £50	Philip J. Kent, Rhos Abbey, North Wales	Dec. 1
Rhos-on-Sea, Colwyn Bay—Laying-out Building Estate	£50, £30, £15	Wm. Smith, Clerk U.D.C., Town Hall, Weston	" 5
Weston-super-Mare—Pavilion at Knightstone (£5,000 limit)	£250, £150, £120, £75, £32	Imperial Society of Architects, 83, Quai de la Moika, St. Petersburg	" 10
Kieff, Russia—Theatre (£48,000 limit, 1500 seats)			" 15
Liskeard, Cornwall—Rebuilding Tower, Parish Church (£3,000 limit)	£50 (merged in Commission), £25	Nettle and Bone, Hon. Secs., Liskeard	Jan. 1
Sunderland—Technical School (£18,000 limit of cost)	£100, £50, £25	Fras. M. Bowey, Town Clerk, Sunderland	" 16
St. Gilles, near Brussels—Town Hall (£42,000 limit of cost)	£160 and two lesser premiums	Municipal Authority, St. Gilles, Belgium	Feb. 1
Osgodby, Lincolnshire—Wesleyan Chapel & Schools (cost £600)	No premium	E. H. Davy, Secretary to Trustees, Kirkley, Market Rasen	"
Kirriemuir, N.B., Parish Church Hall			"
Kesteven District Lunatic Asylum (C. H. Howell, Assessor)			"
Eccleshill, Bradford—Sewage Disposal	£20, £10	Jos. Richardson, Clerk, U.C., 4, Town Hall-square, Bradford	"
Barry, Glam.—Municipal Buildings (£10,000 limit)	£100, £50	Clerk to Urban District Council, Barry	"
Chapel, Cropton, near Pickering		Robert Harland and T. Pickering	"
Warmley, Bristol—Out-Relief Offices	10gs., 5gs., 2½gs.	S. F. Andrews, Clerk to Board of Guardians, Keynsham	"
Scarborough—Higher Grade School (E. R. Robson, F.S.A., Assessor)		Clerk to School Board, Scarborough	"
Leicester—Isolation Hospital (Local architects only)	£100, £50, £25	Borough Surveyor, Town Hall, Leicester	"

LIST OF TENDERS OPEN.

BUILDINGS.

Middlesbrough—Eight Houses	—, Oates	R. Lofthouse and Son, Architects, 62, Albert-road	Nov. 2
Tintagel—Pair of Villas		Wise and Wise, Architects, Launceston	" 2
Greeland, Halifax—School	U.D. School Board	Horsfall and Williams, Architects, 15, George-street, Halifax	" 2
Wattstown, Rhondda Valley—Vestry, C.M. Chapel		Rev. J. Morgan, Garig-road, Ynysyhr	" 2
Ongar—Additions to Workhouse	Board of Guardians	Chas. Smith, Clerk, Town Hall, Ongar	" 2
Moiville, Ireland—One House		Miss Mary O'Brien, Montgomery-terrace, Moiville	" 2
Newbury—Additions Primitive Methodist Chapel	Trustees	W. H. Bell, Architect, Market-place, Newbury	" 2
Mansfield Woodhouse—Nine Houses	Burial Board	A. J. Curslow, Leeming-street, Mansfield	" 2
Keighley—Urinals, &c., at Cemetery	Board of Guardians	Barber, Hopkinson, and Co., Architects, Keighley	" 2
Bingley—Hotel on Rombold's Moor	Lewisham Board of Works	H. and E. Marten, Architects, 5, Charles-street, Bradford	" 2
Bolton—Extending Casual Wards	Committee	Simpson Cooper, Clerk, 28, Mawdsley-street, Bolton	" 2
Lower Sydenham—Brick Wall (1,500ft.) at Depot	London County Council	Surveyor, Catford, S.E.	" 3
Ulverston—Alterations to Oddfellows' Hall	Pontypridd School Board	J. W. Riley, Upper Sun-street, Ulverston	" 3
Holborn—Working-Class Dwellings, Brooke's-market	J. W. Brown	C. J. Stewart, Clerk, Spring-gardens, S.W.	" 3
Hopkinstown—Additions to School		D. M. Jones, Clerk, Pontypridd	" 3
Bridlington Quay—Stable, &c.		J. Earnshaw, Architect, Bridlington Quay	" 3
Brymbo—Additions to Welsh Presbyterian Church	Co-Operative Society	T. G. Williams, M.S.A., 3, Cable-street, Liverpool	" 3
Bradford—Reconstructing Star Inn	Building Committee	S. Jackson and Son, Architects, Tanfield Chambers, Bradford	" 4
Haworth—Stores in Main Street	Board of Guardians	Haydn Parker, Secretary, Haworth, Yorks	" 4
Midhurst—Church Hall	North-Eastern Railway	Arthur G. Gibbs, Architect, Langford House, Midhurst	" 4
Bangor—Alteration to Workhouse	Robert Bland	R. B. Evans, Clerk, Union Offices, Bangor	" 4
Northallerton—Alterations to Passenger Station	Official	C. N. Wilkinson, Secretary, York	" 4
Morecambe—Boarding House		S. Jackson and Son, Architects, Tanfield Chambers, Bradford	" 5
Woodstone, Hants—House		Wm. Boyer, Architect, 10A, Corngate, Peterborough	" 5
Belfast—Parcel Post Depot		P. J. Tuohy, Secretary, H.M. Office of Public Works, Dublin	" 5
Keighley—Additions to R.V. Drill Hall	Co. Gloucester Bank	Judson and Moore, Architects, York Chambers, Keighley	" 6
Barry Dock—Bank and Post-Office	Estate Committee	Gethin and Wallis, Architects, Windsor Chambers, Cardiff	" 6
Nottingham—Twelve Almshouses, Woodborough-road	Langley Brothers	Arthur Brown, Borough Engineer, Guildhall, Nottingham	" 7
Nuneaton—Premises in Bond-street		Guest Luchett, Architect, Aylesbury	" 7
Llanely—Bethel Chapel-schools	Pease and Partners	Thos. Job, Gorphwysfa, Llanelly	" 7
Ushaw Moor, Co. Durham—Thirty-five Cottages	Corporation	W. Oughton, Crook, Co. Durham	" 7
Leamington—Greenhouses	Law and Crown Insurance Co.	W. de Normanville, Borough Surveyor, Leamington	" 9
Bristol—Insurance Offices, Clare-street	School Board	Hy. Williams, Architect, 24, Clare-street, Bristol	" 9
Little Ilford—Essex-road Schools	Corporation	J. Turner, Clerk, 759, Romford-road, Manor Park	" 11
Berwick-on-Tweed—Engine-House Additions	Joint Sewage Board	W. Weatherhead, Clerk, Berwick-on-Tweed	" 14
Haslingden—Sewage Disposal Buildings	Great Northern (Ireland) Railway	R. W. Bugler, Clerk, West View, Haslingden	" 14
Lurgan—Station Buildings and Roofs	Great Northern (Ireland) Railway	T. Morrison, Secretary, Amiens-street, Dublin	" 16
Lisburn—Station Buildings and Roofs	Anglesey County Council	T. Morrison, Secretary, Amiens-street, Dublin	" 16
Llangefni—County Buildings	Devonshire County Council	C. M. Roberts and Son, Architects, Portmadoc	" 24
Bideford—Police Station	Corporation	H. Michelmore, Clerk, Exeter	" 25
Bristol—Alterations to Fish Market		J. Thomas, City Surveyor, 51, Prince-street, Bristol	"
Leeds—Two Houses and Shops, Dewsbury-road		Percy Robinson, Architect, 72, Albion-street, Leeds	"
Kirkby Overblow—Additions to School		T. E. Marshall, Architect, Harrogate	"
Belfast—Business Premises, St. Peter's Hill		J. Armstrong, 16, Shankhill-road, Belfast	"
Chopwell—Two Houses and Shops		T. Atkinson, 6, South-avenue, Ryton-on-Tyne	"
Harrogate—House in Duchy-road		J. M. Fawcett and Son, Architects, 96, Albion-street, Leeds	"
Devonport—Block Floor to School	Female Orphan Asylum	G. Luff, Architect, 64, Chapel-street, Devonport	"
Aldershot—Queen's-road School	School Board	Clerk to School Board, Aldershot	"
Standish, Wigan—Additions to Grammar School	Governors	H. Lord, Architect, 47, John Dalton-street, Manchester	"
Leeds—Shed, Park-lane (3,000 square yards in area)		J. J. Mosley, 6, Wormald-road, Leeds	"
Tonbridge—Business Premises, High-street	Hartington School Board	W. H. Cuthbert, 192, Upper Grosvenor-road, Tunbridge Wells	"
Buxton—Additions, Harper's Hill Schools	School Board	W. R. Bryden, Architect, 1, George-street, Buxton	"
Coventry—Additions, Earlsdon School		G. and I. Steane, Architects, 22, Little Park-street, Coventry	"
Aberthaw—Mission Room		Seddon and Carter, Architects, St. Mary-street, Cardiff	"
Stotfield, Elgin—Villa		Reid and Wittet, Architects, Elgin	"
Belfast—Extension, &c., of Licensed Premises	W. J. Martin	W. J. Moore, Architect, Ann-street, Belfast	"
Kegworth—Erection of Inn		W. T. Hampton, Brook House, Loughborough	"
Leeds—Two Houses		Percy Robinson, Architect, 72, Albion-street, Leeds	"
New Leeds—Four Houses		J. Chas. Spivey, Dagnar House, Roundhay	"
Leeds—New Stables	Burgon and Co.	Walter A. Hobson, Architect, 82, Albion-street, Leeds	"
Nottingham—Pulling Down and Erection of Turkish Baths	Nottingham Turkish Bath Co.	Brewell and Bailey, Architects, Angel-row, Nottingham	"
Overseal, Leicester—Erection of an Hotel	Marston and Son	W. T. Hampton, Brook House, Loughborough	"
Sheffield—Erection of Houses	A. Longmuir, Walkley Bank, Sfield.	James C. Haller, Savile Town, Dewsbury	"
Tonbridge—Business Premises	W. Hodgskin	W. T. Cuthbert, 192, Upper Grosvenor-road, Tunbridge Wells	"
West Cross, Swansea—Currant Tree Inn		T. P. Martin, Architect, Northampton Chambers, Swansea	"
Woodlesford—Houses	Corporation	W. Simpkins, Swan Junction, Hunslet	"
Bristol—Alterations to Fish Market	Norfolk County Council	J. Thomas, 51, Prince-street, Bristol	"
Norwich—Caretaker's Cottage at Shire Hall	Board of Guardians	Chas. Foster, Clerk, Shire Hall, Norwich	"
Morley—Six Houses	Harbour Board	H. Pearson, Britannia-road, Morley	"
Market Harborough—Board-room		R. and J. Goodacre, Architects, 5, Friar-lane, Leicester	"
Londonderry—Shed Extension, Prince's Quay		E. A. Hamilton, Secretary, Londonderry	"
Smithston, Greenock—Gatehouse		Boston and Menzies, Architects, 11, William-street, Greenock	"
Sheffield—Corner Shops, Pinstone-street		Holmes and Watson, Architects, St. James's-road, Sheffield	"
New Mills, N.B.—Police Station	Ayr County Council	Shaw, County Buildings, Ayr	"
Leeds—Wesleyan Sunday Schools, Cardigan-lane	W. B. Skinner	G. F. Danby, Architect, 46, Great George-street, Leeds	"
Higham Ferrers—Four Houses	Committee	A. Skinner, A.R.I.B.A., 45, Finsbury-pavement, E.C.	"
Exmouth—St. John's Church, Restoration		Kerby and Ellis, Architects, Exmouth	"
Bridford, Devon—Rebuilding Harriers' Inn	Sir J. W. Ramsden, Bt.	J. Sherman, Bridford	"
Byram, Yorks—Range, Glass Houses	L. H. Hatting	E. Bernard Wilson, Estate Office, Sutton, Ferrybridge	"
Hornchurch, Romford—Two Houses		F. C. Tyas, 162, Brixton-hill, S.W.	"
Leeds—Four Houses in Harehills-lane		Geldard and Ward, Leeds	"
Kirkstall, Leeds—Two Brick Houses, Vesper-lane		Robshaw and Son, 7, Upper Fountains-street, Leeds	"
Tlandrindod Wells—Additions to Pump House Hotel		A. B. and W. Scott Deakin, Shrewsbury	"
Nechells—Erection of Works	Fairbank Wood Kim Co., Limited	Henry Hendriks, 43, Waterloo-street, Birmingham	"

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GROOVES OF CUSTOM.

CUSTOM exercises a powerful restraint on invention in the arts as in other things. In architecture and building construction, the force of custom, or what Tennyson has called "links of habit," has formed styles as distinctively as it has given us schools of painting, because it is only by the restraining influence of custom that tastes and opinions become, so to speak, crystallised into forms and types. Without custom there would be nothing to hold together the heterogeneous opinions and practices of individuals. But there is a limit beyond which a custom, however good in itself, may become hurtful; and it is this excess of what is customary and usual that has much interfered with both architects and workers. It has, to a certain extent, stifled invention, and has become rather a hindrance to progress by nipping at the bud any new idea or better mode of doing a thing. The main idea seems to be to conform to some standard, not to do anything which has not been done before, or that is unusual, and hence it is that artists and craftsmen are contented to go on repeating a method of designing or doing work which, after all that can be said for it, is not the best. Men are taught to do a thing in a certain way, not to do the best in the circumstances, or their best under certain conditions, and this conception underlies the failure of much of our work. No higher standard can be attained under this rule, and were it not for the few men who voluntarily break through it and make an effort to do something better, our architecture, construction, and artistic work would sink to a dull level of conformity. There are plenty of men in every vocation that will never rise beyond the bare obligation to perform work in this mediocre sort of way. An architect instinctively follows this rule when he has a design to make for a particular building. If he follows a certain plan which has been found to answer the expectations of his clients, he satisfies his own mind. The usual sort of elevation is adopted, not because it expresses its purpose honestly, but because it is the regulation or conventional form that has been accepted. The copyist is permeated with this desire not to depart from precedent; as a "fool of habit" he thinks he can do worse than copy, and so he may if he can point to bad originals, which he is seldom able to do. The critical faculty is somehow generally absent in these followers of traditional custom; they do not know always why a thing is done; they often, as is pointed out in the Report of the City and Guilds of London Institute, "substitute second-hand knowledge—often erroneous—for first-hand knowledge." If they cannot distinguish between good, bad, and indifferent work or design themselves, they cannot expect the public to do so, for we are told on good authority "the public never think." They tacitly accept what is given them. Our architecture is sadly ruled by these conventions. The client wants something like Mr. So-and-So's house. Business premises must be designed to accord with other buildings of a similar kind, and for an architect to attempt to do anything different is to incur displeasure or ridicule. Imagine what an architect would subject himself to if he boldly ventured to design a building in a Hindu or Japanese style, modifying these styles as he may to suit requirements. He would be thought a fool

or a fanatic. Such buildings as Nash's Pavilion at Brighton and the Egyptian Hall, Piccadilly, were innovations which caused a great deal of ridicule, and were denounced in no measured terms at the time of their erection, and every set of revivalists—the Gothicists, for instance—were exposed to much obloquy when they made a new departure, and openly defied the custom of building in their day. It will be said that those departures from custom were mere revivals of style, and by no means rational examples, yet they show at the same time how very hard it is to throw aside the tradition or custom, how tenaciously the methods in use influence the designer's work.

Custom or convention will always rule the best work in architecture. There are certain forms and features which survive after the adventitious and accidental have been cast off which have a kind of recognition, as, for example, the columnar ordinances, pilaster façades, window-dressings, rusticated masonry, though even these may sometimes be introduced or handled with freshness. The designer of elevations reverts to these forms because he cannot think of anything better. No doubt often he would fain discard them for something more honest or rational, but then he has to consider how any innovation would be received. Honesty would often discard features in Classic or Gothic were they not recognised conventions found in the best examples. Useless pilasters, terminals, sham pediments, unnecessary window openings, even the use of ashlar or rustic masonry where brick and terracotta would be better, are cases to which we can point. Again, custom is too complacent with regard to things which have no necessary use in buildings. Buttresses, pinnacles, gargoyles, and the like are often placed where they are not wanted; arches are introduced where square openings would be better, and even ornament is used where only custom has sanctioned its introduction.

But the paralysing effect of custom is observed more in the constructive and technical branches. Lately we have had many opportunities of seeing the work turned out by the students of technical schools and classes under various organisations and societies, and there is one thing that is obvious to any critical observer—how much the students and workers follow "grooves"; how difficult it seems for them to work in any other way than that in which they have been accustomed. Take, for example, brickwork and masonry. The work turned out by candidates at most of the technical institutes is exceedingly clever and praiseworthy as specimens of handicraft and finish; no one can doubt for a moment the mechanical skill and labour that have been expended on the production of these samples of craftsmanship; the pupil evidently takes a great interest in doing the work well. At the same time, we are convinced that he has no idea why he does certain things—why, for example, he cuts and shapes his bricks and stone in the manner he does. It is a rule to him, more or less "rule of thumb," that he does so, and he does not trouble further about it. He is set to execute an elliptical arch or an oblique arch by certain rules which are given him, and these he follows with a care that is highly commendable; he finds his templates, the bevells for the soffit and extrados, but he does not trouble to consider the *rationale* of his method, or the geometrical principles involved in an oblique arch or an arch in a circular wall. So long as the student knows how to take off the bevells and moulds and apply them to the work he is contented; he pays more attention to the use of his tools, the rubbing-stone, hammer, "scriber," and other instruments, for these give the best results in competition. In proof of this lack of intelligence, the report of the work done by students at the City and Guilds of London

Institute just issued may be quoted in reference to those trades. The report says the papers submitted are far below the standard, the drawings are indifferently done, and the written answers "lack intelligence." "The candidates seem to have no idea *why* they do certain things."

In one question, No. 12 Ordinary Grade, it is said, "Only one was able to say why the ordinary method of striking joints is adopted by bricklayers," and more to the same effect. Faultless, regarded as specimens of execution as many of these works are, it must be presumed in many cases that they have been done in a rule-of-thumb manner, and that were we to ask one of the candidates if he could make a departure in the design, he would in all probability reply in the negative. The force of habit in the technical trades of building is all powerful in its controlling influence, and frequently suppresses any improvement and new idea. No doubt it is the main cause of the very conservatism of the building trade, which renders any new departure in design difficult. We remember the time when it was extremely hard to get a bricklayer to do a piece of gauged work, when the stuccoist had all his own way, when arches and niches and other features could only be done in rough brickwork and stuccoed; there were certain recognised ways of doing things. It was a hard nut for the joiner to crack when he was called upon to make a Gothic door or casement or any piece of joinery, for it entailed the disuse of the stereotyped framings and mouldings of the old Classic kind; while chamfering and stop-chamfers, diagonal boarding, and other details of the new style were required. The old-fashioned carpenter of the early "forties" who had been brought up in the school of Nicholson, fought hard against the open-timber framed roof, with its framed and wrought timbers and methods of jointing; for him the old "king"- and "queen"-post roofs were the perfection of scientific construction. The mason, too, had to be re-educated before he could be brought to understand the principles of Mediaeval masonry, or give up his ashlar and rusticated quoins for rubble walls and irregular "long-and-short" courses. The metal-worker, carver, and other trades all were hard to be convinced that the new or revived methods had any merit in them, so strong are those links of habit of which the poet of the "Prisoner of Chillon" sings:—

The very chains and I grew friends;
So much a long communion tends
To make us what we are!

But this influence of custom is still strong amongst us. In speaking of the manual training in woodwork, the unanimous opinion of judges of work done for competition is that candidates too often try to copy or follow—in other words, adopt second-hand methods. Of them, as with all who are engaged in trades, we may say with Herbert Spencer, "Long-continued repetition makes voluntary action into involuntary"; they cannot really help the thralldom under which they work. Apprenticeship, public opinion, the desire not to be eccentric, all contribute to make the average workman what he is.

Inability to interpret drawings of architects is perhaps one of the causes which make him so unable to grasp any idea beyond his daily routine. He has little time to think or to give himself up to design, and we have noticed that the mechanical manipulator, the man who turns out the cleanest piece of work, is often the least capable of breaking through the trammels of his craft. We have hopelessly tried sometimes to discover any skill of adaptation in a piece of work like some of the interesting models of constructive woodwork and joinery to be seen in the exhibition now on view at the Carpenters' Hall, but have failed. Perhaps it is a most beautiful piece of handicraft—a door or

window in a circular wall, a shop-front, or a roof. The manual skill shown is of the highest quality, the joints are put together with minute accuracy, and the specimen is finished to a degree that is marvellous; but it shows little or nothing that is new in design or any skill in application. As a feat of workmanship it is above praise, but beyond this we cannot say much. We look at a number of square, spiral and oval balusters turned in hard and soft woods; they are turned out by the lathe clean and smooth and accurately manipulated, but we find fault with the proportions. The division of plain and turned portions is unsatisfactory; the heavy members in some cases are where the fine ones ought to be, and what is of even more importance, the student has neglected utility in his work which has no reference to its purpose or position. If it is a chair, one or two essential conditions are absent: it is awkward to sit on, the back is filled with meaningless carving and is uncomfortable, or the construction is faulty. We could multiply instances of this kind; and every exhibition shows how often the worker has misapprehended the problem, and tried to show his handicraft at the expense of his brains. We look with amazement at a wonderful feat of carving which a candidate has done at the Exhibition of Works of Wood-carving—of bramble-leaves and birds carved with such a dexterous hand that they have all the delicacy and realism of the leaf and plumage of the real objects. Yet these feats of manipulation have little value beyond: they are not specimens of the kind of work which a technical school should encourage. The test of utility is entirely ignored in these exercises of manual skill, to say nothing of the equally pernicious habit of falsifying the material, or of treating wood-carving as if it were leather. The more skilful the worker the less able he seems to be to master the principles of design. Excessive labour and finish seem to be almost inimical to any intelligent grasp of the subject, as we find them so often displayed in the work of men who have no idea but that common to their trade. The fact is one that ought to be impressed on the minds of instructors in our schools of art and technical classes. A class, it has been truly said, must run in grades, and the specimens of handicrafts we have lately seen turned out by those who compete for prizes very strongly confirm this view.

PIER FOUNDATIONS.

THE erection of high or heavy buildings has called for modes of foundation which are to a certain extent new. In this country the methods in use are few, and consist of concrete, piling, occasionally platform foundations, but in America several systems have been employed to meet the extraordinary demands. In Chicago, the erection of buildings of great height necessitated the employment of some means for spreading the footings over compressible soils, and iron and concrete were first used for which railway metals were adopted. Several layers of rails crossing each other and diminishing in number like brick footings were placed under piers and columns, each layer being filled up with concrete. This gave a solid footing, the iron rails imparting rigidity and cohesion to the concrete and preventing any yielding of the concrete over weak or compressible places. In course of time two or more layers of deep steel beams were found more economical than one, the beams taking all the load and spreading it over the soil. The concrete filling-in was not so coherent in this plan, and less reliance could be placed on it. The weight of the wall has a tendency to bend the centre of the beams and to raise their ends if not of sufficient depth. The beams should, therefore, be deep enough to settle evenly under the load, and

the architect must consider these transversely disposed beams under his wall as if they were supported in the centre and loaded equally from end to end. He must, in fact, consider the section inverted, and the beams ought to be calculated in the same manner as if they thus rested on a centre wall, and were equally loaded. If we suppose two layers of such beams, the weight of the wall will tend to bend those in the upper course which rest on the centres of the lower ones. The main weight, in short, will be borne by the outer beams of the lower layer, whereas if there is only one layer of beams the weight will bend their centres more than their ends. Let us imagine a pier of masonry carried on a footing of this description. There are two layers or courses of **I**-shaped beams, one layer crossing the other. In this case the pier will press with the greatest force on the centre of both sets of beams, the upper layer will deflect under the pier, and the lower beams the same. Tables are published by steel beam companies which give the safe projection on each side of wall or pier of these beams, which are placed about a foot from centres, and for varying bearing power of soil. The Carnegie Steel Company have published a table of this sort. Thus for a bearing power of ground of two tons per square foot, it is easy to find out the safe projection of beam in feet, and its depth will be at once seen. Of course, the projection will be determined partly by the thickness of wall, or the size of pier at its base, and the safe bearing power of soil. If a projection of 3ft. be allowed each side of the wall, the beam required is 8in. in depth, according to the table. But it may not be always possible to spread the footings to the extent required to distribute the load safely. In this case recourse has been had to piers of masonry, which are carried down to the rock or hard substratum. These wells or piers are isolated, and upon them steel girders are placed to carry the walls. Several lofty buildings in Chicago, Kansas, and other cities have been carried in this manner. One notable example of tall fireproof office buildings carried on piers and iron grillages is the Harrison Building, Philadelphia, the construction of which we lately noticed, in which the deep-webbed corner columns are used. In some cases the piers or "wells" of masonry are cylindrical. In one case they were of vitrified brick, 4ft. 6in. diameter, laid in hydraulic cement mortar, solidly filled in and well bonded. They were sunk to the required depth, and capped by cast-iron plates, and upon these caps rested the steel **I** beams which carried the walls. On the top of beams a $\frac{1}{2}$ in. plate was riveted, on which the brickwork was built, and the beams, which were placed in couples on each cap, were kept apart by cast-iron separators. The beams are filled in and incased in concrete, which extend below and on each side. When very great loads are taken by these masonry piers or wells they are reinforced by a core of 12in. **Z** bars, practically a column, resting on the rock bottom, and are built up with the wells, and pass through the cast-iron caps so that they are independent of the brick piers; thus the loads are directly transmitted to the rock substratum. Each division or section of the building is thus carried independently. It would be interesting to notice other examples of the brick pier or "well" system, many details of which have been published in our journal and in the pages of the *Engineering Record*. In New York the system of isolated pier construction has been largely adopted. The Manhattan Life Insurance Building foundations were a notable example of the method of sinking masonry piers to the hard rock, and these were constructed by the pneumatic caisson process. The large caissons were made in sections bolted together. These were located at their positions, calked, and roofed with heavy beams to form a platform, on which

the brick masonry was built. After a few feet had been thus built, the workmen entered the excavating-chamber, and began digging out the soil, which allowed the caisson to sink to the rock without disturbing the adjacent soil and buildings. Lateral "flow" of the soil was thus prevented.

EXHIBITION OF THE COMPANY OF TURNERS.

THE annual prize competition of specimens of hand-turning in wood, which were opened to view last week at the Mansion House, is rather smaller than usual; but the judges report that the exhibits show "no falling off either in quality of work or design," while the amateurs' work shows great improvement in quality and design. The subjects are of a more practical character—not so many turned vases in wood as formerly, nor so many articles of a merely ornamental kind. Certainly the Company are to be congratulated on this change. Without placing unnecessary restrictions in the way of competitors, the Company wisely invite workmen and apprentices to send in specimens of the ordinary works upon which they are daily employed, and the apprentices are advised to confine themselves to the more simple and useful class of works rather than more ambitious and decorated objects. Good drawing is rightly considered to be of the highest importance, and those exhibits which are accompanied by working drawings or sketches are given preference. The explanatory notes that are given on the conditions of competition are timely, and ought to be of value to those who compete.

The first prize, the Silver Medal and Freedom of the Company, and Freedom of the City subject to the consent of the Court of Aldermen, is awarded to W. Watson, of Finsbury Park, for a collection of spiral, square, and oval turned balusters. As specimens of turning in hard and soft woods these balusters are highly creditable; but we may take exception to the oval balusters from an architectural point of view, or to their practical use. The aggravation of profile at the angle where the arcs meet is unpleasant. In a few instances, also, the proportion of base and moulded superstructure is not agreeable; but, on the whole, the competitor has fairly won. In another prize collection of spiral and decorated balusters by Alfred Miller, of Walthamstow, we have, despite the excellent and clean work, and the ornamental patterns which have been produced by the lathe, much that is objectionable from an artistic point. The student has aimed more at ornamental effect, and the proportion between the plain bases and parts and the turned members is not always good. In one or two the finest members are in the base, and a want of relative value between mouldings and plain faces is apparent. The second prize, bronze medal and five guineas, has been won by Fred Powers, Andover, for an oak turned table, in which the top is made to lift up on a spindle regulated by a spring, and which can be used either as a card, smoking, or writing-table. The top is hollowed out by a series of mouldings round the outer edge, and by circles turned on the top surface of table. The legs are framed outside the under circular frame of table, and are made to curve outwards at the feet. The manner these are framed into the lower rails which form concave curves, giving room for the feet of persons using the table, is commendable. The third prize is awarded to T. W. David, of Cardiff, for a lock-rail for a drawing-room door. The motive of the design is a good one. The candidate makes the rail ornamental by a number of quatrefoils, which are backed on to American walnut. Hitherto it has been the custom to work tracery panels from the solid blocks, which, the author observes, causes the rail to split; but by turning them and then fitting them together on the darker wood ground, they are less liable, it is said, to do so—a point about which there may be a doubt. We must say, we prefer working the quatrefoils out of the solid. Certainly the effect of the oak panels on a dark ground is more decorative. A fourth prize is given to W. Gleeson, also of Cardiff, for a hall-lamp stand and two newels. The lamp-stand forms a massive-shaped newel of bold design, bored for a lamp. The middle portion forms a kind of inverted octagonal baluster, with straight sides instead of curved. The upper treatment and members are overdone.

We do not like the backs of hall chairs in oak by G. A. Alderton, which receive a sixth prize: they are very narrow, and filled with open turned circle work, and the manner of support behind is not pleasing. With regard to general excellence of workmanship, the work shows undoubted skill—conditions Nos. 1 and 3 are not so well fulfilled. John Howard, Newington Butts, takes a seventh prize for a collection of square balusters and lamp pillars in deal. These square balusters are of effective profile, the division simple, with well-designed sunk members and neck mouldings. There is also a quietness in the design, and conditions 1 and 3 are complied with. The oak solid bowl which gains the eighth prize seems to us objectionable in the form of zigzag ornament round the bowl at the top: these projecting angles appear to ignore the principle of fitness of ornament for the purpose.

The apprentices' work is very limited. The first prize has been taken by Arthur E. Howard, of Newington Butts, for a pair of oak candlesticks, and the second to L. G. Seegar, of Kingsland-road, N.E. The amateurs' work has decidedly improved in many respects. The case sent by the Rev. C. C. Ellison, of Bracebridge, Lincoln, containing specimens of ivory turning for a variety of ornamental articles—toilet and other boxes, cabinet frames—is a most interesting exhibit, and the extreme minuteness and delicacy of the ornamentation is almost a marvel of lathe-work, especially the eccentric surface patterns produced. The Company's Silver Medals for Mechanical Drawing have been given to students of the City of London School, Freeman's Orphan School, and Commercial Travellers' School. While the exhibition is encouraging to the Company, there is room for improvement in some of the more artistic conditions that have been laid down. Good form and outline is not yet attainable by all those whose excellence of workmanship and finish is unsurpassed. We here and there see a lack of proportion; as, for instance, in the balusters, the mouldings and decorative devices are not always dictated by a right motive; the turned members are sometimes exuberant, as there is a want of gradation and method in their distribution. Sometimes, also, there is a painful effort made to invent decorative forms, and to apply the art of turning to purposes for which it has little or no sympathy. Thus, for tables, chairs, and other objects the ability to turn may be called into account for those portions which admit of such treatment; but it is not always desirable to try and find in turning a motive for a design. The exhibition shows a great advance in many qualities. Cleanly-cut work, as left from the tool, is more conspicuous than polished and "faked-up" examples, and the company have wisely given preference to work showing cleanly-cut forms and mouldings, without the adventitious aids of glass-papery and polishing, so often resorted to in the early exhibitions. The practices of glass-papery, varnish, and polishing are generally resorted to disguise faulty turning and to correct mistakes. Hand turning, and those kinds of decorative turning combinations of segments, modes of "chucking" in which the tool is applied by the hand, which come under this head, are especially favoured, though the more mechanical and commercial forms are represented.

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

THE meeting-room of the Institute of Architects at 9, Conduit-street, W., was crowded on Monday evening, on the occasion of the opening of the sixty-second session, the visitors including, as usual on such occasions, a number of ladies.

In opening the proceedings, the President, PROF. GEORGE AIRCHISON, A.R.A., passed a high eulogium on the services and qualities of the late Mr. William Henry White, for the past eighteen years secretary of the Institute. In concluding, the President mentioned that Mr. White had bequeathed to the Institute his valuable library of architectural works and the whole of his drawings, and proposed a vote of condolence with Col. White, their late secretary's brother, and other surviving relatives, and of thanks to his executors. He also read letters of regret from M. Auguste Choisy, chief engineer of roads and bridges for France (who referred to Mr. White as "an ideal secretary, an artist, and a man of letters"), and from Mr. Charles Lucas, of Paris.

Mr. WILLIAM EMERSON, hon. secretary, read similar letters of condolence from the Glasgow Institute of Architects and the Dundee Institute of Architecture, and seconded the vote of sympathy, which was passed in silence. Mr. Emerson also announced the deaths of three other Fellows of long standing—Frederick J. Francis, Stephen Salter, and Robert Walker.

THE OPENING ADDRESS

was then read by the PRESIDENT, and was briefer than such deliveries from the chair have usually been. He remarked that those to whom all the fine arts are a closed book are apt to say, when pressed, "What do these much vaunted fine arts do for mankind? They merely help to while away an idle hour for those who profess to admire them." What they really do is this: they both instruct and charm mankind in the only way in which the bulk can be instructed and charmed; for the bulk of mankind have little time to spare from earning their living. Civilisation has been built up, as it were, grain by grain; it is like the coral reefs made by innumerable tiny and insignificant insects; but at last the reef defies the might of the stormy ocean; while the fine arts are the crowns of the different phases of civilisation. That nothing comes from nothing is nowhere more apparent than in architecture. The Greek temples are but glorified reproductions of the two-roomed Greek hut surrounded by a verandah. The Greeks, or, at least, the Ionians, were endowed with the gift of definiteness, before them unknown to the world, and saving them, the world was still imbued with vagueness. The Attic Greeks were blessed with a love of beauty, endowed with high intellectual capacities and with every artistic gift. When Vitruvius gave rough rules for obtaining some of the Greek optical refinements in buildings, his meaning could not be understood by any architect or scholar in Christendom from the days of Charlemagne until Wilkins published his solution in 1812; and it was left for my predecessor in the chair, Mr. Penrose, to prove to the world the existence of these refinements in the buildings on the Acropolis. These refinements have made the Parthenon, the Erechtheum, and the Propylæa like nature's work, which never palls; for by the prolonged study of them you only find fresh beauties and fresh wonders. It is quite refreshing to read the enthusiastic admiration of these monuments by so positive a philosopher as Renan. The Roman race, which was but a branch of the Greek family, may be called the practical brother, who seized on every invention of others that suited him, and who had the great art of welding together a vast empire of diplomacy and laws; as Professor Mommsen says, it is ridiculous to complain of the Romans because they could not carve like Phidias nor write like Aristophanes. The Romans were not born artists, but constructors, with a deep insight into the advantages of architecture, and who certainly achieved in their monuments dignity and magnificence. No artistically-cultivated person has passed those still remaining columns of the Forum of Nerva without being struck with their dignity, nor the Triumphal Arches of Rome without appreciating their magnificence; while, from the combination of harmonic proportions with dramatic lighting, the inside of the Pantheon produces the most sublime effect in Europe. What sublimity, vastness, and proportion will produce, when every scrap of moulding, sculpture, and colour has been destroyed, may be seen in the halls of Caracalla's Baths. The Romans brought the arch, the groined vault, and the dome within the pale of architecture. That continuation of Roman architecture we call Byzantine has not produced many effective exteriors; for St. Mark's at Venice owes its external charms to the middle ages. Structurally the Byzantines perfected the dome on pendentives, and invented the dome on a drum, which they often used to light interiors and passages. Byzantine interiors, however, are mostly wonderfully striking in their shape, often delightful by their carving, splendid from the effects of lovely marbles, beautiful inlays, and gorgeous mosaics; and charm us as well by their judicious lighting. The effect of vastness in Santa Sophia at Constantinople, with its dome "pendent by subtle magic," its suffused light, its peculiar and striking shapes, and the splendour of its decoration, make it one of the masterpieces of the world. Who would lose the glories of San Vitale or the delicate sweetness of the Monastery in the Fields; the plain and simple duomo of Torcello, or that jewelled casket of the West, St. Mark's?

Who is not thankful for the mosques and minarets of Cairo, for the gorgeous chambers and courtyards of the Alhambra, with their intricate patterns, modern stucco-work, and splendid colouring? In Romanesque days architects were only learning to build and to design, but they were great men with grand thoughts. Who has not been struck with the Romanesque churches of Germany, with the doorway of Rochester Cathedral, with the naves of Durham and Southwell, and with the apse of Strasburg? Who would lose the fronts of St. Trophime at Arles, and St. Gilles, or the north-west doorway of the Cathedral of Rouen, if, indeed, this last can be called Romanesque? At the emergence of Gothic in the 13th century, the architects had learned to build stone ceilings to churches in the shape of vaults, and to abut their thrusts by flying buttresses, and eventually to use stone with a mastery that was never possessed before or since; though, perhaps, a greater mastery over iron has been shown by our civil engineers. The Gothic architects were too, perhaps, the most logical that the world has seen, and they lived at a time when the Greek and Indian geometry and mathematics were not only fashionable accomplishments, but studies for which there was a passion; and doubtless the Saracen buildings the Medieval architects had seen gave them the idea of rivaling the monuments of their enemies, for it must be borne in mind that at the time of the Crusades the Saracens were the most civilised people in the world. Men's minds in the West were then filled with a mysterious and terrible theology, while architects then realised that their knowledge, skill, thoughts, and aspirations could only be expressed by building. We see how the violent emotions of hope and fear and of adoration amounting to ecstasy were expressed by interiors of disproportionate height, by lofty towers, spires and pinnacles, by tracery as mysterious as the eddies of a stream and relatively to the monument as fine as a spider's web; while the sculptor lavished his work on every part that was to be ornamented. There was then a passion for the excessive and the mysterious, and a striving after the apparently miraculous. No architect ever goes into a Gothic cathedral without asking himself why it does not fall down. Architecture has never been so closely and persistently studied for so many centuries by energetic races, unfettered by national or clerical conservatism. Besides this, architecture and its accompanying arts then offered the only career except fighting to men who wished to exert every mental power without the fear of imprisonment and torture, or of death by fire. Who is not thankful for these pages of history, in which the thoughts, tastes, and aspirations and terrors of the Middle Ages are, as it were, petrified for our observation and delight, and are spread over all Europe, even to the Fortunate Islands? Who is not thankful for Notre Dame, for Amiens, Rheims, Coutances, and Rouen; for Lincoln, Salisbury, York, and Peterborough; for Toledo and Seville, and for the Cathedral of Las Palmas; for the town-hall and the Cathedral of Siena; for the hospital and for the bell-tower of Giotto? If we want to have a corroboration of Medieval history as written in its buildings, we have but to read Dante, one of the few great poets of the world, in whose Divine Comedy the spirit of the 13th century is enshrined. Even in Dante's days a new phase of life was being prepared. Sculpture even then had got new life from the study of Roman remains, painting had begun to throw off Byzantine fetters, and there was a hungering after a knowledge of Greek, as the fountain from which Rome drew her inspirations. The whole vista of the life of classical antiquity was opened out to the Italians, and this world seemed to them suddenly changed from a prison full of misery and terrors into a lovely and fertile valley to be admired and enjoyed. They saw Greece and Rome bringing the uncivilised people of the earth to live under law, and teaching these savages the advanced arts of life. The Italians found in the classic writers a style they longed for but despaired of attaining. A skill and idealism in sculpture, in die-sinking, and in gem engraving, that threw them into raptures; monuments and ruins of a magnitude and majesty that astonished and charmed them, and an unchecked and blameless pursuit of all the pleasures of this life, not to speak of perfect freedom in the unravelling of the mysteries of Nature. Is it surprising that they fell down before the feet of the ancients and worshipped them? This attitude was natural, though unfortunate; still we have lovely work by the

quattro and early cinquecentisti, who were mostly goldsmiths, sculptors, and painters, though it was certainly not progressive architecture. The host of lovely things at Venice alone would be too long to enumerate, from the Church of Santa Maria dei Miracoli to the Palazzo Vendramin; but there are beautiful monuments throughout Italy—the inside of Alberti's Temple to Isotta at Rimini, the Cancelleria and the Church of Santa Maria del Popolo at Rome, by the divine Bramante; the town hall at Brescia, the Casa dei Signori at Verona, and the beautiful palaces at Piacenza. Many of the 16th-century monuments, though heavier and duller than the earlier ones, in certain respects, excite our admiration. They were built after Vitruvius' work had been rediscovered and read, and his work was supposed to be a book of receipts for true architecture, to be illustrated by the Roman ruins that had been measured. In spite of its glaring faults the Palazzo Farnese is a majestic monument. The Pesaro Palace and the church of Santa Maria della Salute of the 17th century, though somewhat Rococo, will keep Longhena's memory alive. In London we have the portico of St. Paul's, Covent Garden, by Inigo Jones; St. Paul's Cathedral and the steeples of Wren, now alas! fast disappearing; Somerset House by Chambers, Newgate by Dance, the Bank of England by Soane, University College and the National Gallery by Wilkins; though those last two were after the Grecian revival. For the charming grafts of Revived Classic on Gothic structures, we must go to France, to Flanders, to Spain, to Portugal, and to Southern Germany. Who has failed to be grateful for Blois? That side of the palace that faces St. Vincent's-square is a masterpiece. There are, too, beautiful monuments of the Early French Renaissance, including Chambord, scattered all over France; and we have Wollaton Hall in England. All the lessons that architecture has to teach have by no means been exhausted. It is, perhaps, more than any other fine art, the expression of the tendencies of the age in which its monuments were built, and this has not as yet attracted the attention of philosophers, though I think it will receive their attention in the future. If Cuvier could construct the effigies of extinct animals from one of their bones or talons, surely in the future philosophers will be able to learn the skill, the tastes, and the tendencies of an epoch from its architectural monuments. When the architecture is genuine, more of the character and taste of the people and the tendencies of the age can be learned from it than from paraphrases of deceased architecture; yet even these show the acquirements of the architects and sculptors, the skill of the workmen, and some of the tendencies of the time. To wantonly destroy these built records is worse than to burn unpublished written ones, as the monuments contain much more history than most written records, and in destroying them you destroy an important lesson that is read to all, the embellishments of a city and a perennial honour to the country. "The accursed greed of gold" is destroying all the virtues of our people, as it did those of the Romans, and makes it hold nothing as sacred where gold is to be got by its destruction. The beautiful Hanover Chapel in Regent-street, designed by C. R. Cockerell, the most refined and accomplished of modern architects, is now being pulled down to make way for shops which pay heavier rates and taxes. The magnificent church of St. Mary Woolnoth, the masterpiece of Nicholas Hawksmoor, is threatened with destruction for a railway station. If this ignorance of the value of architectural monuments is not dispelled, and the greed of gold continues, those who live long may witness the conversion of St. Paul's Cathedral and Westminster Abbey into stations or railway junctions. A genuine architectural style is evolved in this way: from the shapes and sizes buildings take to suit the wants for which they are built; from the exigencies of the materials used; from the shape of the roofs, to protect the inside from rain, snow, or heat; from the size and grouping of the windows, according to the needs of the chambers and the intensity or dimness of the light; from the uses of the doors; from the external provision for shade or shelter; from the original type from which the building was taken; from the constructive skill of the architect; from the æsthetic sensibility of the nation, and the particular direction it takes; from the ability of the architect to evoke the emotions proper to the building; and from the amount of excellence arrived at by the sculptors and painters; for it is

obvious that if these arts co-exist in one building, each art must be of equal excellence to make a consistent and effective whole. Architectural styles are not the creation of a day, nor of a man; they are the alterations of the existing forms and arrangements to meet the new uses and the new tastes of the day. When the new generation is superior to the last, then architecture improves; when it is inferior, architecture degrades. The general taste of former people mostly persisted in the same line for centuries. We see this in Greek architecture, that rapidly arrived at perfection after the successful overthrow of the Persians, and gradually declined till Athens fell under the sway of the barbarous Macedonians. Architecture is a progressive art, but its progress is not always continuous, as nations, unfortunately, do not always improve, nor is their love constant to the same fine art. As long as architecture is alive some change is of its very essence, as each generation has not exactly the same wants and tastes as the one immediately preceding it; hence we see the foolishness of substituting antiquarianism for architecture, fixedness being substituted for natural motion, while a small knot of antiquaries settle what deceased architecture is to be chosen as the model. Once it was Roman work, then Greek, and since it has been Gothic, as if the wants, the knowledge, the skill, and the taste of this end of the 19th century exactly resembled that of the Christian era, of 450 B.C., or that of the 13th century. Deceased architecture is the architect's lesson book, as history is the statesman's, and poetry the poet's. Pleasant as it is to dwell on the glories and delights of deceased architecture, one cannot confine oneself to it when speaking to an Institute like this, formed for the furtherance of the art. It is doubtful if architecture was ever in its present condition, for there has mostly been a tradition or a belief, and never before has a knowledge of many deceased styles been so complete. With two deceased styles at least, Renaissance and Gothic, a large proportion of our architects are so familiar that they could build a paraphrase in either that might almost deceive a Gothic architect of any period, or an Italian of the Late Renaissance. This familiarity must to some extent tinge, if not modify, modern English work, and there is, as well, some superficial acquaintance with every style of importance that the world has known. The Roman architects of the early Empire had probably some knowledge of the architecture of Etruria, Greece, Asia Minor, Syria, and Egypt; at any rate, in Hadrian's days an Egyptian temple to Isis was built in the grounds of his villa at Tivoli. The Saracen architects must have seen the various styles extant in their day from Spain to India, and from the Gulf of Scanderoon to Cape Blanco, as well as the styles of Italy, and had some knowledge of one or more of them. At the end of the 11th century the Romanesque architects, when they went to the Crusades, must have seen most of the architecture of Europe, of Asia Minor, and Syria. Will a new style be developed by our successors as strikingly different from past styles as Saracenic is to Byzantine, or as Gothic is to Romanesque? We cannot help noticing that there are at present plenty of instances of the wildest originality, which have disregarded every architectural canon and every dictate of common sense, owing to a want of proper direction and training being given to the architects; but this complete architectural liberty, although it has drawbacks, has certainly given us some very charming work; and few would desire to go back to those dingy streets of brick, where each house was destitute of proportion, of mouldings, of features, or of any character, emotional or otherwise; but was a plain brick box with holes in it. We may say there are now explorers in every direction, but the real road has not yet been found. Some architects regret that architecture is not a pure fine art; why I cannot tell, for its aim is surely the highest of any of the fine arts—that of creating a perfect organism like one of nature's where every want is met, and where the building tells us for what particular use it was made, and where the sculptor, the painter, and the ornamentalist have combined with the architect to make the building tell its purpose most completely, and evoke the emotions proper to its use. I hope that our glorious art may in the future have still greater triumphs than it has had in the past; for, looking at our wider knowledge, our wonderful appliances, our new materials, our acquaintance with the powers of nature, the greatness of our empire and its position in the world, it may well be expected, if we

and our successors retain our self-denying and single-eyed devotion to our art. I hope that the nation will in the future take a deeper interest in architecture, feel prouder of its triumphs, and understand what it does for the country; and that the architects, casting aside archaeology except for study, may evolve a phase of art which fulfils the tastes and aspirations of the nation as completely as the Greek temples or the cathedrals of the Middle Ages once did; and surely this is taking a very modest view, for may not we who "rift the hills and roll the waters, flash the lightnings, weigh the sun," hope to erect monuments that will cast into shade the Greek temples by their exquisiteness and sublimity, and the glories of the Gothic cathedrals by their size, daring, and solemnity?

A vote of thanks to the President was passed, on the motion of Mr. F. C. PENROSE, F.R.S., Professor Aitchison's immediate predecessor in office, seconded by Mr. ALEXANDER S. MURRAY, LL.D., and supported by Col. LENOX PRENDERGAST.

ADAPTABLE SPECIFICATIONS.—XVI.*

PLUMBERS', BRASSFOUNDERS', AND SUNDRY WORKS: FACTS AND MEMORANDA.

IN this section it may be convenient to include not only works in lead, but those in zinc, brass, and copper. Moreover, one important part of a plumber's work is so vitally connected with drainage, that a plumbing specification, if it is to be easily intelligible, can hardly avoid some reference to stoneware pipes and similar things. In certain districts, again, where the water in general use is free, or nearly free, from sulphate of lime, it acts rapidly on lead pipes, and iron ones are usually substituted for them. It follows, from these facts, that the plumber's specification naturally absorbs into itself many stray details from other trades, and inevitably tends to become somewhat miscellaneous.

1. *Lead*.—This is chiefly obtained from the native sulphide, or *galena*. Its specific gravity is 11.45; in other words, it is about half as heavy again as pure iron, and about 10 per cent. heavier than silver. It is easily rolled into plates, or drawn into coarse wire. It is not much acted on by dilute acids, with the exception of nitric acid, and when exposed to the weather protects itself by becoming superficially oxidised. In pure water, however, and also in water charged with carbonic acid, it is dissolved with comparative rapidity. The water which has thus dissolved it is liable, when drunk, to produce lead-poisoning, so that lead pipes and cisterns are highly objectionable where the water is "soft," or nearly so. "Hard" water generally coats the metal with a thin film of insoluble sulphate of lead, which then acts as a protection. The various waters supplied by the London companies are found to do this, and lead pipes, therefore, are safely used in the Metropolis. But there are various other places—such, for instance, as Bournemouth—where they are quite inadmissible unless specially protected. Various kinds of protection have been tried, the most successful of which, probably, is the tinning of the interior.

WEIGHTS AND THICKNESSES OF SHEET-LEAD.

Lead weighing	3½lb. to the foot super.	is	$\frac{1}{16}$ in. thick
"	"	"	"
"	5lb.	"	$\frac{1}{8}$ in. "
"	6lb.	"	$\frac{1}{4}$ in. "
"	7½lb.	"	$\frac{1}{2}$ in. "
"	10lb.	"	$\frac{3}{4}$ in. "
"	12lb.	"	1in. "
"	14½lb.	"	1½in. "
"	29½lb.	"	3in. "
"	59½lb.	"	6in. "

In selling old lead it is customary to allow 120lb. to the cwt. Solder, if in considerable quantity, is cut out and sold separately.

Flats, Gutters, and Flashings.—In this class of work the expansion and contraction of the metal constantly need to be allowed for. Sheets not more than 2ft. 6in. or 3ft. wide, and drips not more than 7ft. or 8ft. apart, are desirable. The lead of gutters should extend at least 9in. under the slates and 6in. vertically on the walls. The flashings should be well wedged with lead wedges into a joint of the brickwork, and then be pointed in Portland cement. Where they are inserted into a groove or chase in stonework, they should be "burnt in"—or, more accurately, melted in—by forming a temporary clay trough under the chase, and then pouring in melted lead

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so as to unite with the turned-in edge of the flashing, and to fill the groove.

Where a sloping roof abuts against a wall, various ways of keeping the wet out are in use. One is to put on the slates a straight flashing from top to bottom of the roof, turned up in L-shape against the wall. A cover-flashing let into the joints of the brickwork, or into grooves in the stone, is then put over this all the way down. This is liable to injury by the wind, and not always effectual. Some plumbers, again, like to form what they call "secret gutters" in this position, which soon choke with dead leaves, dirt, or snow, and become a constant source of trouble. What are termed "soakers" probably make the best work; that is, pieces of lead so bent that one part of them works in like a slate between the slates themselves, and the other part turns up vertically against the wall. Of course, one soaker is required to each course of slating, and a step flashing, let into joints or grooves in the wall, is needed to keep water from finding its way behind them.

In lead roofs and flats everything should be avoided which would oppose the expansion and contraction of the sheets by heat and cold. Soldering, therefore, is to be dispensed with as far as possible, and sheets which lie side by side are connected by turning the edges of each over a wooden roll, or by folding them together so that the hook into each other. On steep roofs exposed to the sun, lead, unless secured in some way, is liable to "creep" downwards. This effect is counteracted by sometimes putting large screws with turned heads through the lead and the boarding on which it is laid, and then soldering over the heads so that the solder holds the screw and the lead together by a surface 2in. in diameter. This was done at Doncaster Church some 40 years ago.

The lead in ancient roofs being cast and not milled, had to be very thick in order to prevent the percolation of water through accidental holes and crevices in it. That at Canterbury Cathedral averaged about 12lb. to the foot super. The sheets were only about 2ft. wide, and, according to Mr. Burges, were connected by merely folding together the edges of the adjoining sheets, without the use of wooden rolls. At Lincoln the lead lining of the stone gutters was continued over the edge of the stonework and formed into an octofold ornament. Lead rainwater pipes and shoots, especially in the 16th and early 17th century, had a great amount of thought lavished on their artistic treatment, and fine examples remain at Haddon Hall and at Layton, Elton, and other old churches in Huntingdonshire.

Milled lead is prepared in sheets from 6ft. to 9ft. wide, and from 20ft. to 35ft. long. Cast lead, being liable to contain small holes, should not be used of a less weight than 6lb. to the foot. Lead pipes of large size are formed by dressing stout sheet lead round a wooden cylinder and then soldering the edges. Pipes of smaller size are made by pressing melted lead through a hole with a core in the centre of it, so as to form, as the lead solidifies, a continuous tube without a joint. Pipes connected directly to a water company's main require to be stronger than those which are merely supplied from a cistern. The Liverpool Corporation give the following:—

MINIMUM WEIGHTS FOR LEAD WATER-PIPES.

Supplied direct from the Main:—

$\frac{1}{2}$ in. diameter	7lb. per yard
$\frac{3}{4}$ in. "	11lb. "
1in. "	15lb. "
$1\frac{1}{4}$ in. "	18lb. "

Supplied from a Cistern:—

$\frac{1}{2}$ in. diameter	5lb. per yard
$\frac{3}{4}$ in. "	8lb. "
1in. "	11lb. "
$1\frac{1}{4}$ in. "	13lb. "

It is a good rule of this corporation that each house must have one tap on the supply pipe before it reaches the cistern, to draw water direct from the main for culinary purposes.

Soldering.—Plumbers' solders are composed of lead and tin. "Coarse solder," which melts at about 480° Fahrenheit, contains 2½ parts of lead to 1 part of tin. Ordinary solder, melting at about 440°, is composed of 2 parts of lead to 1 of tin. "Fine" solder melts at about 380°, and contains equal parts of lead and tin. By adding tin, and especially by adding a small quantity of bismuth, still more fusible solders can be made, and pewterer's fine solder, which consists of 1 part of lead to 2 of tin and 1 of bismuth, melts

below the boiling point of water. Lead by itself melts at 620°. Fine solders, which are used where strength is not specially required, are melted by a copper "bit." Coarse solders, on the contrary, which make stronger joints, are melted over the fire, and applied with a ladle.

Joints.—Several kinds are in use for pipes; but wiped soldered joints have the reputation of being the strongest. To form them, the end of one pipe is shaved to a thin edge and inserted in the other, which has been widened out to receive it. The solder is then poured on from a ladle, and wiped or smoothed into a rounded mass, inclosing the ends of the pipes, by means of a greasy cloth. It is very important that the solder should be used at the right temperature, so as not to be chilled by the cold lead. Care is also needed to prevent the interior of the pipe from being obstructed, or entirely choked, by solder which may find its way into it. Blown joints contain much less solder, which, in their case, does not surround the joint like a bulb, but is merely run in, by the aid of a blowpipe, between the shaved or rasped end of one pipe and the trumpet-mouthed termination of the other. Thin brass tubes, inserted for a short distance inside the pipe to be joined so as, in the joiner's language, to dowel them together, have also been employed. Solder is necessary even then, but the brass lining prevents any risk of its choking the pipe.

In flats lead should at the very least have a fall of 1in. in 10ft. In gutters 1½in. in 10ft. are usually allowed. A drip should be at least 2in. high. Soakers should extend laterally for about half the width of a slate, in addition to the part of them which is bent up vertically against the wall. Cover-flashings should overhang the lead they cover to a depth of at least 4in. Where lead has to be secured tightly to woodwork—which should be as seldom as possible on account of its expansion and contraction—"lead dots" may be used. They are made by slightly hollowing a place in the woodwork, dressing the lead into the hollow, driving a strong nail—or, what is better, putting a strong screw—through the lead and the woodwork in the centre of the hollow, and then filling up the depression in the lead with solder.

2. Zinc.—This metal is about 40 per cent. lighter than lead. It melts at 773°. Between 250° and 300° it is malleable, will bear rolling and hammering, and after being so treated, even retains its malleability when cold. Otherwise, it is brittle at low temperatures; and again, at 400° becomes so very brittle, that it may be reduced to powder. At a bright red heat it boils and takes fire, burning with a vivid green light.

Zinc for roofing purposes is commonly manufactured in rolls 7ft. long by 32 and 36in. wide; but sheets of rather larger sizes can be had. It should only be used of the very best quality, and not spotty or dark in colour. Other metals should not be placed in contact with it, as it is speedily eaten away by the electric action thus set up. "Galvanised" iron, which is really iron thinly coated with zinc, does not injure it in this way, at any rate, while the zinc film on the iron remains perfect. Sheet zinc should stand bending backwards and forwards without cracking. Zinc is injured by contact with lime and plaster of Paris; but not by Portland cement. A square of zinc roofing, to No. 16 gauge, weighs about 192lb. To save boarding, corrugated zinc is sometimes used. The flutings are frequently about 3½in. from centre to centre, and when of No. 16 gauge corrugated zinc may be laid on light purlins 2ft. 6in. apart. Corrugated zinc roofs should not have a flatter pitch than 20°. The top ends only of the sheets are nailed. Oak boarding should not be used in connection with any kind of zinc roofing. The boarding on which zinc is laid should either be put together with zinc nails or with small-headed iron nails hammered well into the wood so as not to touch the zinc, and the heads afterwards covered with putty. The salts from new brickwork will also destroy zinc, and in Paris, where zinc cisterns are inclosed by brick walls, it is customary to leave a small space between the metal and the brickwork, and to fill it with dry earth. Zinc expands and contracts with changes of temperature even more than lead, and very much, therefore, depends on the mode of laying it. Messrs. Braby's system, which is approved by the Vieille Montagne Zinc Co., is usually considered the most satisfactory one.

Gauges of Zinc.—The Vieille Montagne Co. recommend for roofing nothing lighter than their No. 14, which averages 18½oz. to the foot super., and for flats No. 15, at 21½oz., or No. 16, at

24½oz. With other manufacturers the same numbers of gauges imply different weights per foot from these.

NEW METHODS OF BUILDING CONSTRUCTION IN PARIS.

LEAVING aside for the time being practical work, as shown in the recent notes on the construction of the new building for the Society of Civil Engineers of France, it may not be uninteresting to learn the opinions and theories of one of the best-known Parisian architects' advocates of the large employment of new materials adapted and used in a rational manner in the construction of modern buildings. An interview with M. de Baudot, lecturer at the Trocadero Museum, was a most interesting one, and made known some of his views on the subject of rational architecture, which he is not displeased to learn will be conveyed to his younger *confrères* in England.

It is not possible to give here more than a *résumé* of the ideas and theories which this eminent architect entertains regarding the proper appreciation and study of a rational style of architecture—one naturally evolved from the reasonable employment of the various materials available in the present age, materials which are fit both in theory and practice for work of construction and decoration, and the proper reasoning out of these materials in their adaptation to meet the requirements and necessities of the present day.

The study of the architecture of past ages is one, opines M. de Baudot, which should well repay itself, provided, however, that all imitation be rigorously proscribed. The artist of to-day should not copy or servilely imitate the works of his predecessors, even though these works be considered as *chef-d'œuvres*. He should, however, carefully analyse them, in order to discover the motives and reasons which led to the method of construction and the style of decoration employed. There are only two or three epochs of the past ages which present themselves clearly as creative epochs. Foremost amongst these come the Grecian epoch and that of the Middle Ages, most of the other so-called styles of architecture being merely reminiscences of these few original epochs which were so remarkable for their fertility and for the novelty of construction deduced from a logical reasoning regarding the employment of available materials and the requirements of the social life of the age. Creation in architecture is the rational and logical utilisation of available materials adapted to the necessities of the climate and of the age. Greek art possesses all the characteristics of a creation; Gothic art is equally due to a reasoning creative genius. In the latter style new problems were solved by methods of which previous traces do not exist, and its ornamentation was dictated by the architecture itself. Each decorated stone was at the same time necessary for the stability of the whole, and was not merely an addition placed in the building for decorative purposes only; in a word, decoration and construction should be inseparable. Gothic architecture was, therefore, the natural outcome of a rational use of the materials which were found most available for construction, and the decoration of this style is as rational as its method of construction. Other epochs have certainly endowed posterity with remarkable works; but these periods may not be called "creative periods."

How different to the examples given by the builders of these two epochs is the current architecture of to-day! We have buildings which are more or less imitations or adaptations of the one or the other of these styles, and which very often, owing to the skill of the artist or designer, are pleasing to the eye both as regards proportion and decoration, and the plan is often suited to the requirements if it has not been sacrificed to the façade. But when we examine more closely the fitness of the plan to the style of architecture, the fitness of the style in respect to the materials employed, and again that of the style and plan together in respect to the locality, the climate and the necessities of the present age, how often do we notice that the designers and constructors of these buildings have utterly neglected all rationalism, and have evidently made no profit of what they have learned from the architects of past ages—either because they have studied the old examples in a superficial manner, or because they have neither the will nor the time to design and construct on rational lines.

It is not necessary to enter further into the subject of design and construction reasoned out from the materials usually employed, and the necessities of each special case. Our best-known architects have written and discoursed again and again on these points; but M. de Baudot goes further, and declares that we of the present day do not avail ourselves sufficiently of the various new materials now put at our disposal, the proper use of which would give quite a new character to our buildings.

It is the great misfortune of the present day that the artist is not at the same time a constructor. Here we find the stumbling-block arising from the fact that the preparation, and very often the erection, of our building materials is left to specialists, who, being quite apart from the designer or creator of the work, often ignore or care little regarding the decorative effect which might be drawn, and should result, from the proper employment of such materials when designed and studied by one and the same master mind. Iron, for instance, passes through the hands of the engineer specialist, who will carefully calculate the sections of a girder or truss; but in this case the rough carcase of metal is not available for a decorative purpose: it has to be disguised or covered with a decorative mask. In reality, the artist—the architect—should have the time and the will to design the metallic forms himself, studying at one and the same time both the stability and the decoration of the building; if this were done, new forms would be created which would be alike artistic as regards form, and logical as regards construction.

It would perhaps be going too far at the present moment to advocate a fusion of the schools of architects and engineers. It is, however, certain that with the materials of to-day and the available methods of construction, the chief designer of a building should be the absolute master of his work, and not find the necessity for intrusting to any other person the work of designing and calculating certain portions of the construction; a deeper study of materials would bring about the creation of new forms, and we should no longer have to deplore the mediocrity of our imitations of the present day.

Before the numerous exigencies of the age, exigencies which did not trouble our forefathers, it is strange that we still follow in their footsteps and continue in their errors, especially when to-day the science of engineering points out so many indications of new methods which we neglect, but which would perfectly comply with modern programmes. Speaking of dwellings only, apart from the æsthetic acceptance of art and architecture, it is evident that the methods of construction usually employed do not obey even the most elementary laws of common-sense and hygiene. It is evident that our builders are often more desirous of pleasing the eye than of assuring a real economy and the protection of the dwellers from the variations of temperature. In our large towns, both in private houses and public buildings, the outer walls which are visible from the street are built of massive stone of excessive and unnecessary thickness, whilst the courtyard walls and those which are out of sight at the back of the building are constructed of thin brick or of still slighter walls of iron and brick combined. In point of view of construction, we have here a proof of complete absence of reasoning, and in a hygienic point of view a cause of inequality of temperature in various portions of the same apartment or dwelling—a defect which is all the more absurd when it is considered that no account is taken of the proper thickness of the wall with regard to its orientation. In these same dwellings the health and comfort of those who may dwell in the topmost stories are sacrificed beneath roofs whose thin covering is a very imperfect protection from the variation of temperature in winter as in summer. Again, the floors are often of excessive thickness and of faulty construction, liable also to harbour dirt and germs of disease. Apart from the defects of walls, floors, and roofs, if we consider the manner and arrangement of the flues for heating and ventilating purposes, and the various apparatus for water, gas, and electricity, we find that evidently little thought was given during the preparation of the plans for the proper and reasonable position and arrangement of these various elements so indispensable at the present time; the result is a series of insufficient, incomplete, and badly-working installations, as unreasonable in their economy and work as in their pernicious action on the health of the dwellers. The architect of to-day should, therefore, in

order to avoid such errors, carefully consider the programme of the new problems and necessities, discuss and study the means and the methods at his disposal which would best enable him to accomplish his difficult task, and by making a close inquiry into the qualities and defects of various new materials available for construction and decoration, by combining and employing them in a rational spirit, he would ere long produce a modern style evolved naturally from the use of these materials, and put aside the heterogeneous mixture of imitations from the old styles, which were in their day, it is true, rational creations; but which to-day are neither reasonable nor logical.

Such in *resumé* are some of the opinions of M. de Baudot regarding the theory of a modern style of architecture evolved from the rational employment of modern materials adapted to the necessities of to-day. But, as this architect says, he who attempts the practical realisation of these theories will meet with many difficulties and checks often in places where he may least expect them. He himself, by force of will and untiring example, has certainly done much to put his theories to a practical test, as may be seen in the many interesting public and private buildings constructed according to his ideas, forming a series of architectural attempts at modernism which will in time help the *maître* or his followers in forming a new school of study as logical, but much more modern in theory, than that formed by his regretted master, Viollet le Duc.

He deplores the distance and want of sympathy between architect and workman, the lack of interest shown in the work of the latter, the difficulties which all new ideas meet with, and this age of hurry when artists and architects have not the time to leave the old methods and seek out the new.

The private house constructed and occupied by M. de Baudot, in the Rue de Longchamp, was one of the first of the practical tests put to his theories, and in this he has boldly endeavoured to employ with economy and logic the new materials and modern methods which industry has placed at his disposal. This dwelling, as regards its style of architecture, is very pure and harmonious in line and form, and excellent as regards the principle and practice of construction. It may be taken as a good example of the method of building, the resulting façades being excessively simple, the interior comfort and arrangements very complete, and the decoration of good taste. The chief materials employed and advocated by M. de Baudot are iron and cement, the combination of which produce a system of construction not only economical in itself, but permitting the realisation of further economies in the arrangement of the walls and the use of stone and other materials, whilst allowing the combination of three new methods—hollow walls, heating by means of the wall-surfaces, and construction by means of iron wire and cement; systems which have been much discussed during recent years.

In a further article we will examine this system of construction as applied to this dwelling-house, and compare it with the other methods now in use. Paris. ARTHUR VYE PARMINTER.

WROUGHT IRON AND STEEL IN CONSTRUCTIONAL WORK.—IV.

By JOSEPH HORNER.

STEEL is carbonised iron. The differences in many varieties of steel are due partly to the exact apportioning of the percentage of combined carbon present. But some inferior wrought iron will contain as much as, or more carbon than, the milder steels. Thus, a mild steel suitable for plates may contain about .11 per cent. of carbon, while an inferior iron plate may be found with .25 per cent. On the contrary, steel suitable for rails will contain from .35 to .60 per cent., and a soft wrought iron as little as .02 per cent. So that the percentage of carbon alone will not serve to distinguish iron from steel. These differences are largely due to the elimination in greater or less degree of the impurities which existed originally in the ores and in the fuel used in smelting. The purer a steel is, like iron, the more ductile it is. Steel containing a large proportion of foreign ingredients, as silicon, manganese, phosphorus, is stronger than a purer material, but less ductile, and it is, therefore, less adapted to the purposes of the engineer. The aim of the steel-maker is, therefore, to secure an almost chemically pure product, definitely car-

bonised. According to the composition, the results will yield steels which are of the finest texture, highly crystalline, dense, and capable of receiving almost any degree of temper and hardness, and the highest polish; and others highly ductile, which are not far removed in respect of this quality from the best wrought iron.

Practically the greatest difficulty with which the steel-makers have to contend is the imparting to the metal the exact percentage of carbon required for the special quality of steel which it is desired to make. One would be inclined to think it an easy task to stop the process of decarbonisation at a set period, but in practice it is not so. Hence the custom is to decarbonise the metal entirely—that is, convert it into wrought iron, and then add the precise amount of carbon required afterwards.

Within the memory of many of us the only steel obtainable was that which was produced laboriously in very small quantities. It was expensive to make, and was reserved for the best articles only, and articles of small size chiefly. It was called blister steel, shear steel, crucible steel, each term signifying methods or steps in the process of its manufacture. For a few moments we must advert to those, for the purpose of enabling us to understand the reason of the later processes, and also as describing methods of manufacture which are still carried on, though somewhat eclipsed by the vaster operations of the recently-developed steel-works.

The earliest steels made were, we may conclude by analogy, similar to the Indian wootz, which has been manufactured probably for thousands of years by the partial fusion of bar iron in contact with charcoal. But in its formation, as in the modern cementation process, there is one essential lacking—and that is uniformity of composition and texture. The fusion of wootz anticipated by many centuries the great discovery of Huntsman, but the temperature obtained in the Indian furnaces was never sufficiently high to insure perfect homogeneity. David Mushet, whose collected "Papers on Iron and Steel" have a classical interest for students of metallurgy, records an extensive series of experiments on wootz which he undertook at the request of Sir Joseph Banks. He found the cakes of wootz which were submitted to him to be variable in physical characteristics and chemical composition, almost ranging from malleable iron to cast iron; and he considered the want of homogeneity and of real solidity in almost every cake to be a direct consequence of the want of heat sufficiently powerful to effect a perfect reduction. If, as has been conjectured, the sword-blades of Damascus were made from Indian wootz (Percy, "Iron and Steel," pp. 185, 860), the lack of homogeneity of that material may possibly account for the wavy or watered appearance of the blades when acted on by acids. This appears more probable than the supposition that bars of iron and steel were alternately welded together. It is actually a very difficult task to weld steel of high temper, or that which contains more than about 1 or 1.25 per cent. of carbon.

For many hundreds of years there was little advance made in the method of manufacture of steel. The blister steel is made by a process of carbonisation, without fusion. It is produced by heating (without fusion) the purest wrought iron in contact with charcoal. This is termed the "converting" or cementation process, because the charcoal employed as the carbonising agent is termed cement. Bars of malleable iron, having a cross section of about 3in. by 3in., and ranging from 6ft. to 12ft. in length, are placed edgewise in layers in long troughs or pots of fireclay in a converting furnace, about an inch of space being left between the bars. At the bottom of each trough, and also alternating with each layer of bars, is strewn a stratum of charcoal broken into small fragments, and the whole is covered with the mud which collects in the water troughs of the Sheffield grinders. This is termed "wheel swarf" and being highly silicious it forms a glaze over the pots, excluding the air. The furnace is lit, and the temperature slowly raised until in about 48 hours the process of conversion begins. The temperature is high enough to melt copper (about 2,000° Fahr.), and is maintained constant during a period of from seven to ten days, the period being dependent upon the amount of carbonisation required. When the process is completed, as evidenced by a trial bar, withdrawn from time to time and broken, the furnace is allowed to cool down, previous to the withdrawal of the bars, as gradually as its

temperature was raised. When the bars are examined superficially, they present a rough, scaly, blistered surface, the protuberances ranging from about $\frac{1}{4}$ in. to 1 in. in diameter, which are due to the evolution of the gases generated by chemical reactions. Because of this appearance the term "blister steel" is applied to the product. The outside is of a brownish-yellow colour, and a fractured surface appears highly crystalline. The unavoidable differences in the characteristics of the products of the same furnace are apparent on an inspection of the fractured surfaces, and the bars are, therefore, assorted according to their several qualities. What has happened is, that the carbon (charcoal) has, in the form of gaseous oxide, penetrated into and amalgamated with the iron, converting the tough fibrous metal into a highly brittle and crystalline alloy of iron and carbon. At the time when the bars were put into the pots they were fibrous, and would bend double without breaking. When taken out they are crystalline in structure, and will break with a slight blow from a hammer. The slight amount of carbon in the original bars, perhaps less than $\frac{1}{4}$ per cent., has been increased to $\frac{1}{2}$ or $\frac{1}{3}$ per cent.

The blistered steel is of little use in its crude condition, from want of homogeneity, by reason of the presence of the blisters, the inter-mixture of laminae and scale, and from its excessive crystalline structure. Hence it requires to be subjected to further treatment to prepare it for employment in manufactures. It is therefore converted into tilt, or shear steel, by fagoting and hammering; or, further into double shear steel, by re-fagoting, re-heating, and hammering. Still, though very useful for forged work, there is a lack of uniformity in texture which renders the steel unfit for cutting tools, and for fine purposes in general. It is, in fact, steely iron, having many of the imperfections of malleable iron. It has been prepared by processes almost identical in outline with those used in making iron, except with the distinction that carbon has been added to it, while in a pasty condition, instead of having been abstracted from it. But in each case there has been no fusion, but chemical action operating through spongy masses of metal, and the imperfect separation of slag from the metal. Not until about the middle of last century was the practice of fusion resorted to in England. The methods for producing cast or crucible steel do not differ essentially from those devised by Huntsman.

To produce cast steel, the blister steel is broken into fragments, and piled in deep narrow crucibles with closely-fitting covers, containing from 28lb. to 50lb. each. A number of such crucibles are placed in pairs in fires in a steel melting-house, heated with coke, and subjected to an intense heat produced by a powerful draught. This effects the melting of the steel, which is poured or "teemed" into ingot moulds of cast iron. Bar iron or puddled steel are sometimes fixed in crucibles along with charcoal or spiegeleisen, or with both, thus saving the cost of conversion. In recent years crop ends of Bessemer and Siemens steel have been utilized for the same purpose.

It is clear that only comparatively small quantities of steel can be made at one time by the methods hitherto noticed, and that the cost must, therefore, be prohibitory for heavy constructions. The finest qualities of crucible steel can only be made of iron manufactured from Dannermora ore. The average cost of the iron alone for the last 40 years has been at least £25 per ton. Steel made by cementation and in crucibles being so costly, its use is limited to such articles as tools, implements, springs, files, &c. As the processes for its production have remained nearly unchanged, so its price is nearly what it was 40 or 50 years ago—viz., £50 to £60 per ton. Moreover, these early methods are only adapted for making steel of high temper, the conditions for carbonisation not being sufficiently under control for the production of the *mild* steels—that is, steels low in carbon. Although many patents for steel making had been taken out, the industry down to the year 1855, when Bessemer took out his first patent (No. 2321, "Improvements in the Manufacture of Cast Steel"), remained almost as Huntsman left it. The introduction of manganese into cast steel by Josiah Heath, in 1839, marked, however, a memorable advance in the manufacture. Previous to this date only the best Swedish or Russian bar iron could be employed in making crucible steel; but, by the addition of manganese, the commoner bar-iron of British manufacture was rendered available. Heath was robbed of his patent, and involved in ruinous litigation; but posterity has

reaped vast benefit from his discovery. It is not known in what precise manner manganese acts upon steel. It reduces the iron oxide, forms with silica a fluid slag, and tends, in a lesser degree than carbon, to harden the steel, and this represents all our knowledge of its mode of operation. But manganese is, nevertheless, a necessary constituent of all steels, and it is invariably added, in combination with carbon, in "spiegel" or "ferro," to all Bessemer and open-hearth steels. These steels, though made from the best possible materials, would, without manganese, break in pieces under the hammer, while after the addition of so small a quantity as 0.08 per cent. of manganese they become highly tenacious and ductile. The value of crucible steel is very great, not only for cutlery, but for the best castings. Until within the last few years nearly all the best engineers' castings were made in the commoner grades of this material. In the exhibition of 1862 Krupp had a block of cast steel 40,000lb. in weight, poured from 600 crucibles, broken in the middle to show the fracture, by means of the 50-ton steam hammer. Though the Bessemer and Siemens processes have either ruined or crippled some branches of the wrought-iron trade, they have not injured in the least degree the manufacture of the crucible cast steel. But the duration of the work, and the comparatively small quantities which can be operated upon at once, render it a very expensive mode of production, and practically prohibits the use of the article for all but the best and highest-priced wares. Hence for many years those interested in the manufacture of steel goods sought for some cheap and ready method of converting pig, or malleable iron, into steel.

Both the Siemens and the Bessemer processes are of a dual character—that is, the crude iron, contaminated with carbon, sulphur, phosphorus, silicon, and other foreign elements, is first decarburised, and purified by the removal of the major part of these ingredients, and then is recarbonised by the addition of a measured quantity of carbon. Here the broad similarity between the two processes ceases, the details being altogether different. Bessemer's method comes first in point of time. But it is curious that the reading of his paper "On the Manufacture of Malleable Iron and Steel Without Fuel," before the British Association on Aug. 13, 1856, was regarded as a wild joke, and was ignored by the Association, who would not print it in their *Transactions*. It is also curious that this was not the first attempt in that direction. Nasmyth had patented the employment of a jet of steam, which, by its decomposition, supplied air for the oxidation of the carbon in the iron, and this was carried out successfully. Further, in the important detail of the addition of spiegeleisen to the decarbonised iron, Mushet's patent, 1856 (No. 2219), had forestalled Bessemer's method.

In the original Bessemer converter, conducted on the acid process, the objectionable elements present in impure pig, with the one exception of phosphorus, are oxidised out by the direct action of atmospheric air blown through the bath of molten metal. The terms "acid" and "basic" relate respectively to the non-metallic or metallic character of the converter linings. Thus, silicon is acid, or non-metallic, being the oxide of silica. Lime is basic, or metallic, being the oxide of the metal calcium. The molten pig is run direct from the blast furnace into the converter, and there transformed into steel within the space of half an hour. Converters are worked in pairs. The converter, a pear-shaped vessel, is from 12ft. to 15ft. high, by 6ft. or 8ft. in diameter, and supported on swinging trunnions. The diameter of an 8-ton converter will be about 8ft. 4in. inside the plates and 6ft. 10in. inside the lining, the dimensions being taken at the zone of the trunnions. It is constructed of plates of iron, lined with firebricks, and the silicious, highly refractory material ganister. The bottom of the converter is pierced with twyer holes for the pouring in of a blast of air, the main pipe to which passes through one of the trunnions. The upper portion of the converter is narrowed, and slightly curved to prevent the escape of the contents when the blast is on. At the commencement of operations the converter is tilted upon its side, and the charge run in; then the blast is put on at a pressure sufficient not only to sustain the weight of the metal itself, but to blow right through it—usually 15lb. to 25lb. As soon as the blast is on, the converter is turned back into the vertical position, so that the molten metal is brought over

the twyer holes, and the process of deoxidising begins at once. The silicon and manganese are first attacked by the oxygen of the incoming air, being oxidised to silica and oxide of manganese, which go into the slag. The energy of the chemical combustion at the same time develops sufficient heat to maintain the metal in a liquid condition. Then the carbon is attacked, and burnt to carbonic oxide, during which period the whole of the contents of the converter are in a state of ebullition—hence the term "boil" applied to this stage of the process. The duration of this period is marked by the burning of the carbonic oxide at the mouth of the converter, with its characteristic blue flame, and as long as this lasts the decarbonisation cannot be complete. But when the flame drops the carbon is eliminated and the blast is stopped, the converter turned down, and a measured quantity of spiegeleisen run in, when the flame bursts up again for a moment, and the process is complete, the metal being then run into ingots.

The early steel made by the acid process was unreliable. Since the lining used was ganister, which consists of about 90 per cent. of silica, and since silicon results from the silica originally present in the pig, the resulting silicon held all the ferrous oxide in its grasp to the total exclusion of the weaker phosphoric acid, which became reduced and re-absorbed in the steel. Hence it was necessary to use only Bessemer pig, or pig almost free from phosphorus, and this was costly. This so-called "Bessemer pig," prepared from nearly pure ores, contains not more than 0.1 per cent. of phosphorus, and in some qualities not more than 0.04 per cent. The sulphur also must be small in quantity, and may average from 0.01 to 0.05 per cent. But carbon and silicon are present in large quantities, the former ranging from 3.5 to 5.0 per cent., the latter from 2.0 to 3.6 per cent. The presence of manganese is also desirable. The hematite ores are only available in certain districts, and the cost of their transit to districts far removed therefrom would often render economic steel-making impossible. Hence the importance of removing phosphorus in the converter. Yet it was found that certain percentages of silicon or of phosphorus were necessary to maintain by the calorific power generated by their oxidation the temperature in the converter; so that if phosphorus could be eliminated, everything would turn out well.

This grave difficulty, however, threatened the Bessemer process with extinction, until M. Gruner pointed out the reason for the non-elimination of phosphorus, and Mr. Snelus tried lime; and, finally, Messrs. Sydney Thomas and Percy Gilchrist solved the problem on a practical basis (in 1878) by employing lime and oxide of iron as a lining and adding lime to the charge. When the paper of Messrs. Thomas and Gilchrist was first submitted to the Iron and Steel Institute, it was not admitted to be read. Mr. Windsor Richards, then the manager of the great steel works of Bolckow, Vaughan, and Co., saw the value of the discovery, and it was at those works that the manufacture of basic steel was first prepared after the early experimental stages which were conducted at Blaenavon. Then came the importation of pure Spanish ores, and in the issue good steel is made by both acid and basic processes.

NOTES FROM PARIS.

THE installation of the tomb of Pasteur, at the Institute of the Rue Dutot, is nearing completion under the direction of M. Girault, the architect of the new palaces of the Champs Elysées. The crypt, 65ft. long by 20ft. wide, is situated under the entrance steps and the vestibule, and is divided into three portions: the antechamber with vaulted ceiling, the central portion surmounted by a dome, under which will be placed the mausoleum of Pasteur, and the third portion forming a chapel containing a white marble altar. The vaulted ceiling is supported by black marble columns of the Doric Order. The walls are lined with blue-veined white marble, with a black bordering. Several of the wall panels, consisting of very interesting and artistic mosaic work, represent groups of dogs with wide open jaws, or numerous rabbits and fowls.

Whilst in the interior of Paris much difficulty is being made over the putting into practice of the new scheme of town sanitation, almost greater obstruction is being met with in the districts surrounding Paris, especially in the villages near the grounds employed for spreading and disinfecting

purposes. M. Vinccy, one of the engineers of the town of Paris, has just made a visit to these districts in order by means of speech and persuasion to induce the inhabitants to submit to the alleged inconveniences of the new scheme. The representatives of the various communes have decided to offer every resistance to the further carrying out of the scheme of *tout à l'égout*.

The monument to be erected to the memory of Alphand, director of the Exposition Universelle of 1889, chief inspector of the Ponts et Chaussées, and chief engineer of the town of Paris, is nearing completion. The *maquette* may now be seen in the studio of the sculptor, M. Dalou. The group will be placed on the Avenue du Bois de Boulogne, near the Rue Le Sueur. On the two lower steps, leaning against the balustrading surrounding the pedestal, is a group of workmen standing in a semicircle—gardeners, masons, carpenters, navvies, and other workmen of the town of Paris. The corners of the pedestal are guarded by an engineer, an architect, a painter, and a sculptor, whilst above them on the pedestal Alphand is standing, hat in hand, leaning lightly on his cane, one arm raised with a familiar gesture, as if the engineer was giving instructions to his various co-operators placed beneath him.

The foundations for the two palaces to be erected in the Champs Elysées are being commenced, the new monumental bridge to be thrown across the Seine opposite the Invalides will now be rapidly continued, and the preliminary work of the 1900 Exposition will be carried on apace. The Minister of Commerce and Industry has signed the list of general terms and conditions to be complied to by the contractors for the various works for the Exposition. This document contains a number of articles favouring the participation of workmen's societies in all work given by contract, and insuring the protection and welfare of all workmen taking part in the various works.

The contract for inclosing the Exposition grounds during the course of the work of preparation has been adjudged. As it is desired to in no wise spoil the aspect of the Champs Elysées during the building of the two palaces, much attention has been given to the choice of a suitable palisade. Several finished models have been put into place in order to judge of the effect, and one chosen, formed of a series of decorative palisades separated by pilasters, the whole composed of wooden trellis-work about 12ft. high, painted green, and adapted for covering with climbing plants, making quite a picturesque effect. The adjudication of the contracts for the railway to carry all rubbish and materials to the banks of the Seine, and for the chief contracting work for the construction of the palaces, will be made at the end of this month. Now that the whole scheme of the Exposition has been thoroughly studied out and decided upon, no further time will be lost, and the work will be carried on with all speed.

RAGSTONE AND PORTLAND CEMENT.

AT a meeting of the Society of Engineers, held at the Royal United Service Institution, Whitehall, on Monday evening, Nov. 2, Mr. S. H. Cox, president, in the chair, a paper was read by Mr. D. B. Butler, Assoc. M. Inst. C.E., F.C.S., on "The Effect of Admixtures of Kentish Ragstone, &c., upon Portland Cement."

The author first referred to the geological and chemical nature of Kentish rag, which he defined as a sandy limestone of the Lower Greensand formation, consisting chiefly of carbonate of lime, but containing more or less sandy and clayey matter, its composition varying according to the strata in which it was found. He then proceeded to describe his first series of experiments, which consisted in ascertaining the effect of admixtures of various proportions of finely-ground ragstone upon the tensile strength of four different Portland cements, both when tested neat and with three parts of standard sand, the amount of ragstone added varying from 2 to 50 per cent., and the tests extending from seven days to twelve months. The results showed that, although in some instances the neat briquettes were slightly improved by the admixture, the three to one sand briquettes invariably showed a diminution in strength, the diminution ranging from 6 to 19 per cent., according to the amount of admixture used. It was further found that the weakening effect of the ragstone was greatly intensified when the briquettes were left entirely in air, and also when gauged with and placed in

sea water. The effect of an admixture of finely-ground sand was also tried in one instance, and the results suggested that further experiments with that substance would be of interest. A further series of experiments with three other cements corroborated the results obtained in the first series—viz., that the three to one sand briquettes were invariably reduced in strength by the ragstone admixture; that an admixture of finely-ground sand with cement was practically of the same value as an admixture of ragstone; and that by leaving the briquettes entirely in air, and also when used with sea-water, the prejudicial effect of the ragstone was much more marked. Tabulated results of the whole of the experiments, which comprised some two thousand briquettes, in addition to chemical analyses and other tests, were given in the appendix. The conclusions the author deduced from them were that, inasmuch as the admixture of Kentish rag reduced the adhesive power or cementitious value of the cement, it was simply a diluent or adulterant; and, as a corollary of these experiments, he further expressed the opinion that any admixture which by itself was inert, unless it was readily soluble in water or reduced to an absolutely impalpable powder, must diminish the value of the cement, *quâ* cement, and thereby prove a source of weakness. In the latter part of his paper the author discussed some of the methods by which the presence of Kentish rag and other admixtures could be most readily determined. Kentish rag, consisting chiefly of carbonate of lime, effervesced freely upon the addition of dilute hydrochloric acid, and if, therefore, a cement contained any appreciable quantity of ragstone, it would develop similar characteristics according to the amount of admixture present. As, however, most cements absorb a certain amount of carbonic acid from the atmosphere, some care and experience were necessary to distinguish between the effervescence caused by such absorption and that due to ragstone. After giving some account of the principal chemical and physical peculiarities of cements containing slag and similar substances, the value of a microscopic examination in conjunction with other tests was demonstrated. For the latter purpose the coarser particles of the powder were found to be the most convenient—viz., those particles which passed through a sieve having 76 holes per lineal inch, and were retained on a sieve of 120 holes. Examined with a microscope under these conditions, Kentish rag was of an almost white, semi-transparent nature, while well-burnt cement was of a dark, almost black appearance, somewhat resembling coke, and of the well-known porous nature characteristic of cement clinker. Slag similarly examined was also much lighter in colour than cement, and, moreover, appeared to split up into sharp, angular, almost flaky fragments on grinding. Several typical examples of cements containing these substances and also of pure cements were given by means of microphotographs and lantern illustrations, which demonstrated very clearly the marked difference, microscopically, between pure cements and those containing admixtures.

THE AUCTIONEERS' INSTITUTE.

THE inaugural address in connection with the third session of the Auctioneers' Institute of the United Kingdom was delivered on Tuesday evening in the lecture-room of the Institute, Chancery-lane, by the president (Mr. James F. Field). The President drew attention to the condition of the property market, and said that two classes of investment were remarkable for their enhanced value—freehold ground-rents and licensed properties. Of both it might be said that the only method of ascertaining their value was to submit them to auction. Freehold ground rents had frequently realised from 30 to 40 years' purchase, in spite of the reversions being long deferred. With the laying of the ghost of the proposed taxation of ground rents, a continuous appreciation of this class of property had ensued. Possibly two years and a half of a low bank rate, and of abnormally high prices for Consols and other trustees' investments, had had much to do with this; but probably the greater reason was that trustees had become fully alive to the fact that freehold ground rents offered as good security as the finest of Government Securities, with the added inducement of reversions to large unearned increments, and that the longer one held, the more valuable the property became—a result scarcely applicable to any other non-speculative

investment. As with freehold, so with leasehold ground rents, the market had been steady and well maintained, and not only did this remark apply to ground-rents, but to every class of "gilt-edged" properties. West-end houses and residential properties within 50 miles of town showed signs of improvement as regarded both letting and selling, premiums in some cases having been paid for the residue of leases granted a few years since of country properties, whilst several mansions had been sold this autumn, as much as £100,000 being the aggregate realised by four lately. West-end shops were in great demand, whilst in the City and elsewhere there was a better demand for all classes of property. The Estate Exchange returns for the year ending October 1, 1896, gave a total of the recorded sales at £6,450,599. The sales recorded to October 1, 1896, exceeded those for the corresponding period of 1895; but they had much leeway yet to make up to get back to the prosperous times of the seventies. The recorded sales at the Auction Mart (which included very few provincial properties) were, for the year 1876, £8,387,952, and for 1877, £9,992,812, or nearly ten millions. The term "auctioneer" had ceased merely to designate one who wielded a hammer. It conveyed to the public that the possessor of the title was not only a surveyor, but one who, in one or more branches of the art of valuation, was a practical expert, whose calling necessitated observation, criticism, and comparison, and who had in his everyday life to learn the necessity of studying both sides of every question, and who thereby became in time an astute adviser on all matters affecting the value, the rights, and the responsibilities of property.

CHIPS.

In the hall of St. John's College, Cambridge, there was hung, on Tuesday, a portrait of the late Mr. C. C. Babington, for 34 years until 1895 Professor of Botany in the University of Cambridge, and Fellow of St. John's. The painting was executed by Mr. W. Vizard, of Brighton.

During next session the Great Eastern Railway Company intend to apply for power to construct a direct coast line from Yarmouth to Lowestoft. The company have decided to proceed with the work at once upon their application being granted. It is believed that a station will be built at the north end of Lowestoft.

The first of this year's course of Rhind Lectures in Archaeology, the subject of which is "The Early Relations between Britain and Scandinavia," was delivered on Monday afternoon in the lecture-hall at the Scottish National Portrait Gallery Buildings, Queen-street, Edinburgh, by Dr. Hans Hildebrand, Royal Antiquary of Sweden. There was a large attendance, and Sir Reginald Macleod presided.

Mr. Albert W. Lawson, of the City Surveyor's Department, Manchester, has been appointed borough surveyor of Rawtenstall.

On Tuesday week a service was held in St. Peter's Collegiate Church, Wolverhampton, to dedicate a new clock, with Westminster chimes, which has been erected in the tower as a memorial of the late Prebendary Jeffcock, who was rector for 19 years. The clock has been built by Messrs. John Smith and Co., of Derby.

The town council of West Ham have accepted the charge of a new recreation ground, ten acres in extent, facing Hermit-road, Canning Town, the most densely populated district in the borough.

The foundation-stone of the new Academy at Kulmarck, which is being erected by the Burgh School Board on the Elmbank Estate, was laid with Masonic honours on Saturday by the Provincial Grand Lodge of Ayrshire. The estimated cost of the buildings is £14,000.

A block of property, consisting of 40 villa residences, has just been completed on the Rotton Park estate, at Edgbaston. The cost of erection approaches £20,000. In the same vicinity 10 villas of somewhat similar arrangement, but larger in size, are in course of erection. The cost will be about £6,000. The architect for the whole is Mr. J. Statham Davis, and the builder Mr. Edward Airey, both of Birmingham.

A new board school in Whitehall-place, Forest Gate, was opened on Thursday in last week. It has been built from designs by Mr. Jacques, architect to the West Ham school board, the contractor being Mr. Sharpe, of Stratford, and the cost was £18,000. Accommodation is provided on three floors for 1,411 children—551 infants on the ground floor, 430 girls first floor, 130 boys second floor. Each floor includes seven classrooms, with large hall for assembly and drill purposes. Playgrounds for the boys are formed on the roof.

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ILLUSTRATIONS.

ENTRANCE HALL, PANSHANGER, HERTS.—SKETCHES FROM
THE CHURCH OF ST. ETIENNE DU MONT, PARIS.—SOUTH
EASTERN COLLEGE, RAMSGATE.—HAMPTON COURT
PALACE.—THIRD PREMIATED DESIGN FOR THE NORTH
BRIDGE STREET RECONSTRUCTION, EDINBURGH.—
NATIONAL SILVER MEDAL DESIGN FOR A WAYSIDE INN.—
OLD ENGLISH FURNITURE OF THE XVIIITH CENTURY.

Our Illustrations.

ENTRANCE HALL, PANSHANGER.

The original entrance-hall at Panshanger, Earl Cowper's well-known seat in Hertfordshire, was narrow and low; a more important hall was required. This was formed by taking down a side wall, and thereby adding to the width, and by taking out the first floor, so as to make the hall two stories high. The bridge across the hall forms the connection from the staircase to the first floor passage on one side of the house. The walls, arches, and columns up to the first floor level are of Painswick stone; the upper part of the walls were arranged to take old tapestries, with which they are hung, as shown on the drawing. Our illustration is from the drawing shown in this year's R.A. Exhibition by Mr. William Young, the architect.

ROAD SCREEN, ST. ETIENNE DU MONT, PARIS.

In further illustration of this interesting work, and the geometrical drawing by Mr. Middleton in the BUILDING NEWS for July 31 last, Mr. F. W. Catterall, of Preston, writes:—I send you a sketch made in company with him. The exterior of this church is disappointing and nothing like so fine as the interior. The accompanying sketch of the north doorway is interesting for the way in which the sacristan's house has been placed above, access to same being gained by means of the circular turret at angle, forming a rather picturesque "bit" against the tower.

SOUTH EASTERN COLLEGE, RAMSGATE.

The illustration of the South-Eastern College at Ramsgate shows additions now being built. To the west is a new wing raised in memory of Canon Hoare, having on the ground floors common rooms, and dormitories on the upper three floors. The central block, standing between the old building to the east and the new wing, comprises the main entrance, board-room, libraries, and accommodation for the general administration departments of the college. The building is of red brick, with stone corbel-course and cornice to each of the projecting bays, and large stone bay window in the centre of the façade. The main lines of the building are governed to a great extent by the ungainly proportions of the old block. The absence of the usual chimney-stacks is a marked feature in the building, there being only two large air-exits; all the rooms are heated mechanically by fanning warm air from heating-chambers in the centre of the building in the basement. The architect is Mr. Vivian Young, of Westminster.

HAMPTON COURT PALACE.

In continuing our series of reproductions of Mr. H. P. G. Maule's Silver Medal drawings of Sir

Christopher Wren's masterpiece at Hampton Court, we to-day publish a double-page plate of half-elevation of the central portion of the main front and entrance to the Palace from the gardens. In the BUILDING NEWS for October 9 we gave the elevations and a plan with sections, and at the same time Mr. Maule's description of the work, which he has so ably and carefully illustrated, was printed. All the jointings and figured dimensions of the masonry were filled in on the spot.

THE NORTH BRIDGE STREET RECONSTRUCTION,
EDINBURGH.

We have already published the first and second premiated designs chosen by Mr. Alfred Waterhouse, R.A., the referee in this competition, and we now give the view of the scheme awarded the third premium, the authors of which are the joint architects, Messrs. Lanchester, Stewart, and Rickards. In our previous descriptions the general idea and provisions incorporated in the intended improvements were rather fully stated, and there is nothing calling for further particulars on this occasion. The view, unlike those of the two previous designs, shows the street as seen above the bridge level. The others were exhibited from below.

DESIGN FOR A WAYSIDE INN.

The perspective view of the above quaint design was specially prepared for the present purpose of illustration in our pages by Mr. E. F. Reynolds, of the Municipal School of Art, Birmingham. Mr. Reynolds obtained a silver medal at the national competition at South Kensington during the past summer, when his design was shown by geometrical drawings. The lower story is treated in stone, while for the upper part rough-cast plastering is intended. The plan given with view explains the disposition of the building, and no further comment is needed. A riverside warehouse, by the same contributor, was illustrated in our pages of Feb. 14 last.

SEVENTEENTH-CENTURY ENGLISH FURNITURE.

The Table illustrated is a quiet and chaste example of 17th-century work from the South Kensington Museum, and is to be found inside what is known as the "Oak Room" from Sizergh Castle, Westmoreland (illustrated in the "B.N." for April 24, 1891). The Chair, from the same place, is remarkable for its height of back and lowness of seat, the latter being only 12in. high. The coat-of-arms on the back are those of Thomas Wentworth, the First Earl of Strafford. The inlay of bog oak and holly is curious. The other pieces belong to Mr. John Butler, F.R.I.B.A. The Cabinet and Settle are heavy and massive. The former is inlaid with bog oak in the panels. The Chair, with a shaped back and "Cabriole" legs, is a sturdy piece of furniture of a later period. All the leading dimensions are figured on the drawings for reference.

C. O. NELSON.

At the Hornsey District Council, on Monday, the chairman, Mr. Cory Wright, stated if that body gave £10,000 towards the purchase of Churchyard Bottom Wood, Highgate, for an open space, he would undertake that the remaining £15,000 was forthcoming to complete the purchase. The council resolved to contribute the sum asked for. The woods are 25 acres in extent, and for years have been threatened by builders.

An inquiry was held in Liverpool on Friday concerning the application of the corporation to the Local Government Board for sanction to borrow £50,000 for the purpose of demolishing insanitary property. By an order granted in 1864 the corporation were authorised to borrow £200,000 for this purpose, subject to the approval of the department, and no opposition was offered to the present proposal.

At Shenstone Church, near Lichfield, on Wednesday week, a new organ and new choir-stalls were formally dedicated. The total cost of these and other alterations and additions has been about £600. The organ has been built by Messrs. Nicholson and Lord, of Walsall, and is placed in the south aisle, close to the chancel. Hitherto the chancel has been occupied by two private pews. These have been replaced by oak choir-stalls, erected by Messrs. A. R. Dean and Co., Ltd., of Birmingham. The heating apparatus of the church has been entirely re-laid and extended to St. Peter's Chapel. The erection of the new organ at the east end of the south aisle has hidden from view a stained-glass window erected to the memory of Admiral Sir William Parker; but this is to be removed to the west end of the same aisle.

ARCHITECTURAL & ARCHÆOLOGICAL SOCIETIES.

DUBLIN ARCHITECTURAL ASSOCIATION. — The want of a society for co-operative educational and mutual improvement of architectural students in Dublin has been increasingly felt during the past twenty years, and it is satisfactory to learn that a small committee has been formed to promote an association having the following objects in view: To afford to pupils and younger members advantages of education beyond the daily routine of office work on similar lines to the London Architectural Association—viz., by classes of instruction, access to standard works of architecture, visiting buildings old and new, and general social intercourse and discussion; and to insure a more general interest in architecture by means of occasional popular lectures and exhibitions. It is also hoped to institute a series of examinations, and to offer prizes for work done by the members. It is not proposed to restrict the membership to those following architecture as a profession only; students in engineering or science and arts cognate to architecture will be eligible. At a preliminary meeting held on October 28, it was decided to call a general meeting to inaugurate the association, which was duly held at the Grosvenor Hotel, Westland-row, on Wednesday last at 8 p.m. Mr. A. E. Murray, secretary R.I.A.I., Dublin, occupied the chair. Mr. Thomas Drew R.H.A., P.R.I.A.I., expressed hearty approval of the proposed association, and offered to place a room at 22, Clare-street, Dublin, at the service of the members, and also to form a reference library for their use. Messrs. McCarthy (city architect), O'Callaghan, Mitchell, W. S. Doolin, and others also spoke in support of the movement. Mr. William R. Gleave, A.R.I.B.A., 72, Serpentine-avenue, Sandy Mount, Dublin, was appointed hon. secretary pro. tem. A suggestion was read from a Belfast architect that the title of the proposed society be "The Architectural Association of Ireland," but this was felt to be premature.

GLASGOW ARCHITECTURAL ASSOCIATION. — A meeting of the above association was held in the rooms, 187, Pitt-street, on Tuesday evening, the 3rd inst. Mr. Conner, president, occupied the chair. Mr. Harry Thomson read a paper on "Mural Decoration." He spoke about the various methods which were employed, and recommended painting in oil and distemper as preferable to wallpaper. Graining as practised was condemned, as was also the imitation of marble. The essayist advocated decorating the walls in colour, mosaic and fresco work, &c. The house, he said, should be a store place of all that was beautiful. Simplicity in mural decoration should be emulated. Mr. W. J. Anderson opened the discussion, and at the conclusion a hearty vote of thanks was accorded to the essayist.

CHIPS.

The new nursing home in connection with the district infirmary at Chelsea was opened on Wednesday week. The building, which immediately adjoins the infirmary, has been erected at a cost of £10,000, and will provide general accommodation for the entire nursing staff, numbering fifty-five.

A meeting will be held to-day (Friday) at the Church House, Westminster, in connection with the movement for the erection of a national memorial to the late Archbishop Benson.

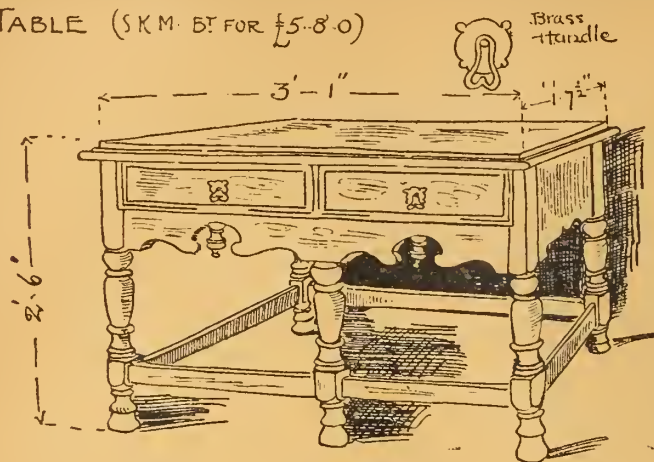
Messrs. Cooper and St. Pier, of Priestwood Mansions, Archway-road, Highgate, have some eligible freehold and leasehold parcels of land in the northern suburbs ripe for the erection of much-needed houses.

The Hertfordshire County Council have obtained the sanction of the Local Government Board for the following loans for the new asylum at Hill End, St. Alban's, in course of erection from plans by Mr. G. T. Hine, of Westminster: £110,930 for the construction of the building, &c., and £29,070 for furniture, road, lighting, heating, &c.

The new church of St. Augustine, Preston Park, Brighton, was consecrated by the Bishop of Chichester last week. It consists at present of a nave of six bays, with north and south aisles, and seats 724 persons. The style is Early Perpendicular, and the materials Sussex sandstone and red brick. Mr. G. E. S. Streatfield is the architect, and Messrs. Longley and Son, of Crawley, were the builders. The outlay thus far has been £7,000.

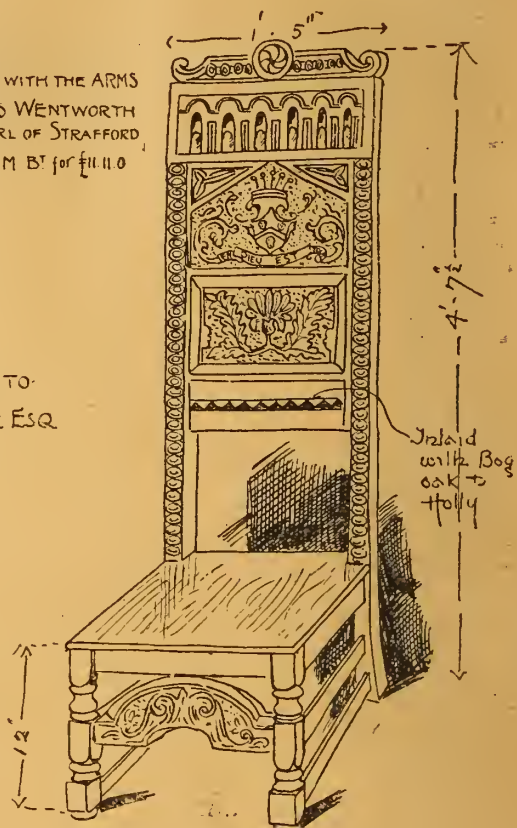
The Newton Academy, Ayr, is being warmed and ventilated by means of Shorland's patent Manchester grates, the same being supplied by Messrs. E. H. Shorland and Brother, of Manchester.

TABLE (SKM. BT FOR £5-8-0)

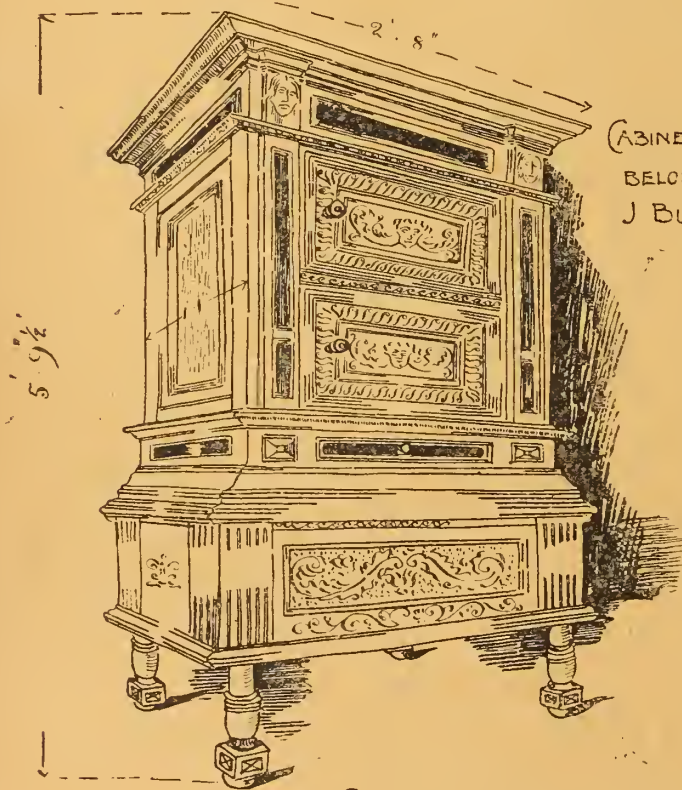


OLD ENGLISH FURNITURE OF THE 17TH CENTURY.

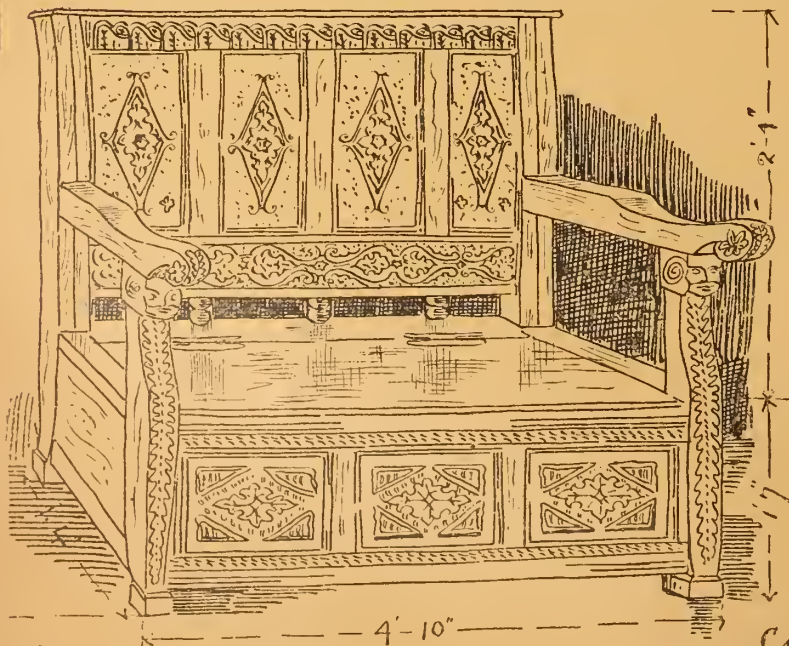
CHAIR WITH THE ARMS
OF THOS WENTWORTH
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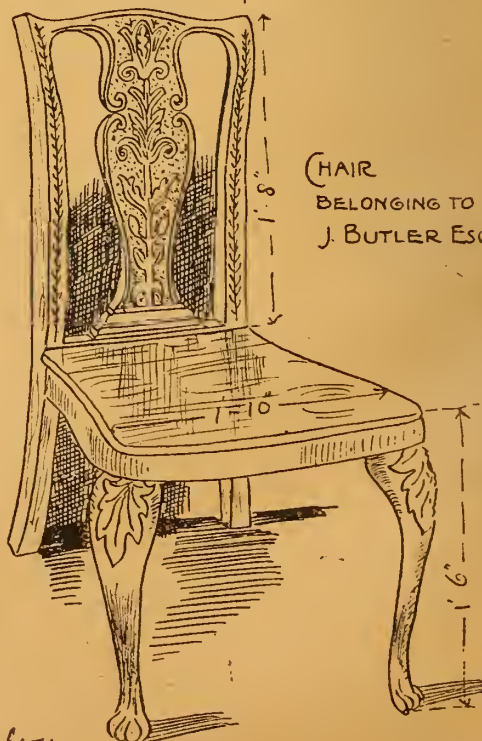
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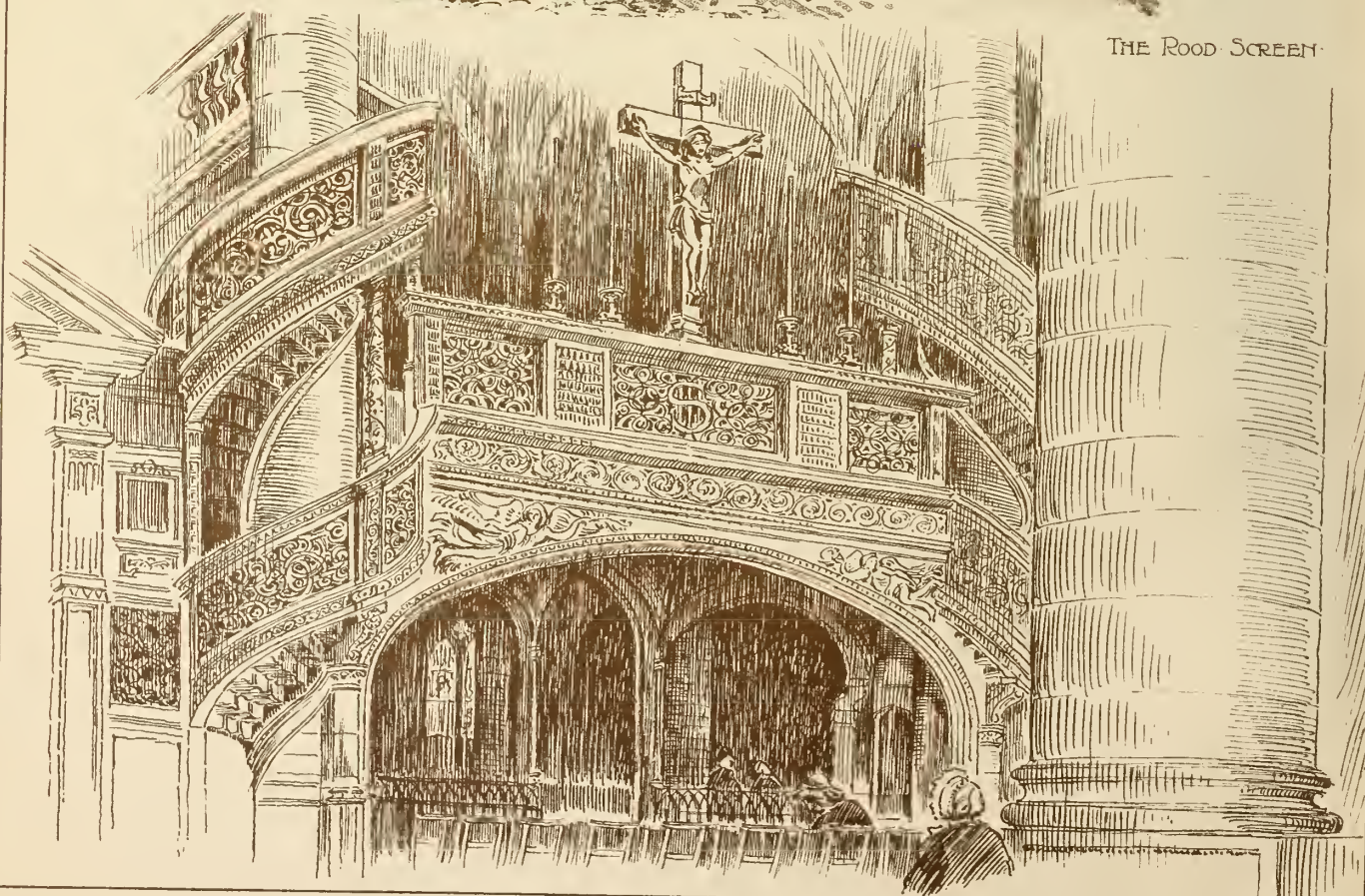


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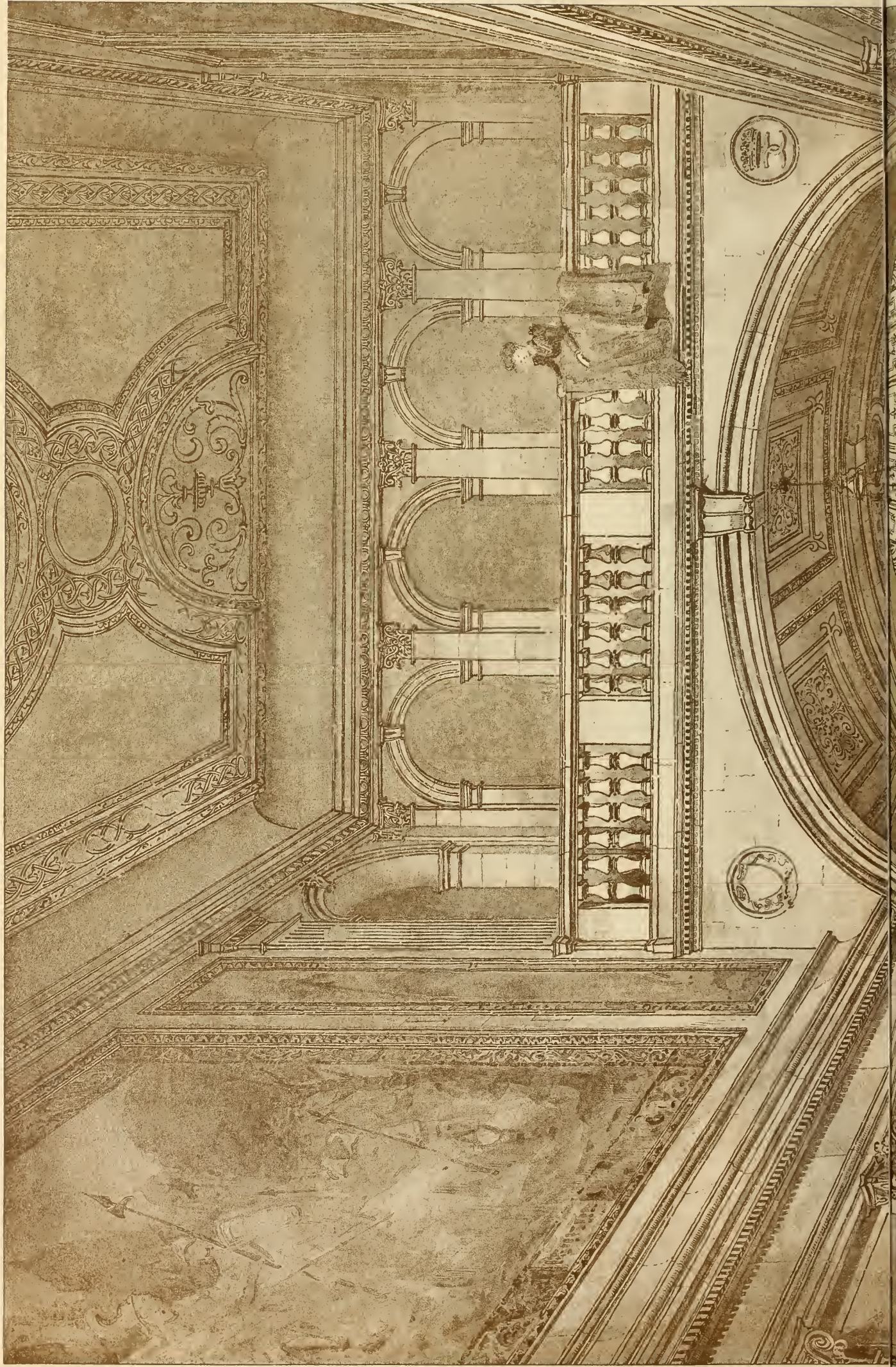
THE NORTH DOOR.

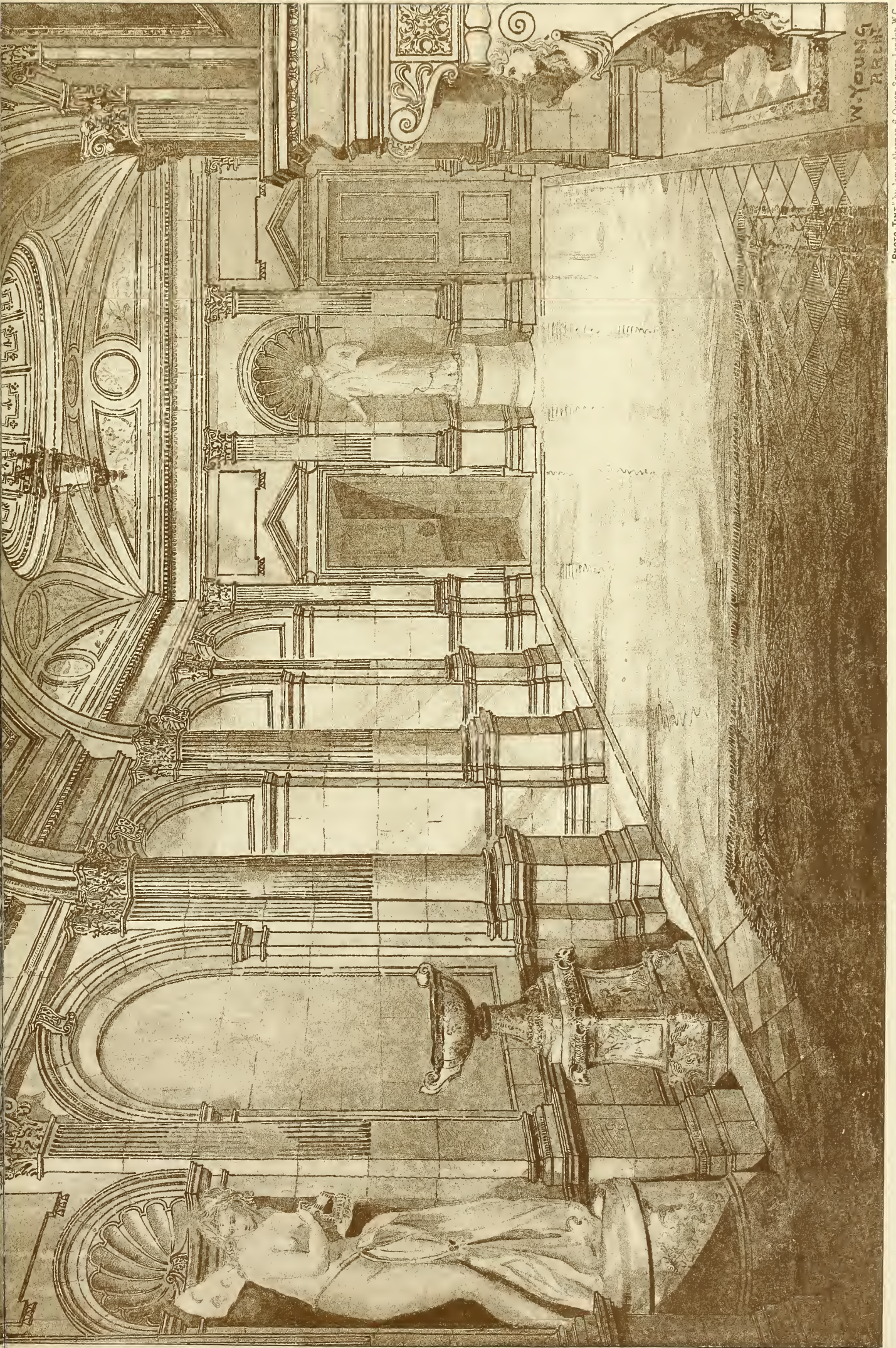


THE ROOD SCREEN.



Photolithographed & Printed by James Akerman, 6 Queen's Lane, W.C.



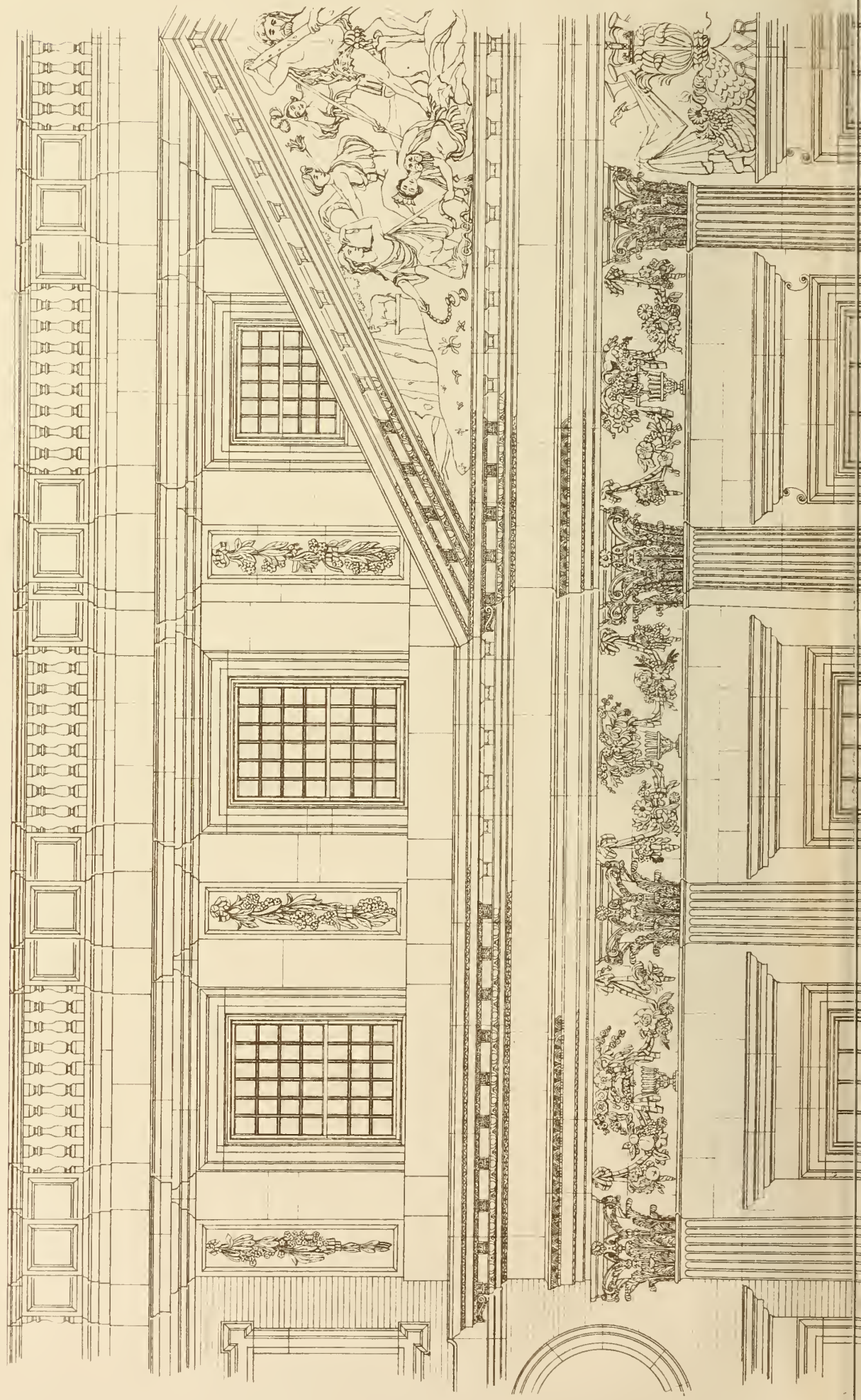


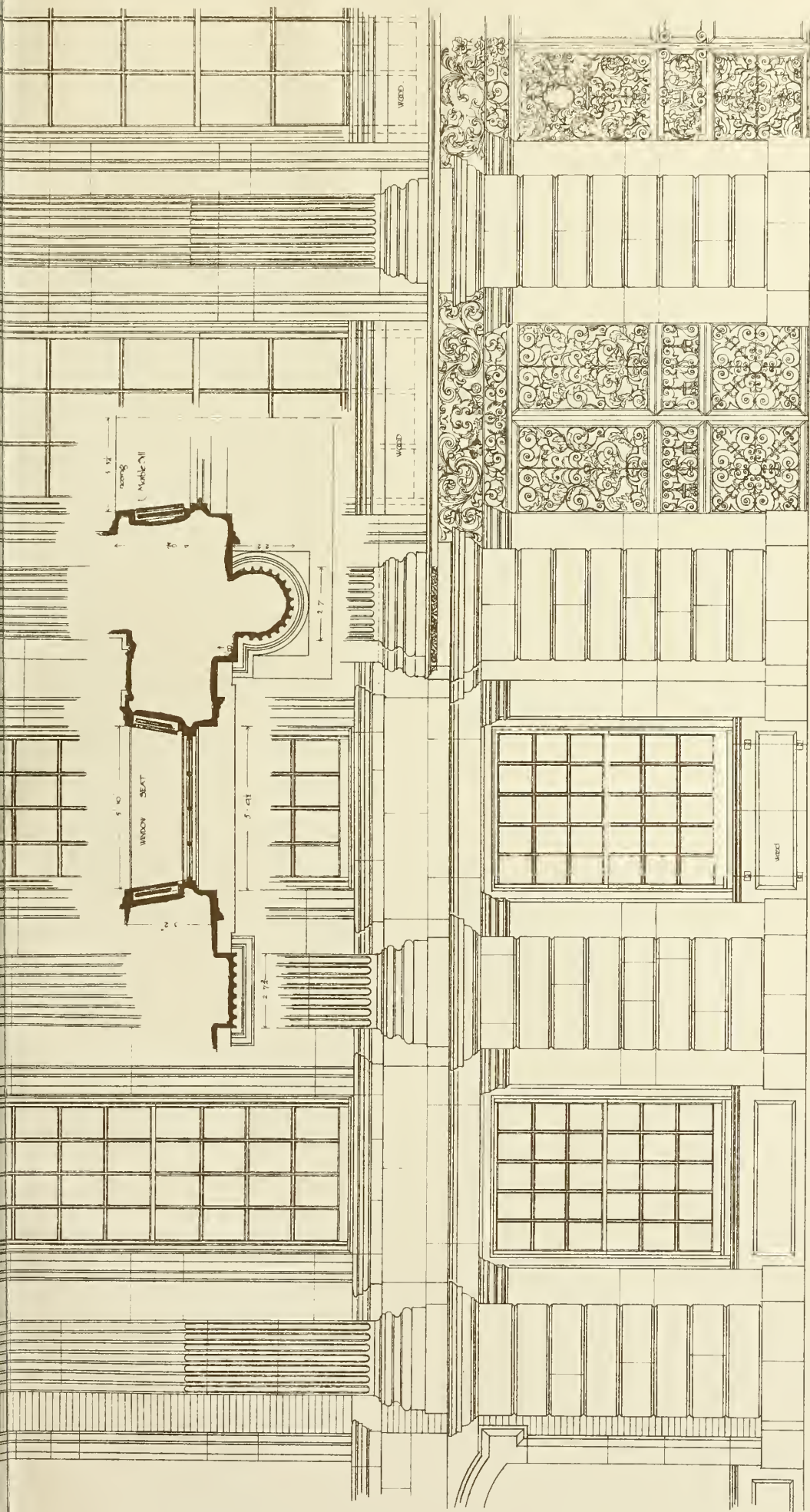
"PHOTO-TINT" By James Akerman, 8, Queen Square, London, W.C.

THE · ENTRANCE-HALL · PANSHANGER · HERTS. · Wm YOUNG FRIBA ARCHT.

HAMPTON COURT PALACE : (WREN.)

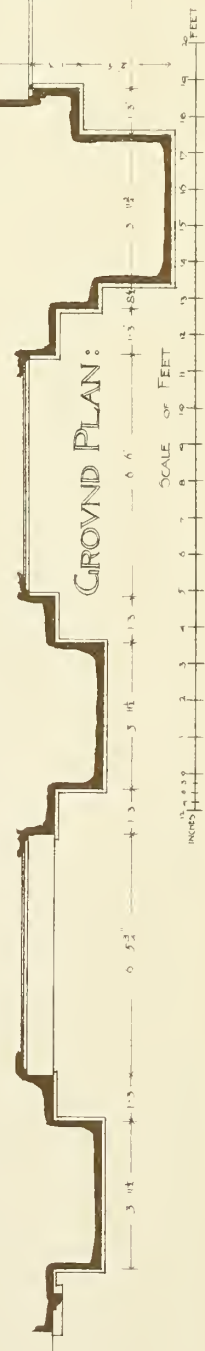
GARDEN FRONT :





HALF ELEVATION CENTRAL PORTION :

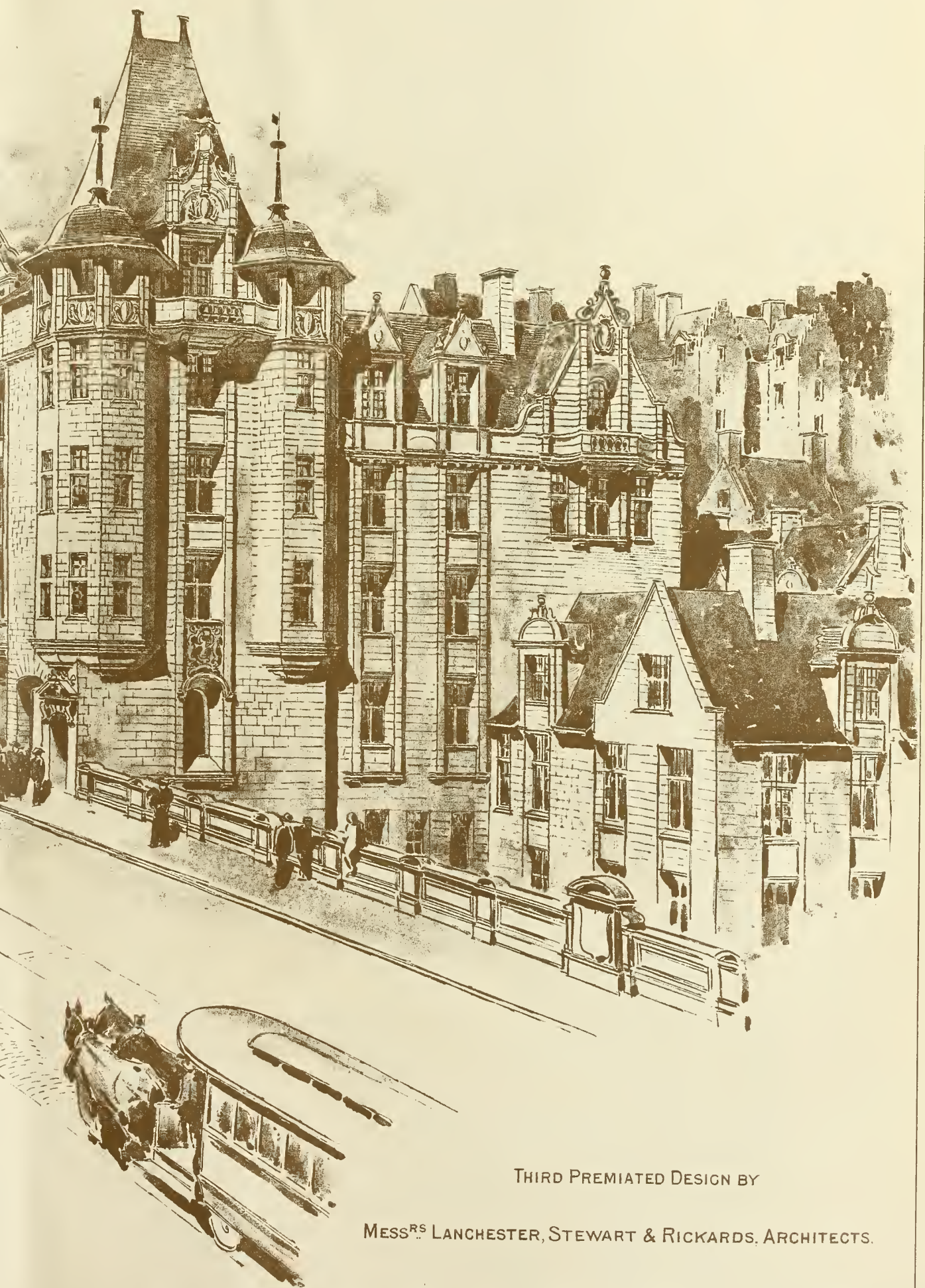
RIBA SILVER MEDAL AWARDED HUGH P G MAULE





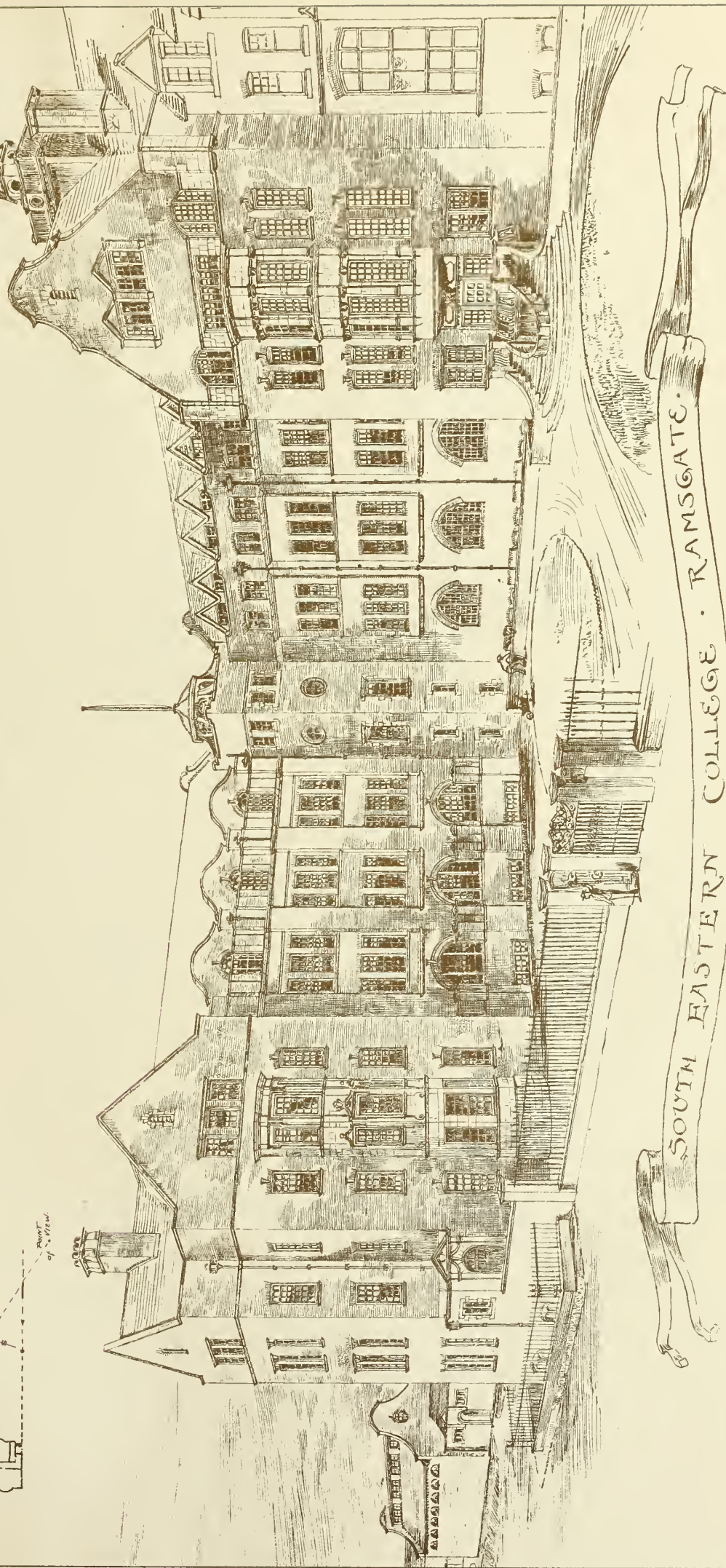
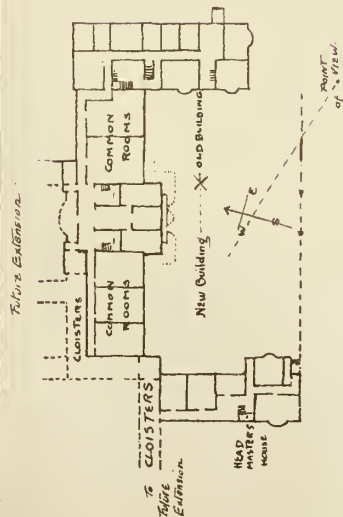
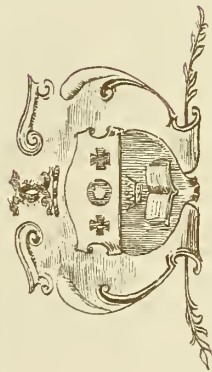
RECONSTRUCTION OF
NORTH BRIDGE STS.
VIEW FROM BRIDGE

EDINBURGH



THIRD PREMIATED DESIGN BY

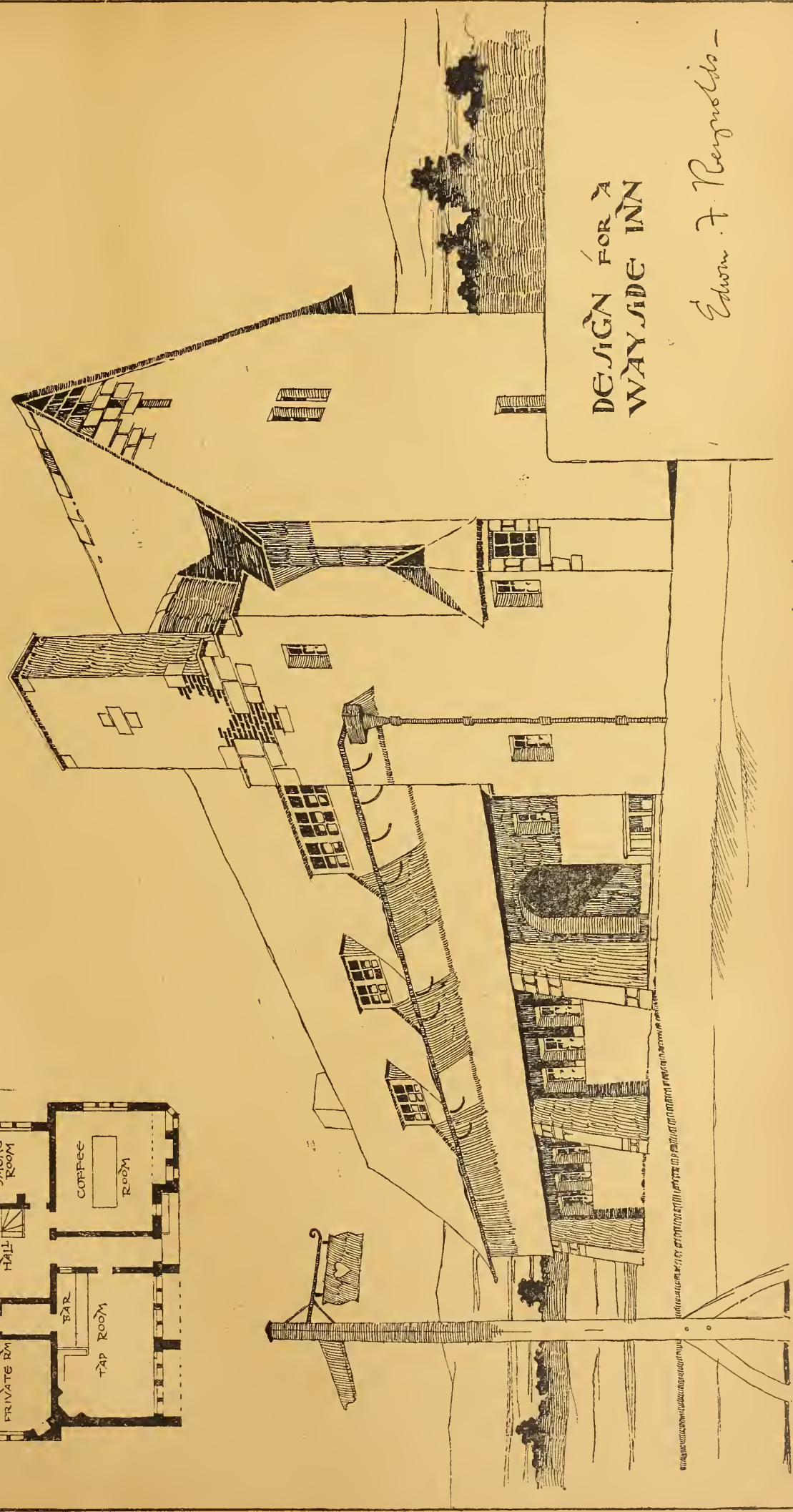
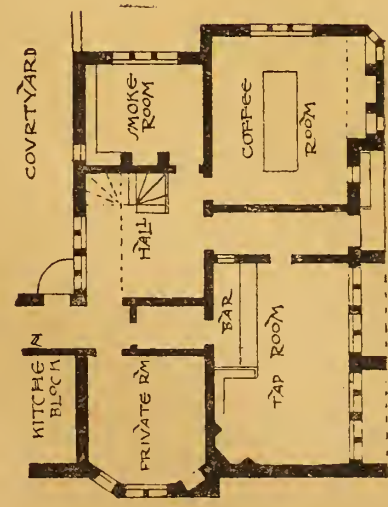
MESS^{RS} LANCHESTER, STEWART & RICKARDS, ARCHITECTS.



VIVIAN E. YOUNG, ARCHITECT.



NATIONAL SILVER
MEDAL DESIGN.



DESIGN FOR A
WAYSIDE INN

Edwin F. Reynolds -

Building Intelligence.

ARCHBISHOP TENISON'S SCHOOL, LEICESTER-SQUARE.—Important structural alterations have recently been effected at this school. A new floor has been inserted about half-way up the large hall. The area, of 60ft. by 25ft., has been equally divided into chemical and physical laboratories, each of which has accommodation for 20 students. The room formerly used as a chemical laboratory has been converted into a manual training workshop for 12 students. The total cost has been approximately £900, the structural work having been carried out by Messrs. H. and E. Lea, of Warwick-street, W., the architect for the trustees being Mr. Charles Mason, A.R.I.B.A., St. Martin's Town Hall, Charing Cross, W.C.

BYKER, NEWCASTLE.—The foundation-stone of an English Presbyterian church was laid in Priory-street, Byker, on Tuesday. The church is to be built from plans by Messrs. Badenoch and Bruce, 55, Pilgrim-street, Newcastle-on-Tyne, the contractor being Mr. Alexander Bruce, of the same city. It is planned with nave and aisles, the aisles and west end having galleries. The ground floor is seated for 480, and the galleries for 270, making a total of 750. The design is a simple treatment of the Early English style. The walls are of local stone with rock-faced necked work outside, the bays of the nave being indicated by external buttresses which finish above the eaves with pinnacle weatherings. The west front has a central and two angle buttresses, the latter being carried up in octagon form with pinnacles. On either side of the west gable are placed the staircases, which are treated octagonally at the ends, and finished with hipped roofs. Internally the nave is divided from the aisles by an arcade consisting of five pointed arches on either side. The roof is of dressed pitch-pine cladding run into panels by mouldings. The vestry and session room, with kitchen, are placed behind the east gable, and the heating chamber is under the kitchen. The church will be heated on the low-pressure hot-water system.

CHIPPENHAM.—Hungerford Chapel, at the south-eastern end of the parish church of St. Andrew at Chippenham, which has been for some time under renovation, was reopened on All Saints' Day. The general fabric was restored some 18 years ago at a cost of upwards of £7,000. The roof of the chapel—interesting for the strength of its English oak timber and ornate character—was not, however, then touched. The roof is entirely new, formed of oak, traceried, moulded, and carved. It rests upon supporting angels, bearing shields; two of them new and exact replicas of the original 15th-century figures. The intersections of all the roof-timbers are covered by carved-oak bosses, with "crow's feet" attached, and of the local conventional Perpendicular character. The whole is covered in with thick sheets of lead. The works have been carried out from the designs, and under the immediate direction, of Mr. Graham Awdry, F.R.I.B.A., of London, the general contractor being Mr. William Light, of Chippenham. The carved oak work and the sculptured angels are by Messrs. Harry Hems and Sons, Exeter.

CRIPPLEGATE, E.C.—The Lord Mayor opened on Wednesday the new Cripplegate Institute in Golden-lane. The institute has been erected from designs by Mr. Sidney R. J. Smith, of 14, York Buildings, Adelphi, and was illustrated in our issue of July 6, 1894. It is Free Renaissance in style, built of red bricks and Portland stone, and comprises rooms for libraries, newspaper and magazine-rooms, and a room for the special advantage of those who are out of employ, wherein morning papers may be searched. On the first floor is a concert-hall, which is approached by a marble staircase. There are also refreshment-rooms and cloak-rooms, and the second floor is devoted to classrooms. The total cost of the building and furnishing was £50,000. During the after proceedings at the opening, Mr. J. Passmore Edwards promised £250 towards a boys' library at the institute.

HILDENBOROUGH, KENT.—St. John's Church was reopened on Friday evening after undergoing complete restoration, together with entire rearrangement internally and enlargement at the western end. The work has cost close upon £2,000. The architect was Mr. F. W. Hunt, son-in-law of the first vicar of the parish, and the

work has been carried out by Messrs. Langridge and Son, builders, of Tonbridge and Birling. The west wall has been carried out 12ft., and the door there abolished and replaced by a large three-light window. A new entrance has been provided, a porch being thrown out near the south-west angle. The whole of the old deal seats have been replaced by others in wainscot oak, the material employed throughout. The pitch-pine rafters have been outlined with red and white, and the font has been removed to the north-west corner of the church. The chancel is divided from the nave by a dwarf screen with wrought-iron gates in the centre, and the altar has been enlarged and a brass rail provided. Two 12-light gaseliers have been placed in the chancel, facing which is a brass corona, and there are also nine five-light gas burners for lighting the remainder of the building.

HULL.—New offices and warehouse are now in course of erection adjoining the present flour-mill in Clarence-street, Hull. The new building, which is of Renaissance design, has a frontage of 60ft. to Clarence-street, and a return frontage of 60ft. towards the river Hull, and will be occupied on the ground and first floors as offices, with the principal entrance from Clarence-street, having a fireproof strong-room on each floor. The four upper floors will be used for warehouse purposes, while the basement will provide lavatory accommodation, storage, &c. The building is faced with Lincolnshire red pressed bricks, with dressings of Yorkshire stone and buff terracotta. The offices will be fitted up in pitch-pine and mahogany. Mr. J. Harmar was the contractor for the foundations, and Messrs. Marsden and Son, builders, are erecting the superstructure under the supervision of Messrs. Gelder and Kitchen, architects, of 76, Lowgate, Hull. The total cost will be over £6,000. Messrs. Doulton and Co. are supplying the buff terracotta.

WINCHESTER CATHEDRAL.—The Dean has issued a statement, in which he says that excellent progress is being made with the repair of the nave roof of the cathedral, and the contractor, Mr. John Thompson, expects to complete the work early in the summer of 1897. The original contract was for £6,520, but additional work has been found to be necessary, and the total cost of the repairs of the nave roof and vaulting, including architect's fees, extra insurance, and other necessary charges, cannot be estimated at much less than £8,500. A very liberal response has been made to the appeal that was issued early in this year, and the total amount of contributions already received or promised is £7,500. An additional sum of £1,000 is, therefore, required to complete the repair of the roof and vaulting of the nave. The report presented by Mr. Colson, the cathedral architect, to the Chapter on September 1, embodying the result of a survey, proves that almost every roof of the cathedral is in need of some repair, and that none of them can be prudently neglected. If everything is undertaken as recommended in the report, the total cost of these additional repairs, including professional fees, will amount to not less than £6,500. Before so large an additional outlay on the roofs was contemplated, the Dean had consulted Mr. Willis about the organ, which is in great need of repair and of modern mechanism. Mr. Willis, who built the organ about 50 years ago, offered to remodel it thoroughly and make it first class in every respect for £1,000, provided his offer were accepted within twelve months. The dean closed with the offer, and Mr. Willis has undertaken to complete the work by Easter, 1897. The organ will then be undoubtedly one of the finest in the kingdom.

The town council of Llanidloes have appointed Mr. Radford, of Nottingham, as assessor, at an hourarium of 35 guineas, to adjudicate on the competitive schemes sent in for a water supply for the borough.

The parish church of Bampton, Devon, is about to be restored, from plans by Mr. C. H. Samson, of Taunton. Messrs. Bryant and Son, of Barnstaple, are the contractors, their tender having been accepted at £1,690.

The Halifax Corporation having applied to the Local Government Board for sanction to borrow £7,500 for the extension of their Gaux depot, £6,129 for the purposes of street improvements, and £450 for the purchase of land for quarrying purposes, Colonel A. G. Durnford, R.E., Local Government Board inspector, held a public inquiry at the town hall on Friday.

STAINED GLASS.

ALDERSHOT.—The large east window of Holy Trinity Church, Aldershot, has just been filled with stained glass, and it was unveiled by the Dean of Winchester on Sunday last. The window contains figures of Our Lord as the risen Christ, supported on either hand by the four great archangels, whilst in the lower portion of the windows are a number of subjects illustrating the events in which the angels appeared on earth. The work has been designed and executed by Messrs. Powell Brothers, of Park-square, Leeds.

CHIPS.

The King of Roumania attended, on Friday, the ceremony of laying the foundation-stone of the work of the new harbour at Constanza, which it will take six years to construct.

Lady Mary Howard, Mayoress of Sheffield, publicly opened on Thursday in last week a new ward which has been added to the Sheffield Hospital for Sick Children, Western Bank.

The urban district council of Bilston have raised the salary of their surveyor, Mr. Wilson, to £275 a year.

For the ventilation of the additions now being made to the Counties' Lunatic Asylum, Larbert, Stirlingshire (Messrs. A. and W. Black, architects, Falkirk), the "Climax" patent direct-acting turret ventilators are being supplied by Messrs. Cousland and Mackay, ventilating engineers, Glasgow.

The Cessnock Docks at Glasgow, constructed from designs by Mr. James Deas, engineer to the Clyde Trust, are almost completed. The docks consist of a canting basin, in which a ship 700ft. long may be turned, and three basins, divided by quays projecting from the east end. The depth of water at low tide will be 28ft., and there is on one of the walls of this canting basin a 130-ton jib crane for the use of marine-engine constructors. The first of the three basins was ready for partial occupancy in 1892, and was completed in 1893, the second in 1895, and the third has only now to be dredged. The work of construction was carried out by the Clyde Trustees workmen.

The Lord President of the Council has appointed a committee, including with others Sir John F. D. Dounely, secretary of the Science and Art Department; Sir H. Roscoe, Mr. W. Armstrong, director of the National Gallery, Dublin, and Captain W. de W. Abney, Science and Art Department (Secretary), to consider the mode in which the grants in aid to science and art schools are distributed, and to report if it is desirable to make any alteration therein.

A Local Government Board inquiry was opened at the town hall, Stratford, last week, by Mr. George Willocks, C.E., for the purpose of considering the application of the West Ham Town Council for sanction to borrow £53,723 for street improvement works, the chief items being the paving of the North Woolwich-road from the swing bridge to Silvertown railway station at an estimated cost of £17,439, and of the Victoria Dock-road, from the White Gates down to Connaught-road, at an estimated cost of £14,812; £50,000 for electric lighting; and £4,860 for sewers and footpaths as the preliminary step to erecting a lunatic asylum at Chadwell Heath. Mr. Lewis Angell, the borough engineer, and Mr. Steinitz, electrical engineer, explained the proposals.

The Barbers' Company have placed a portrait in oils of the Lord Mayor (Sir Walter Wilkin) in their hall in Monkwell-street, in commemoration of his year of Mayoralty. The portrait, which depicts the Lord Mayor in his State robes, is the work of the Hon. John Collier.

The Shire Hall at Gloucester has just been enlarged for the county council by taking in the site of premises on the west side, and there have been provided a new council-chamber, 48ft. by 37ft., with cloak-room, chairman's private room, and a waiting-room and treasurer's pay office. The old quarter session room has been dismantled, and converted into offices for the county surveyor and his staff. A boiler-house, engine-house, and store-rooms and workshops for county use are provided under the council-chamber and the adjacent buildings. The buildings were erected by Mr. H. A. Forse, of Bristol, from designs by Mr. Medland, the county architect, and under the supervision of Mr. William Wiggall, clerk of works.

Dr. Hoffman, of the Home Office, resumed on Monday his inquiry into the proposal of the Abney Park Cemetery Company (Limited) to establish a proprietary cemetery on 29 acres of land belonging to the Eton College estate at Golder's Hill, Hendon. There was a strong opposition. The evidence was mainly directed to the question whether the site was a suitable one, and could be properly drained, on which conflicting statements were made by experts. The inquiry was concluded on Tuesday, when Dr. Hoffman said he should not send in his report till December 1.

COMPETITIONS.

BELFAST.—Mr. Alfred Waterhouse, R.A., the referee in the preliminary competition for the city hall at Belfast, has made his choice of the three best designs submitted out of the 51 competitors, the numbers chosen being Nos. 30, 42, and 43 for the final contest. Any one of these schemes, it is stated, can be carried out for the sum of £150,000, the Parliamentary limit. The great skill displayed by various competitors is said to have impressed both Mr. Waterhouse and Mr. Bretland, the city surveyor, who acted with the professional assessor in the examination of the plans. The amount of work involved in the preparation of the preliminary drawings was very considerable, the front elevation and three principal plans being included in each instance. We are not at liberty at the present moment to state the names of the selected architects.

EXETER.—In the competition for the new church in St. Thomas, Exeter, the Church Extension Committee, acting upon the advice of Mr. B. Ingelow, F.R.I.B.A., their assessor, nominated by the President of the Royal Institute of British Architects, have awarded the premium of £100 for the set of plans adjudged by them to be first in merit, and which were furnished by Mr. Harold Brakspear, A.R.I.B.A., of Corsham, Wilts, and the premiums of £25 each for the next three adjudged worthy of merit, to the plans furnished by the following competitors, viz.:—Mr. F. Bligh Bond, A.R.I.B.A., 36, Corn-street, Bristol; Messrs. J. E. P. and J. K. Cutts, 34, Maiden-lane, Covent Garden, W.C.; and Mr. Gordon P. G. Hills, A.R.I.B.A., 4, Adam-street, Adelphi, W.C., the order of names being alphabetical. The church will occupy a site on the Okehampton-road, and the limit of cost was £6,000, exclusive of a tower to be added at some future period. Accommodation was to be provided for 600 persons, with provision for future enlargement beyond that amount of seating.

LISKEARD.—A decisive step has been taken by the committee which has been appointed to carry out the erection of a new tower for Liskeard Parish Church. This work is estimated to cost £3,000. The committee have advertised in our columns for designs from architects for a tower to be built of granite at a cost not exceeding £3,000. The designs must be delivered by January 1 next, and premiums of £50 and £25 respectively are offered for the first two selected designs, the former to merge in the architect's commission.

PLYMOUTH.—In the competition recently instituted, the Plymouth Board of Guardians, acting on behalf of the Hele Charity Trust, have, with the advice of the assessors, Messrs. Hine and Odgers, architects, of Plymouth, awarded the first premium of £25 to Messrs. Wiblin and de Boinville, architects, Old Town-street, Plymouth, and the second premium of £15 to Mr. B. Priestley Shires, A.R.I.B.A., of the Central Exchange, Plymouth. The authors of the first premiated designs have been commissioned to proceed with the work, and Messrs. Corderoy, Selby, and Corderoy, of Plymouth and Westminster, have been appointed surveyors.

SOUTHAMPTON.—At the last meeting of the town council, the health committee reported with respect to the competitive plans for the Infectious Diseases Hospital at Mousehole, that a special meeting of the committee was held to receive the award of the adjudicators—Mr. W. Emerson, F.R.I.B.A., of London, and the medical officer of health, Dr. A. Wellesley Harris—upon the designs sent in. The assessors reported having carefully considered the 43 designs submitted for the fever hospital, and that there was no design amongst the number sent in which would not require considerable modification or rearrangement, either in general disposition or details of scheme, before it could be erected. Taking this into consideration, their opinion was that the design numbered 43 was the first in merit, and that numbered 40 the second. The award was recommended for adoption. The sealed envelopes containing the names of the architects were opened, and the names announced as follows:—No. 43, Messrs. F. H. Greenaway and J. H. Smith, Old Queen-street, Westminster; No. 40, Messrs. George E. Halliday and John W. Rodger, High-street, Cardiff. The adjudicators, being asked to mention the designs in the next order of merit, gave Nos. 19 and 1, and the sealed envelopes were opened and the names of the architects announced as follows—viz.: No. 19, Messrs. W. H. Mitchell, Son, and Gutteridge, South-

ampton; No. 1, Messrs. Edward Thomas and Sons, Queen Anne's-gate, S.W. In reply to questions, the town clerk stated that the conditions provided that the designs selected for first and second awards were to become the property of the corporation, and all other designs must be returned to the respective authors. An animated discussion took place, regret being expressed that the premiums, amounting in all to £225, had not fallen to local architects; but eventually the report was adopted. From the tone of the discussion it appeared probable that the whole scheme may be abandoned, as the freehold of the suggested site has not yet been acquired by the council.

CHIPS.

A further appeal is being made for £1,500 for the completion of the repairs of Clonfert Cathedral, the smallest in the United Kingdom, in accordance with the recommendations of Mr. J. F. Fuller, of Dublin. Work of reparation has been carried out in sections during the past year by Mr. A. P. Sharp, builder, of Great Brunswick-street, Dublin, and the local funds available in the West of Ireland are naturally very small, and now appear to be exhausted.

At Bilston, Staffs, the foundation-stone of the new technical school in the Willenhall-road was laid last week. Mr. Wilson (town surveyor), is the architect, and Mr. Thomas Tildesley, Willenhall, the contractor, the contract price being £5,087. The school is to be built of red brick, with terracotta facings, and contains a large lecture-room, an examination-room, and 14 smaller rooms, to be used as classrooms, laboratories, and workshops.

The foundation-stone of an intermediate school for Llanelly was laid last week. The building is being erected in Marble Hall-road, and will accommodate 200 children. It will be constructed of brick faced externally with pressed Cwmbran bricks, relieved with Corsham Down stone and terracotta. The floors throughout are to be wood block, and the roofs covered with green slates with red tile ridge-crests. The buildings and boundary walls will cost £5,000, and they are being erected from the designs and under the superintendence of Mr. W. H. Dashwood Caple, architect, of Cardiff. The builder is Mr. Edgar G. Groom, Marble Hall-road, Llanelly.

The Queen has had a memorial cross erected on the grave, in Whippingham Churchyard, of the late Mr. George Warren, for 34 years telegraph clerk at Osborne House. The memorial consists of a Portland stone cross, with curved arms connected by a perforated wheel. This rests on a chamfered base of grey Yorkshire stone. On the portion of the cross below the arms is an inscription. The work has been carried out to her Majesty's order by Messrs. Garret and Haysom, monumental masons, of East-street, Southampton, who have recently executed the stonework in connection with Prince Henry of Battenberg's memorial chapel added to Whippingham Church, and are now engaged on the marble flooring for the same building.

A new railway, running from Ottawa to Parry Sound, on Lake Huron, a distance of 260 miles, and forming the most direct route from Chicago and other Western cities to the Atlantic seaboard, was completed on Monday. The line has been built through the enterprise of one man—Mr. J. R. Booth, an Ottawa lumberman.

The opening of the Gamble Institute, St. Helen's, by the Right Hon. the Earl of Derby, took place yesterday (Thursday). The Gamble Institute is a pile of buildings, comprising the central free library and technical schools, which have been erected at a cost of nearly £30,000, at the corner of Hardshaw-street and Corporation-street, fronting the Town Hall, St. Helen's, and, together with the freehold site, presented to the town by Colonel D. Gamble, C.B., who has been five times mayor of the borough. It is three stories in height, and is Renaissance in style. It has been erected from designs by Messrs. Briggs and Wolstenholme, of Blackburn and Liverpool, the contractors being Messrs. Robert Neill and Son, of Manchester. We illustrated this building in our issue of Aug. 31, 1894.

At a meeting of Burntisland Harbour Board, on Friday, it was intimated that the new dock works would be let to contractors by the end of January, and operations would probably be commenced in April. Messrs. Meik and Son, of Edinburgh, are the engineers, and Mr. Henderson is the resident engineer.

The new wing at the Royal Alexandra Hospital for Sick Children, Dyke-road, Brighton, will be formally opened on Wednesday next. The new wing is of two stories, connected with the main building by a covered way. It is intended solely for the accommodation of nurses, there being twelve bedrooms, six on the ground floor and six on the first floor. The wing is in two stories.

TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. All communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondents.]

It is particularly requested that all drawings and all communications respecting illustrations or literary matter should be addressed to the EDITOR of the BUILDING NEWS, 332, Strand, W.C., and not to members of the staff by name. Delay is not unfrequently otherwise caused. All drawings and other communications are sent at contributors' risks, and the Editor will not undertake to pay for, or be liable for, unsought contributions.

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NOTICE.

Bound copies of Vol. LXIX. are now ready, and should be ordered early (price Twelve Shillings each), as only a limited number are done up. A few bound volumes of Vols. XXXIX., XL., XLI., XLVI., XLIX., LI., LIII., LIV., LVIII., LIX., LX., LXI., LXII., LXIII., LXIV., LXV., LXVI., LXVII., LXVIII. may still be had, price Twelve Shillings; all the other bound volumes are out of print. Most of the back numbers of former volumes are, however, to be had singly. Subscribers requiring any back numbers to complete volume just ended should order at once, as many of them soon run out of print.

RECEIVED.—E. F. Randall.—J. H. and Co.—S. R. B.—Quarinnan.—F. J.—R. A. (Ashford).—B. E. P. Co.—W. E. Lindley.—L. B.

Correspondence.

THE "DAVID LEWIS" NORTHERN HOSPITAL, LIVERPOOL.

To the Editor of the BUILDING NEWS.

SIR,—Will you kindly allow me to state that, owing to pressure of work, I did not submit a design in competition for the above hospital?—I am, &c.,

TROS. W. ALDWICKLE.
1, Victoria-street, Westminster, S.W., Nov. 2.

ILLICIT COMMISSIONS (!)

SIR,—Apropos of this subject, the following little story may be interesting. As all connected therein are "dead and gone," there can be no objection to its being told now:—

"The ancient church of St. Mary Major, in the Cathedral Close of this city, was rebuilt (A.D. 1865-68) from the designs of the late Mr. Edward Ashworth (deceased March 8, 1896, aged 81). When the roof was nearly all covered in, it was found by Mr. Ashworth that the copper nails specified for the slating had not been used by the contractors. Mr. Ashworth firmly told the builder that all the slates would have to come off again, and be properly fixed according to specification. The same evening a dozen bottles of prime port were delivered at the architect's residence, accompanied by a polite note from the builder asking his kind acceptance of the little present. Mr. Ashworth, ever as tender-hearted as he was honourable, was the last man to hurt anyone's feelings, even if he did not agree with them. So next morning he despatched his servant

to the builder's house with another hamper of wine, and a note that ran something as follows:—

"Thanks for your kind present. Favour me, in turn, by accepting the accompanying dozen of dry sherry. You will have to use the copper nails!"—I am, &c.,

Fair Park, Exeter, Nov. 2. HARRY HEMS.

CHIPS.

At a meeting held at Liverpool on Tuesday to consider a scheme for rebuilding the Hospital for Consumption at Mount Pleasant, in that city, it was decided to take steps for erecting a fresh hospital with 76 beds, on an extension of the present site. Of the £50,000 it was estimated will be required, £16,775 was subscribed in the room. Plans of this new building, prepared by Mr. W. E. Willink, of Liverpool, were exhibited at the meeting.

St. Andrew's pro-Cathedral, Dundee, has just been reopened after internal decoration, carried out by Mr. J. Thomson, from designs prepared by Mr. T. Martin Cappon, architect, of Dundee.

A bronze memorial tablet was publicly unveiled by the Mayor of Bristol on Friday in the vestibule of the museum in Queen's-road, in memory of the late Sir Charles Wathen, six times mayor of the city, 1884-90. Mr. H. J. Margetson was the sculptor.

The Exeter City Council have adopted a report of the navigation committee recommending extensive dredging operations in the estuary of the river Exe, whereby the channels will be deepened and widened throughout. The dredging will be carried out by Sir John Jackson (contractor of Keyham Extension Works), and the operations are expected to extend over five or six years.

Plans have been sanctioned of a new Baptist church proposed to be built in Risk-street, Dumbarton, to accommodate about 400 persons. The cost is estimated at £15,000.

The improvement and enlargement of the organ in Holy Nativity Church, Knowle, Bristol, has just begun. It is proposed to complete the great organ, which at present consists of only five stops; to add a second, and a larger scale open diapason to the pedal organ; to re-voice the swell reeds, and to add a clarinet to the choir organ. The work will be carried out by Messrs. W. G. Vowles and Sons, St. James's Square, Bristol.

The ancient parish church of Ilncillo, in the diocese of Hereford, has just been reopened after restoration at a cost of £500. Mr. Godsell, of Hereford, was the architect.

The parish church of St. Nicholas, Tackley, near Oxford, has just been enriched by the addition of a carved oak chancel screen, designed by Mr. T. Garner (Messrs. Bodley and Garner). It is of English oak, and in style belongs to the late 14th century. It is in three bays, the solid portion on each side, as well as the gates, being panelled and ornamented with tracery. The whole is surmounted by a canopy with delicate fan-like groining, and above the cresting of the canopy rises the symbol of Redemption. The hanging Perpendicular tracery at the head of each bay is finished with crockets and roses.

In the new district church of All Saints, Norwich-road, Ipswich, a memorial reredos was unveiled on Sunday. It is constructed of wainscot oak, with painted panels of mahogany, and is about 14ft. in width, the centre, which is higher than the sides, being 10ft. high. The design consists of a central portion with side wings, the whole being inclosed by a stout moulded frame. The centre panel is occupied by a carved gilded cross on a diapered background. On either side of the central panel are two square panels, one over the other, containing painted emblems of the Four Evangelists. The side panels are decorated with the symbolical lily and rose. All the panels are surmounted by carved and traceried canopies, and the cornice over the central portion has carved paterae, and a carved and gilded cresting above. The oak work is decorated in colour, and most of the carved finials and foliage are gilded. The reredos was executed at Lancaster, under the personal superintendence of the architect, Mr. S. Wright, of Morecambe, who was architect for the church. The oak work and carvings have been carried out by Messrs. Hatch and Sons, of Lancaster, the decorations by Messrs. Shrigley and Hunt, of Lancaster and London, the painted panels being from the brush of Mr. Jewitt, also of Lancaster.

The Old Friends Meeting House at Leek is rapidly undergoing transformation at the hands of Mr. Billings, builder, and will shortly be ready for the decorators. It will be known in future as the William Morris Labour Church. The treasurer has kindly undertaken the whole cost of decorating the interior, in memory of the late Mr. Morris. The opening services are expected to take place in December.

Intercommunication.

QUESTIONS.

[11584].—**Drains.**—In the case of nine cottages in a row, all drained at the back into a common drain, A buys Nos. 1 to 8, and at his death Nos. 1 to 4 pass into the hands of B, and Nos. 5 to 8 into the hands of C. The houses are drained with fall towards No. 1, No. 9 being the upper dead end. In the event of B selling his four—viz., Nos. 1 to 4, could the purchaser refuse to allow the drains from Nos. 5 to 9 their present outlet through his property? and in the event of the purchaser redrawing his four, would he be compelled to leave the existing drain in for the benefit of those above him? The houses have been built about 30 years.—ANON.

REPLIES.

[11563].—**Iron Railings, &c.**—These can be fixed with sulphur, and the surface of stone should be weathered so that no water stands at the foot of the iron. Cramps should be copper, or at least galvanised iron.—H. L.

[11569].—**Copper and Iron Vessels.**—If these are kept scrupulously clean, there should be no danger. The latter might, if preferred, be enameled.—H. L.

[11570].—**Natural Bed.**—If "Portland" cannot distinguish the grain in the stone, he should use a powerful glass, when he will easily see the difference.—H. L.

[11571].—**Stone Cornice.**—Usually cornices and sills can be weathered, the joints in the former being water joints; but in some positions, and especially in London, the lead covering is very useful.—H. L.

[11573].—**Breeze Lintels.**—The material referred to is coke breeze, a material very much used in London in concrete floors. Wooden boxes or moulds are used for the concrete.—H. L.

[11575].—**Architects' Charges.**—I am afraid that "W. B. G." will not recover his charges for time spent in the train and on the works, as that time is covered by the commission for superintendence. The sum of £40 does not seem excessive for the work; but if all architects charged as "W. B. G." proposes to do, the advantages would be in favour of employing a local man.—H. LOVE-GROVE.

[11576].—**Wall Posters.**—I suggest that the wall be rendered roughly in cement, and a little gine put in the gum.—H. L.

[11577].—**Quantities.**—"Xit" seems to have mixed up two different processes in taking out quantities. There is no expeditious method of measuring the work from the drawings. It must be done carefully and correctly, but if squaring dimensions is incessantly practised by decimals, many short and rapid methods will suggest themselves.—H. L.

[11579].—**Breweries.**—The only book that I have seen is a work by Mr. G. Scammell; it can be obtained through Mr. Batsford, High Holborn, W.C.—H. LOVE-GROVE.

[11580].—**Damp in Walls.**—From the description it would seem that some salt has got into the bricks or plastering. I have known similar results through using old bricks which had become saturated with saline liquid.—H. L.

[11580].—**Damp in Walls.**—The damp patches that show on the plaster after rain, the walls being solid, comes through the brickwork. The bricks will take in every drop of rain that falls on them, till they are fully charged with moisture from outside to inside. Our forefathers, that are now called "old fogies," when they built houses with solid walls, used to fix 1½ in. battens on the inside of all exposed walls, and then lath and plaster, as a preventive of damp, or slated or tile-hung the walls on the outside. Our modern custom is to build hollow walls, keeping 4½ in. brick weather-casing to protect the inside walls. The solid walls, especially the storm side, will continue to show damp at all rainy seasons, and now the bricks are new the rain goes in quickly, but also dries out quickly; but as the walls age the bricks will become less pervious, and the damp will also be longer drying out. Perhaps the plasterers' idea of the bricks saltpetre may be correct, especially if the damp patches show on any of the internal walls. He may know, as I guess there is more saltpetre in the plaster than in the bricks, as plasterers like the bricks set up saltpetre, and I have known them on many occasions to impart some of their saltpetre into the thirsty bricks, rather than take the trouble to go off the scaffold, and have seen the damp effects for years afterwards. Fires are not so very much good for drying walls; fires bring the damp to the surface, and the bricks pull it back again. A current of dry air takes it right away. A good day's blow of dry air will be more effectual than a ton of coal burnt in the stove.—H. PRESTON, Lymington.

[11581].—**Figuring Doors on Plans.**—It is best to figure on the plan the size of the door, and to describe the size, and whether frames or linings in the specification.—H. L.

[11581].—**Figuring Doors on Plans.**—The dimensions figured on internal doors, where no special note is made to the contrary, should be taken as mason's openings between brickwork, and from finished floor-level to underside of lintel, as it is the usual custom (at least, in the North) to figure up the plans for the mason to work by, leaving the joiner to take his own dimensions from the building, or to allow for linings and plugs, so that the joiner is responsible for his own accuracy, except in cases where sashes or frames are walled in.—S. W. PITCHERS.

[11582].—**Green Growth on Stone.**—As a rule soap-water and elbow grease will remove vegetation from a gravestone. In obstinate cases, spirits of salt diluted with water should be used. This may be cleaned off with clear water and a sponge, and the preparation repeated until the required result is obtained. As "E. C." does not state the locality, its surroundings, and the kind of stone affected, the question is somewhat ambiguous.—HARRY HEMS.

Mr. J. R. Bell, for many years past consulting engineer to the Government of India, has just retired.

LEGAL INTELLIGENCE.

RE JOHN THOMAS WREN.—This debtor, whose examination took place at the Southampton Bankruptcy Court last week, is described as of Chandler's Ford, North Stoneham, brick manufacturer, carrying on business at Chandler's Ford, and also at Mottsfont. He presented his petition on the 26th August, a receiving order being made, and he was on the same day adjudged bankrupt. The gross liabilities amount to £10,983 14s. 3d.; but of this large sum only £246 15s. 10d., due to unsecured creditors, is expected to rank for dividend. The assets as estimated by the debtor show a surplus in favour of the estate amounting to £2,432 5s. 10½d. The cause of failure alleged is pressure of the bank on their security. The debtor was allowed to pass.

IN RE H. H. BRIDGMAN.—An adjourned meeting of creditors was held before Mr. E. S. Grey, Assistant Official Receiver, at the London Bankruptcy Court, on Monday, under a receiving order made against Henry Hewitt Bridgman, described as an architect and surveyor, carrying on business at 42, Poultry, E.C. The debtor, who is a Common councillor, has during the last fifteen years been engaged in speculative building transactions, and he has also acquired house property in London and Brighton. The liabilities amount to £29,280, of which £5,873 are unsecured, and there is an estimated surplus in assets of £5,346. The debtor ascribes his present position to his inability, through illness, to attend to his business during the present year, and to his inability to dispose of his properties on advantageous terms. On the last occasion a scheme of arrangement was refused by the creditors; but the debtor being desirous of bringing in another scheme, he intimated that he should apply to the Court for leave to do so. With the assent of the creditors, the meeting was adjourned until Thursday, the 19th inst.

PAINTERS' FOREMAN RECOVERS DAMAGES FOR SLANDER.—Before Mr. Justice Cave and a common jury, on Monday, an action was tried, "Munro v. Jameson," in which the plaintiff, a painters' foreman, sued the defendant, an auctioneer, for slander. The plaintiff had been in charge of a number of men in the employment of Messrs. Howard and Co., decorators, who had been engaged in carrying out works of repainting and decorating at the defendant's private house. The defendant had complained that Munro was frequently under the influence of drink while the work was being done, and in consequence he was discharged by Messrs. Howard, who, however, stated that if he cleared himself of this charge they were willing to take him back. The defendant pleaded justification and privilege; but the jury found for the plaintiff with £50 damages, and judgment was entered accordingly.

DAINGEROUS STRUCTURES.—CASE UNDER THE LONDON BUILDING ACT, 1894.—A case of considerable importance under this Act came before the magistrate (Mr. Chuer) at the North London Police Court, on October 28 last, which raised the question of whether the Dangerous Structure provisions of the Act applied to premises which were alleged to be dangerous in the rear and in the interior (ceilings, &c.), and which were unoccupied. The case was originally before Mr. Bros, on October 21, when objection to the proceedings of the London County Council was taken, and the magistrate adjourned the matter, in order that case law upon the subject should be produced, and suggested further proceedings under the Neglected Structure provisions. It was agreed that Mr. Chuer should deal with the case, and consequently the proceedings were commenced *de novo*. Mr. J. W. Godfrey appeared for the Council, and the owner was represented by Mr. Preston. The premises in question are situated at 130, Cassland-road, and Mr. Alexander Payne, the district surveyor for South-East Hackney, gave evidence in support of his certificate of condemnation. He was not cross-examined, as Mr. Preston intimated that he should deal only with the point of law raised. He argued that, as the house stood back from the road for a considerable distance, and was in its own ground and was unoccupied, it could not be a dangerous structure to passengers or inmates as contemplated by the Act. If the Council had taken the proper proceedings, they would have instituted them under the Neglected Structure provisions, although he would not admit that the house in question was a neglected structure. Mr. Godfrey contended that, under the case of the "London County Council v. Herring" (1894), 2 Q.B. 522, it was quite clear that the Council's proceedings were regular, and urged that many persons might lawfully go on the premises, which were advertised to be let by means of boards which were in the grounds. He further pointed out the distinction to be drawn between the provisions dealing with Dangerous Structures and Neglected Structures. Mr. Preston said that the case quoted supported his view, as the houses were occupied, and that that fact explained the Judge's ruling. Mr. Godfrey rejoined that the houses were not all occupied, and even if they were, it would not affect the general question, as a house occupied one day might be vacant the next, and *vice-versa*. After hearing the arguments the magis-

trate decided in favour of the Council, holding that the premises were dangerous within the meaning of the Act, and he made an order upon the owner to do the necessary work.

WHAT IS A "COMPULSORY PURCHASE"?—Before Mr. Justice North, an action was tried on Tuesday, "Jervis v. the Newcastle and Gateshead Water Company." It raised, first, the question whether a purchase by the defendant water company in conformity with a statutory requisition was a compulsory purchase so as to entitle the vendors to such, if any, extra amount of purchase-money or compensation as they would be entitled to by reason of the land being taken compulsorily; and, secondly, the more important question, never before decided as matter of legal principle, whether in the ordinary case of land being taken by a public body under the Lands Clauses Acts a vendor is really entitled to something more than the fair market value of the property taken. The latter question is one that in general it is difficult to raise, because it is the practice of umpires to award a lump sum as the price of property taken without any reference to compensation for compulsory sale. The plaintiffs are trustees of the Pawson estates in Northumberland, and the defendant company had obtained, in 1894, an Act of Parliament enabling them to take compulsorily a portion of the estates. In this Act the plaintiffs had obtained the insertion of a clause requiring the defendant company, if required, to purchase the whole of the particular lands affected at a price to be settled by arbitration; and they gave notice to the defendants to purchase the whole accordingly. Sir Jacob Wilson was appointed as arbitrator, and he awarded £40,189 6s. as purchase-money, and £8,152 18s. as compensation for compulsory purchase. The defendant company impeached this award, denying that there was any title to compensation for compulsory purchase, and the plaintiff then brought the present action for specific performance. His Lordship decided that the sale was not compulsory, and declared that the defendants were entitled to a conveyance on payment of the sum of £40,189 6s.

At the last meeting of the School Board for London, the solicitor was requested to take steps to obtain compulsory powers of purchase of 40 sites, to be utilised either for new schools or for school extensions.

Mr. Samuel Head, a well-known builder and contractor, died at Redruth on Thursday in last week. Deceased was at Pool on Wednesday afternoon superintending the building of the new board school's, and on returning home complained of internal pains, and died next day from cancer in the stomach. The deceased, who leaves a wife and eight children, was 50 years of age.

The members of the staff of the late city surveyor, Mr. W. Howard-Smith, Assoc. M. Inst. C.E., &c., to the number of 160, have presented him with an illuminated address, as a token of the high estimation with which they regarded his eminent abilities and kindly qualities which caused him to enjoy quite a unique popularity among his subordinates. The address is on exhibition at Messrs. Thurnam and Sons', by whom it has been executed. We are pleased to say that Mr. Howard-Smith, who is at present residing in the Engadine, is almost completely restored to health.

The underpinning of the Albert Institute at Dundee has just been completed, at a cost of £980, under the direction of Mr. William Alexander, the city architect.

Mr. Rienzi Walton, M. Inst. C.E., held an inquiry on behalf of the Local Government Board at Liverpool on Friday, concerning applications by the City Council for sanction to borrow £50,000 for the purchase and demolition of insanitary property; for the sale of corporate land in Garnet-avenue, Kirkdale, and to the borrowing of £18,675 for the improvement of public baths and washhouses.

Estate duty has been paid on £97,119, as the net value of the personal estate of Sir John Everett Millais, late President of the Royal Academy of Arts.

St. Enoch's Parish Church, Glasgow, which has been closed for four years and a half, on account of the Glasgow Subway Railway operations, has lately been reconstructed internally and modernised, and was reopened on Sunday.

A comprehensive scheme for the enlargement of Holy Trinity church, Llandrindod, has been prepared by Mr. Nicholson, of Hereford, whose father designed the church itself. Under this scheme seating accommodation for 2,000 worshippers will be provided, at an estimated expenditure of £6,000. The scheme is being carried out in sections. During the last winter one portion was completed—viz., the enlargement of the west end and a narthex (now used as a choir vestry) with a crypt beneath. The expenditure already incurred amounts to over £1,200, and the building committee have concluded to wipe this off before proceeding further.

WATER SUPPLY AND SANITARY MATTERS.

SHEFFIELD AND ITS WATERWORKS.—The Sheffield City Council were occupied for several hours on Wednesday week discussing proposals of the Water Committee, for the appointment of Mr. E. M. Eaton as the engineer of the waterworks about to be constructed by the Council, in the valley of the Little Don. The committee proposed the appointment of Mr. Eaton as consulting engineer, at a salary of £1,200 per year, he to give all the time necessary to the work. An amendment was submitted by Mr. H. Fisher in favour of a resident engineer, with power to call in an expert in consultation if necessary. A great deal of feeling was introduced into the discussion, and eventually the amendment was carried by a considerable majority. Thereupon a letter was read by the town clerk from Mr. Eaton, resigning his appointment as water engineer to the corporation. Another amendment was carried referring the whole question to a specially appointed committee for them to report on the best course to be taken on the basis of a resident engineer. The letter from Mr. Eaton was referred to that committee.

CHIPS.

Jan Verhas, the Belgian artist, died on Saturday, aged 63. Born at Termonde, where his father was director of a school of design, he was sent to the Antwerp Academy. Under the advice of his fellow-worker, Alma Tadema, Verhas achieved his principal success as a painter of children and animals. In the Modern Museum at Brussels is a large canvas from his brush, representing a procession of the communal school children defiling past the King, standing in front of the palace in Brussels, surrounded by the civic dignitaries.

In honour of the 60th year of the reign of the Queen, the exhibition to be held next year at the art galleries of the Guildhall of the City of London will consist of a selection of examples of the highest class (not exceeding 200 in number), executed by artists of the British school who have flourished since her Majesty ascended the throne.

The Todmorden Urban Council have appointed Mr. C. R. Pease, of Batley, surveyor and engineer, at a commencing salary of £125, rising to £200; and have resolved to apply to the Local Government Board for sanction to a loan of £45,900 for a sewerage scheme.

By the permission of the architect and builders, the Birmingham Clerks of Works and Builders' Foremen's Association paid a visit to the new Girls' Grammar School, New-street, in that city, on Saturday last, and were conducted over the building by the clerk of works, Mr. Jones.

An elaborate oak reredos is now being erected at St. Beuno's Church, Berriew, Montgomeryshire. The design consists of a bold centre canopied compartment filled with sculpture, the subject of which is "Feed my Sheep," in bold relief. Flanking the centre are four niches, which contain figures on pedestals of four renowned Celtic saints. The work has been carried out by Messrs. Collins and Godfrey, of Tewkesbury, from the designs and under the superintendence of Mr. F. R. Kempson, F.R.I.B.A., of Cardiff and Hereford. The sculpture is by Messrs. Earp and Hobbs, Canterbury-place, Lambeth, S.E.

Mr. F. H. Tulloch, inspector of the Local Government Board, held an inquiry at Bath, on Friday, into the application of the urban sanitary authority for power to borrow £58,000 for purposes of electric lighting. Mr. R. Hammond, electrical engineer, gave evidence in support of the proposal, of which £22,735 is the sum to be paid to a private electric company for purchase of their works, in accordance with the award of Professor Kennedy, and £12,500 for proposed extensions.

A new organ which has been erected in the Baptist chapel, Stafford, by Messrs. Nicholson and Lord, of Walsall, at a cost of £200, was opened on Wednesday week.

Camphill House, which recently became the property of Glasgow Corporation on the purchase of the estate of Camphill as a public park, was on Saturday opened to the public with a collection of specimens from South Kensington Museum. The exhibition includes examples of Persian, Indian, Chinese, and Japanese art in metal, pottery, porcelain, textiles, and embroideries. In one room the walls are entirely occupied with specimens of old lace of Venice, Alençon, Brussels, Mechlin, and Honiton; and among the textiles there is an embroidered Turkish door curtain from the collection of the late Lord Leighton.

A public inquiry was held at the town hall, Sandbach, on Friday, by Colonel C. H. Luard, R.E., on behalf of the Local Government Board, to inquire into the council's application for sanction to borrow £600 for purposes of water supply, and £200 for portion of expense (£700) of constructing a new road to Malkin's Bank.

Our Office Table.

THE unexpected has happened in the election, on Wednesday night, of Mr. Edward J. Poynter, for the past two years director of the National Gallery, as ninth President of the Royal Academy, by the narrow majority of three votes over Mr. Briton Riviere. No member of that body seemed so distinctly head-and-shoulders above his colleagues as to be unmistakably recognised as the fittest occupant of the chair, unless, perhaps, Mr. Watts, whose advancing years it was well known would have precluded him from accepting the dignity had it been offered, and at least three or four painters were supposed to be in the running. Although the choice will not be enthusiastically acclaimed, yet it will be generally approved, for Mr. Poynter, as a former director of the Art Training School at South Kensington, brings with him powers of organisation that are especially valuable in the presidency of the Academy, and will, it is to be hoped, be brought to bear on the managers of its schools. The son of an architect, the late Ambrose Poynter, educated at Ipswich Grammar School, and a pupil of Gleyre, of Paris, Mr. Poynter, who is now just sixty years of age, possesses wide sympathies and culture. His best-known works are his "Israel in Egypt," now in the permanent collection of the Guildhall Art Gallery; "The Fortune Teller," his diploma picture; "Diadumene," "Atalanta's Race," "A Visit to Esculapius," and "The Meeting of Solomon and Queen Sheba"—all classical subjects; but he has also contributed landscapes and portraits to the Royal Water Colour Society, has painted cartoons for mosaics and frescoes, and designed decorations. In this summer's Academy he was represented by two figure subjects, "Neobulé" and "The Oread." His lectures on art, given as Slade Professor at University College, Gower-street, evince his qualifications to deliver the biennial addresses to the Academy students. Either of his high callings at Burlington House and Trafalgar-square affords more than sufficient scope to employ the whole of his energies; and although there is the precedent of Sir Charles Eastlake to justify Mr. Poynter's retention of the dual responsibilities, he will act more wisely to devote himself entirely to his Academical duties.

THE advancement of Mr. Thomas Graham Jackson, M.A., Associate, to full membership as Royal Academician, can but command the entire approval of all architects; and certainly the election of so capable and successful an architect will reflect an honour on the Royal Academy of Arts. Mr. Jackson's enthusiasm in the direction of reforming the architectural schools at Burlington House may, it is hoped, with the co-operation of Mr. Norman Shaw, at no far distant date lead to new methods and a more practical development in this much-needed direction. At any rate, Mr. Jackson will now have a fair chance afforded him of realising in a tangible form the theories and more liberal scheme of technical art tuition which he advocated, under the editorship of Mr. Norman Shaw, in their joint book entitled, "Architecture a Profession or an Art?" The scholarly attainments of Mr. Jackson are distinguished, and his literary abilities share no equal in the architectural profession, his volumes on Dalmatia alone furnishing sufficient evidence for the justice of this remark. Nevertheless, we can but record our surprise and regret that so great an architect and so complete an artist as Mr. Bodley should have been thus passed over in favour of Mr. Jackson. All who knew Mr. Bodley are familiar with his retiring disposition; but they also know his great ability and the beauty of his buildings and designs; and for these reasons we are sure our surprise will be shared by the majority of architects. Mr. Bodley is, moreover, Mr. Jackson's senior by ten years in the Associateship. Mr. Jackson, whose portrait was given by us on Feb. 7, 1890, is one of Sir Gilbert Scott's pupils, and has designed and carried out many churches and schools, but will be longest remembered for his work at Oxford, including the University Examination Schools, the restoration of the Bodleian library, new quadrangles for Trinity and Brasenose Colleges, and new buildings for Lincoln, Corpus, Hertford, and Wadham (of which he is Honorary Fellow) Colleges, and the Somerville Hall for Ladies. One of his most important recent works in London is the residence for Mr. and the Hon. Mrs. Athelston Riley in Kensington Court, for whom he also designed a grand

piano, manufactured by Messrs. Broadwood, and illustrated in our issue of Jan. 6, 1893.

THE constant interruption to traffic which has been going on for some weeks in the Strand and other parts of the more crowded thoroughfares ought to open the eyes of the authorities to the absolute importance of providing subways wherever they can be constructed. The block to traffic of the vehicular kind especially is becoming a scandal, as not only those in vehicles suffer delay, but those also who have to cross the street, and are pressed for time. A block occurs, in consequence of an obstruction, at a junction, and it is very difficult to cross the road at those points. If subways for pipes and telephone-wires cannot be put down, crossing-subways or footbridges ought to be constructed at all centres. As to the times at which this continual pulling-up of the roadway takes place—in the busiest and most crowded season of the year—much may be said; but it is a never-ending complaint.

THE Southampton Corporation have now arrived at the end of the first stage in the demolition of the slums which disfigure parts of their town, under the provisions of the Act relating to the Housing of the Working Classes. An arbitration was recently held in the borough, and the awards have now been taken up, with the exception of two dealing with public-houses, not yet settled. The amount of the claims sent in for the area, which is $3\frac{3}{4}$ acres in extent, was £42,588 10s. 8d., and with the two exceptions named, these claims have been settled for a total sum of £24,750 6s., exclusive of costs.

THE first of a series of five weekly lectures in connection with the Arts and Crafts Exhibition now open was given in the New Gallery, Regent-street, last (Thursday) evening by Mr. T. J. Cobden-Sanderson, who took as his subject "Art and Life." Next Thursday evening, Nov. 12, Mr. W. R. Lethaby will descend upon "Beautiful cities"; and the subsequent meetings will be: Nov. 19, "The Decoration of Public Buildings," by Mr. Walter Crane; Nov. 26, "Public Gardens and Squares," by Mr. Reginald Blomfield; and Dec. 3, "Colour in Architecture," by Mr. Halsey Ricardo.

THE Paddington Vestry decided on Tuesday night by a very large majority to rescind a resolution passed in February last to repave part of Edgware-road and the whole of Praed-street with Baltic yellow deal. It was stated that long experience of the yellow deal hitherto used in paving eight miles of the streets of the parish, and the careful investigations of a special committee appointed by the vestry to ascertain the relative merits of hard and soft wood for road-making purposes, as practically tested in the Metropolis generally, led the vestry to decide in favour of hard Australian wood as ultimately the most economical, and certainly the most cleanly, sanitary, and durable. Its adoption, instead of deal blocks, in the paving of roads over which heavy and constant vehicular traffic passes would certainly obviate the necessity of frequent renewals of material and interruption of traffic.

SOME months ago a commission was appointed by the Bishop of Worcester to consider and report to his lordship upon the desirability of removing from the centre of Birmingham some of the churches to which practically no resident populations are now attached, and to indicate districts in the suburbs to which population has migrated, and which are deficient in church accommodation. The commission recommends the removal of three town churches—Christ Church, New-street; St. Peter's, Dale End; and St. Mary's, in St. Mary's-square. With the money acquired by the sale of the present churches it is proposed to build two small mission churches in the area which will be affected. With the remainder of the available funds it is proposed to build three suburban churches, each with a distinct parish assigned to it. One of these will be placed in the Sparkbrook district, one in All Saints' Ward, and one in the Balsall Heath district.

THE town council of Stafford, who are introducing the water-closet system into the town, have decided to purchase 2,000 wash-down water-closets of the "Sirius" pattern as required from Messrs. Gabriel and Co., of Birmingham, at 17s. 6d. each inclusive. With regard to waste water-closets, they will practically test different patterns before deciding upon the particular one to be adopted, and, therefore, 100 each will be purchased from the Sanitation Improvement

Company, of Wolverhampton, and Messrs. Duckett and Co., of Burnley, and 20 from Mr. M. L. Hopkins, of Birmingham, and fixed in different localities in the town. The corporation will leave it entirely open to each ratepayer to have whichever kind of closet he may prefer. The sewerage system for the borough is approaching completion, and is expected to be in working order by the beginning of December.

ONE of the few artistic bridges of the suspension order is that at Buda Pest, Austro-Hungary, Mr. Adam Clark being the engineer. The main piers which carry the chains are of Classic proportions, and represent massive archways with rusticated bases and arches; above this rusticated plinth the piers are of dressed ashlar of graceful outline, there being a slightly curved batter. A well-proportioned enriched cornice, with trusses surrounded by a broken attic, crown the composition; the footways go round the base of the masonry, and project beyond the piers on cantilevers of stone. A considerable rise is obtained in the centre span of roadway. The architectural design of these masonry towers resembles much the quasi-Roman treatment of the triumphal arch as we see it in Paris, a rusticated version of the Arc de l'Etoile. Whether this kind of structure is more suitable than the towers we do not discuss. Certainly, it is a sensible form of construction, and looks imposing.

THE Buchananland Railway has been finished for a distance of 162 miles beyond Mafeking, and earthworks are in progress to a distance of 230 miles. It is hoped that 220 miles will be finished by the end of the year.

A new Congregational church is in course of completion at St. Anne's-on-Sea. The cost will be about £9,000, exclusive of a site valued at £1,500, which has been given. The contractors are Messrs. T. and J. Foster, of Ramsbottom.

The Bishop of Stepney on Sunday afternoon dedicated two frescoes, designed and executed by Mr. Daniel Bell, which have been placed on the walls of St. Matthias, Stoke Newington.

ONE of the most important of the private Bills to be submitted to Parliament during the next session is a project for the construction of a new railway from Nottingham to Manchester. The line of route, which embraces Derby, Ashbourne, Leek, and Macclesfield, has already been surveyed, and plans will shortly be deposited. An independent station will be built at Nottingham, and at Manchester an effort will be made to run into the Central Station of the Cheshire Lines.

At Stratford town hall last week a full-length portrait of the late Alderman Worland, late mayor of West Ham, was formally unveiled. It has been painted for subscribers by Mr. C. Grenville Mantou.

The partnership heretofore subsisting between F. Redfern and H. J. Haigh, architects and surveyors, Leicester, under the style of Redfern and Haigh, has been dissolved.

The name of Mr. W. Wybrow Robertson, of Her Majesty's Office of Works, and Master of the Edinburgh Merchants' Company, has been added to the commission of the peace for the city of Edinburgh.

THE restoration of the central tower of the fine parish church St. Nicholas, New Shoreham, has now been completed at a cost of £2,500, and the tower was rededicated by the Bishop of Chichester, Dr. Wilberforce, on Tuesday. The work of restoring the tower has been carried out by Mr. John Thompson, of Peterborough, with Mr. Bloodworth as clerk of the works. The work includes not only the thorough restoration of the tower, but the recasting and an addition to the bells. Originally there were five, of which four were cracked. There are now six, the four which have been recast, the one left which was sound, and an entirely new one. Space has been left for two more bells, which will complete the octave, and which were promised on Tuesday.

On Wednesday week the chapel at the Sevenoaks Workhouse, Ide Hill, was reopened after having been renovated. The floor to the chancel and sacristy has been renewed, and raised in steps. The ceiling has been repaired, the portion over the chancel and sacristy being panelled with wood mouldings. Ornamental strutting has been fitted beneath the principal rafters in the framing of the queen-post roof, and a wooden cross has been fixed in the centre of the straining-beam. New pitch-pine benches and choir-stalls have been provided, and the seating accommodation has been rearranged. The old windows have been replaced by new ones, the walls cemented, and a terracotta dado run round. The work was carried out by Mr. R. Durnall, of Brasted, under the supervision of Mr. T. Potter, of Sevenoaks, architect.

MEETINGS FOR THE ENSUING WEEK.

THURSDAY.—New Gallery. "Beautiful Cities," by W. R. Lethaby. 8.30 p.m.

Central School of Arts and Crafts, 316, Regent-street, W. "Mechanical Principles Involved in Building," Lecture I., by R. B. Molesworth, C.E. 8.30 p.m.

FRIDAY.—Architectural Association. Short papers on: "Roof Coverings," with demonstrations: "Lead Copper, and Zinc," by G. Ewart; "Tiles," by F. Walker; and "Slating," by T. Stirling, Jun. 7.30 p.m.

CHIPS.

The church of SS. Peter and Paul, Stokesley, Yorks, was reopened on the 28th inst. by the Lord Bishop of Hull, after thorough renovation, under the superintendence of Messrs. R. Lofthouse and Son, architects, Middlesbrough.

Mr. Kite, superintending civil engineer at Devonport, has been appointed to the directorate of the Works Department at the Admiralty, and Major E. R. Kenyon, R.E., is appointed to succeed him at Devonport.

The foundation-stones of the new Young Men's Christian Association premises at Newcastle-on-Tyne, were laid on Wednesday. The building will cost, with site, £38,000, and is being erected from plans by Mr. J. W. Taylor, of the same city, by Mr. Alexander Pringle, of Gateshead. The fireproof flooring is by Messrs. Homan and Rodgers.

On Tuesday morning, Mr. Thomas Forbes, road surveyor for the county of Mid-Lothian, was discovered lying dead on the kitchen stairs of the Royal Exchange Hotel, Edinburgh, death evidently being due to his having fallen from the top of the steps, and struck his head upon the wall. Mr. Forbes had been for a quarter of a century connected with the management of the county roads in the vicinity of Edinburgh.

The foundation-stone of the technical institute and free library for West Ham was laid in Romford-road, Stratford, on Thursday, in last week. The building is being erected from designs by Messrs. Gibson and Russell, of Gray's Inn-square, whose design was selected, from 75 competitive plans sent in, by Mr. J. MacVicar Anderson, the assessor, and was illustrated in our issues of Oct. 4 and 11, 1894. It is Renaissance in style, and will be faced with Portland stone. The contract has been taken at £41,000 by Messrs. Shillitoe and Son, of Bury St. Edmund's.

The foundation-stone of the new Huddersfield Police-station was laid on Friday. The new premises, which are estimated to cost between £10,000 and £11,000, are being constructed at the junction of Peel-street and Princess-street. They adjoin the fire-station, and will be connected to the town hall by a subway. They are being carried out from plans by the borough surveyor, Mr. R. S. Dugdale, the chief contract having been taken by Mr. Schofield.

Mr. G. W. Willcocks, M.I.C.E., held a Local Government Board inquiry last week at Lowestoft into the application for sanction to borrow £7,000 for the construction of a new sewage outfall to the south of the existing structure. The town clerk said that the outlet was to be placed at the Ness Point, about 120 yards south of the existing works. The amount of the loan was made up as follows: Tender from Messrs. Cooke and Co., Battersea, £6,547, and contingencies £453.

Dr. Hofstede de Groot, who has for some years assisted Dr. Bredius at the Hagne Gallery, has been appointed Director of the Print Room in the Ryks-museum at Amsterdam.

The completion of the block of premises erected for Messrs. Maple and Co., of Tottenham Court-road, for their new showrooms, on the site of the old Eden Theatre, at the corner of the Rue Scribe, and facing the Grand Opera, in Paris, is announced, and the opening to the public is fixed for December 1.

Mr. J. Wolfe Barry delivered, on Tuesday evening, the inaugural address for the session of the Institution of Civil Engineers, of which he is the president for the year. He devoted his speech to a review of the progress made in engineering during the 59 years of the Queen's reign.

A new branch bank, near Bedminster Bridge, Bristol, was opened by Messrs. Prescott, Dimsdale, Cave, Tugwell, and Company, Limited, for business on Monday. The building occupies part of a site of a late brewery. Messrs. Stephens, Bastow, and Co. were the contractors, the architect being Mr. Mr. Walter Cave, of London, a son of Sir Charles D. Cave, Bart., the senior director of the Bristol Old Bank.

Sir William Henry Wills, Bart., M.P., laid, on Saturday, the foundation-stone of a new chapel at Mill-hill School, which is to be erected, at a cost of £5,000, from the designs of Mr. Basil Champneys.

LIST OF COMPETITIONS OPEN.

Bootle—North Board School for 1,000 children (local architects only)	No premium	F. K. Wilson, Clerk, Balliol-road, Bootle	Nov. 11
Sunderland Corporation—Artisans' Dwellings (for 480 persons)	£50, £30, £20	Fras. M. Bowey, Town Clerk, Sunderland	" 14
Stamfordham and Hawkwell Drainage Plan	£10	Geo. Wilkinson, Clerk, 27, Mosley-street, Newcastle-on-Tyne	" 14
Sunderland—Workmen's Dwellings	£50, £30, £20	Fras M. Bowey, Town Clerk, Sunderland	" 14
Darlington—Laying-out Southend Estate	£35, £15	R. C. Pearce, Estate Agent, Darlington	" 20
Douglas, I.M.—Municipal Buildings (£10,000 limit of cost)	£40, £20, £10	T. H. Nesbitt, Town Clerk, Douglas	" 21
Shotley Bridge, Co. Durham—Cottage Homes for Children	No premium	Geo. Craighill, Clerk to Guardians, Gateshead	" 23
Pel, Isle of Man—Approach Road to Shore-road	£20, £10, £5	Geo. Cannell, Town Commissioners' Office, Peel	" 30
Newport, Mon.—Hospital (£16,000 limit of cost)	£100, £50	J. K. Stone, Secy., 39, High-street, Newport	Dec. 1
Rhos-on-Sea, Colwyn Bay—Laying-out Building Estate	£100, £35, £15	Philip J. Kent, Rhos Abbey, North Wales	" 5
Weston-super-Mare—Pavilion at Knightstone (£8,000 limit)	£50, £20, £10	Wm. Smith, Clerk U.D.C., Town Hall, Weston	" 10
Kieff, Russia—Theatre (£48,000 limit, 1500 seats)	£290, £160, £120, £76, £32	Imperial Society of Architects, 83, Quai de la Moika, St. Petersburg	" 15
Longton, Staffs—Schools and Free Library (£8,000 limit)	£75, £25	Geo. C. Kent, Town Clerk, Longton	" 31
Liskeard, Cornwall—Rebuilding Tower, Parish Church (£3,000 limit)	£50 (merged in Commission), £25	Nettle and Bone, Hon. Secs., Liskeard	Jan. 1
Tottenham—Higher Grade Schools, Wood Green	No premium; commission 3½ p. c.	J. F. A. Adams, Clerk to School Board, Tottenham	" 15
Sunderland—Technical School (£18,000 limit of cost)	£100, £50, £25	Fras M. Bowey, Town Clerk, Sunderland	" 16
St. Gilles, near Brussels—Town Hall (£42,000 limit of cost)	£160 and two lesser premiums	Municipal Authority, St. Gilles, Belgium	Feb. 1
Osgodby, Lincolnshire—Wesleyan Chapel & Schools (cost £600)	No premium	E. H. Davy, Secretary to Trustees, Kirkley, Market Rasen	"
Kurtemuir, N.B., Parish Church Hall			"
Kesteven District Lunatic Asylum (C. H. Howell, Assessor)			"
Edeshill, Bradford—Sewage Disposal	£20, £10	Jos. Richardson, Clerk, U.C., 4, Town Hall-square, Bradford	"
Barry, Glam.—Municipal Buildings (£10,000 limit)	£100, £50	Clerk to Urban District Council, Barry	"
Chapel, Crompton, near Pickering		Robert Harland and T. Pickering	"
Warnley, Bristol—Out-Relief Offices	10gs., 5gs., 2½gs.	S. F. Andrews, Clerk to Board of Guardians, Keynsham	"
Scarborough—Higher Grade School (E. R. Robson, F.S.A., Assessor)		Clerk to School Board, Scarborough	"
Leicester—Isolation Hospital (Local architects only)	£100, £50, £25	Borough Surveyor, Town Hall, Leicester	"

LIST OF TENDERS OPEN.

BUILDINGS.

Leamington—Greenhouses	Corporation	W. de Normanville, Borough Surveyor, Leamington	Nov. 9
Bristol—Insurance Offices, Clare-street	Law and Crown Insurance Co.	Hy. Williams, Architect, 24, Clare-street, Bristol	" 9
Arundel—Bakery, Tarrant-street	Co-operative Society	S. H. Morgan, Secretary, Arundel	" 9
Bristol—Additions to Premises, White Ladies-road	Alexandra Drapery Co.	Hy. Williams, Architect, 24, Clare-street, Bristol	" 9
Worthing—Coal Store and Workshop at Waterworks	Corporation	W. Verrall, Town Clerk, Worthing	" 9
Alnwick—Three Cottages, Abbey Lands	Earl Percy	—Kryle, Clerk of Works, Alnwick Castle	" 10
Aberdeen—South Wing Extension, Marischal College	Town Council	A. Marshall Mackenzie, A.R.S.A., 1, Bon Accord-street, Aberdeen	" 10
Edinburgh—Excavations for Cable-Power Stations	School Board	Burgh Engineer, 1, Parliament-square, Edinburgh	" 10
Harwich—Additions to Esplanade School	School Board	A. J. H. Ward, Clerk, Harwich	" 10
Little Ilford—Essex-road Schools	School Board	J. Turner, Clerk, 759, Romford-road, Manor Park	" 11
Deptford—Shelter, &c., Recreation Ground, Benbow-street	Greenwich District Board of Works	J. Spencer, Clerk, 141, Greenwich-road, S.E.	" 11
Bingley—Shops, Main-street		Walker and Collinson, Architects, Swan Arcade, Bradford	" 12
Bristol—Laundry and Stables, Southmead	Bristol Sanitary Laundry Co.	Hy. A. Francis, Secretary, 44, Corn-street, Bristol	" 12
Llanidloes—County Intermediate School	Glamorganshire County Council	M. H. Scather, 92, St. Mary-street, Cardiff	" 12
Oxenhope—Wesleyan Sunday Schools		W. and J. B. Bailey, Architects, Bradford	" 13
Hill End, St. Alban's—Asylum Superstructure	Herts County Council	P. W. Dumville, Clerk, St. Alban's	" 14
Everton and Mathersey—Repairs to Properties	Magner's Charity Trustees	Godfrey Tallents, Clerk, Carter-street, Newark	" 14
Romford—Posts, Gates, Gas-Pipes, &c., at Market	Urban District Council	Geo. Bailey, Clerk, South-road, Romford	" 14
Berwick-on-Tweed—Engine-House Additions	Corporation	W. Weatherhead, Clerk, Berwick-on-Tweed	" 14
Haslingden—Sewage Disposal Buildings	Joint Sewage Board	R. W. Bugler, Clerk, West View, Haslingden	" 14
Whitworth—Church School, Lloyd-street	Trustees	J. Stott, Architect, St. Anne's-on-Sea	" 14
Lurgan—Station Buildings and Roofs	Great Northern (Ireland) Railway	T. Morrison, Secretary, Amiens-street, Dublin	" 16
Lisburn—Station Buildings and Roofs	Great Northern (Ireland) Railway	T. Morrison, Secretary, Amiens-street, Dublin	" 16
Burton Port, Co. Donegal—Coastguard Station	H.M. Office Public Works	P. J. Tuohy, Secretary, Dublin	" 16
Abertillery—Six Shops	David Morgan, Cardiff	James and Morgan, M.M.S.A., Charles-street Chambers, Cardiff	" 16
Llangennech—Two Houses	School Board	Davies and Son, Architects, Cowell House, Llanelly	" 16
Coventry—South-street Schools	Board of Guardians	G. and I. Steane, Architects, Coventry	" 16
Bethnal-green—Workhouse Infirmary, Palestine-place		D. Thomas, Clerk, Bishop's-road, Victoria Park, N.E.	" 17
Kennington—Bath-room and Steam Drying Closets, Lambeth Infirmary	Board of Guardians	W. B. Wilmot, Clerk, Brook-street, Kennington-road, S.E.	" 18
Chard—Five-Storeyed Fireproof Staircase	Owners of Holyrood Mill	J. Fletcher Trew, M.S.A., County Chambers, Gloucester	" 19
Southampton—Store on Town Quay	Harbour Board	J. C. Poole, 4, Portland-street, Southampton	" 20
Llangefni—County Buildings	Anglesey County Council	C. M. Roberts and Son, Architects, Portmadoc	" 24
Bideford—Police Station	Devonshire County Council	H. Michelmores, Clerk, Exeter	" 25
Eccles, Lancs.—Town Hall Extension	Town Council	Geo. W. Bailey, Town Clerk, Eccles	" 25
Blackpool—Three Houses		Thos. Fox, Layton, Hawes	"
Burnley—New Board Schools	School Board	W. A. Quarmby, Architect, Grinshaw-street, Burnley	"
Leeds—New Board Schools	School Board	W. S. Braithwaite, Architect, Leeds	"
Nottingham—Pulling Down Buildings		C. H. Kitchen, Warsengate, Nottingham	"
Sheffield—Shops		Holmes and Watson, Architects, St. James's-row, Sheffield	"
Nottingham—Painting Interior of Premises, Eastcroft	Hide Company, Limited	—Dawson, Eastcroft	"
Cardiff—Rebuilding Hayes Market	D. Rees and Co., Limited	J. P. Jones, Richards and Budgen, Architects, Cardiff	"
Woodlesford—Houses		W. Simpkins, Swan Junction, Hunslet, Leeds	"
Manchester—Row of Six-Roomed Houses		Manchester Guardian Office	"
Sherriff Hill, Newcastle—Three Cottages		Shepherd Inn, Blue Quarries, Sherriff Hill	"
Burnley—Rose-grove Schools	School Board	W. A. Quarmby, Architect, Imperial Chambers, Burnley	"
Leeds—City-square Improvement (Granite Work)	City Council	Town Clerk, Leeds	"
Kettering—Semi-Detached Villas		M. Hall, Huntly-grove, Kettering	"
Kettering—Three Houses, Cavendish-street		M. Hall, Huntly-grove, Kettering	"
Chelmsa—Middle-class Flats		Alfred J. Best, Surveyor, 38, Sloane-street, S.W.	"
Edgfield, Norfolk—School and House	School Board	H. J. Green, Architect, Norwich and Lynn	"
Cardiff—Rebuilding Haye's Market	Rees and Co.	Jones, Richards, and Budgen, Architects, St. Mary-street, Cardiff	"
Antwerp—Covered Quay (about £6,800)	Official	Eastern Railway Station, Antwerp	"
Manchester—Rebuilding Tivoli Theatre, Peter-street		Harry Percival, Architect, 22, Buckingham-street, Strand, W.C.	"
Robin Hood's Bay—Hotel		Jno. Rickinson, Robin Hood's Bay, Whitby	"
South Hampstead—Additions to Day Dawn House		L. Sinclair, Netherhall-gardens, South Hampstead	"
Hereford—Iron Warehouse, Commercial-road	Rogers and Co.	W. W. Robinson, Architect, Hereford	"
High Spen—House and Shop	Joseph Brown	T. C. Nicholson, F.R.I.B.A., 24, Grainger-street West, Newcastle	"
Garwood, Lynn—Six Houses	B. Hewetson	B. Hewetson, King-street, Lynn	"
Billerica—House	G. King, Gravesend	W. L. Wood, Architect, 26, Alexandra-street, Southend	"
Barry, Glam.—Pair of Semi-Detached Villas	C. J. Vaughan	Jones, Richards, and Budgen, 18, St. Mary-street, Cardiff	"
Leeds—Sixteen Houses, Haddon-avenue		Carlton Brothers, Leeds	"
Leeds—Two Shops, Kirkstall-road	Councillor Bettison	J. W. Thackray, A.S.I., 3, Rossington-place, Leeds	"
Rushden—Alterations to Vestry Hall	Frank P. James	Fred Shove, Architect, Clare Chambers, Bristol	"
Barry, Cardiff—Semi-Detached Villas	Urban District Council	Wm. Pare, Surveyor, Rushden	"
Carlisle—Three Shops, Botchergate	C. J. Vaughan	J. P. Jones, Richards, and Budgen, Archts., 18, St. Mary-st., Cardiff	"
Blaengarw—Hotel	W. D. Todd	H. Higginson, M.S.A., 3, Lonsdale-street, Carlisle	"
Brandon, Rugby—Mills		J. S. Williams, 23, Montague-terrace, Aberdare	"
South Moor, Newcastle—Residence	Artificial Silk Spinning Co.	F. W. Baker, 1, Broad-street Corner, Birmingham	"
Narberth—Iron and Glass Roof (115ft. Sin., by 81ft.)	Anthony Gibson	T. C. Nicholson, F.R.I.B.A., 24, Grainger-street West, Newcastle	"
Kensington—Six Residences	Market Hall Co.	John Roberts, Secretary, Narberth	"
Manchester—Rebuilding Tivoli Theatre, Peter-street	Kensington Freehold Land Trust	Booth and Fox, 9, John-street, Adelphi	"
Crickhowell—Alterations to St. Edmund's Church	Directors	H. Percival, Architect, 22, Buckingham-street, W.C.	"
		Nicholson and Heavittree, Architects, Hereford	"

ENGINEERING.

Heyst-sur-Mer, Belgium—Pumps for Waterworks and Sewers.	Official	L'Administration Communale, Heyst-sur-Mer	Nov. 9
Glasgow—Fans and Motors	Corporation	William Arnot, 75, Waterloo-street, Glasgow	" 9
Barden, Bolton Abbey—Barden Beck Bridge		Gilson Martin, Estate Office, Bolton Abbey	" 10
Dundee—Pipes and Electric Cables	Gas Commissioners	Electrical Engineer, Dudhope Crescent, Dundee	" 10
Ayr—Electricity Works Extension	Burgh Council	A. G. Young, Town Clerk, Ayr	" 10

ENGINEERING—continued.

Bonnybridge, N.B.—Waterworks	Stirlingshire County Council	Mathie, MacLuekie, and Lupton, 22, King-street, Stirling	Nov. 11
Birmingham—Remodelling Cooking Plant	Guardians of the Workhouse	W. H. Ward, Architect, Paradise-street, Birmingham	" 12
Syracuse—Iron Bridge over Anapo (£8,000)	Ministry of Public Works	The Préfecture, Syracuse, Sicily	" 12
Hastings—Heating and Hot Water at Workhouse	Board of Guardians	A. R. Inskipp, Clerk, Wellington-square, Hastings	" 12
Comb Martin, Barnstaple—Water-mains (1,200ft. 3in.) and Flushing Tank	Barnstaple Rural District Council	W. H. Tolber, Clerk, Barnstaple	" 12
Southampton—Electric Installation at Guildhall, Municipal, and Police Offices	Corporation	G. B. Nalder, Town Clerk, Southampton	" 13
Stafford—Cooking Apparatus at Workhouse	Board of Guardians	W. Morgan, Clerk, 4, Martin-street, Stafford	" 13
Oxford—Heating Chapel of Radcliffe Infirmary	Committee	A. C. Virgo, Secretary, Oxford	" 14
Mexico City—Pumping Machinery and Boilers	Official	City Sanitation Board, Mexico	" 14
Eastbourne—Cast Iron Pipes (1,000 tons)	Corporation	R. M. Gloyne, Borough Surveyor, Eastbourne	" 14
Holland—Two Cornish Boilers, Waddinxveen	Official	Management of the Achterof and Puttepolders, Waddinxveen	" 14
Berwick-on-Tweed—Cast-Iron Water Mains	Town Council	Leslie and Reid, C.E.'s, 72A, George-street, Edinburgh	" 14
Alexandria—Landing Stage	Harbour Board	President, Administrative Council, Cairo	" 15
Carshalton—Pipe Sewers (12 miles)	Urban District Council	C. P. Lovelock, Clerk, Carshalton	" 16
Hamilton, N.B.—Laundry Plant at Hospital	District Committee	J. F. Mackenzie, District Clerk, Hamilton	" 16
Sandown, I.W.—Greenheart Landing Stages	Pier Extension Co.	W. H. Wooldridge, Secretary, Sandown	" 16
St. Mary's Island, Hartley—Lantern for Lighthouse	Trinity Brethren	Chas. A. Kent, Secretary, Trinity House, E.C.	" 19
Monmouth—Machinery	Town Council	Bramwell and Harris, 5, Great George-street, Westminster, S.W.	" 23
Monmouth—Cast Iron Pumping Main	Town Council	Bramwell and Harris, 5, Great George-street, Westminster, S.W.	" 23
Monmouth—Electric Lighting Main	Town Council	Bramwell and Harris, 5, Great George-street, Westminster, S.W.	" 23
Maryborough—Electric Installation at Asylum	Irish Board of Control	Secretary, Customs House, Dublin	" 23
West Ham—Electrical Instruments and Machinery	Corporation	J. J. Steinitz, Electrical Engineer, Town Hall, Stratford	" 24
Fivemiletown—Waterworks	Clogher Board of Guardians	J. C. Scraggs, Clerk, Clogher	" 28
Sutton, Cheshire—Waterworks	Runcorn Rural District Council	John Ashton, Clerk, 71, High-street, Runcorn	" 28
Lichfield—Sinking Shaft, Walsall-road	Lichfield Conduit Lands Trustees	A. E. Chinn, The Close, Lichfield	" 30
Copenhagen—Boilers and Electrical Plant	City Magistracy	Secretary, 30, Gothersgade, Copenhagen	Dec. 4
Calcutta—Sewage Pumping Machinery	Municipality	W. R. Macdonald, Corporation Secretary, Calcutta	" 8
St. Malo—Waterworks	Municipal	Hôtel de Ville, Ile-et-Vilaine, France	" 31
Huelva, Spain—Dredging Harbour	Official	Dirección General de Obras Públicas, Ministerio de Fomento, Madrid	Jan. 1
Furnes, France—Cleaning Canal (7½ miles, about £3,000)	Official	The Préfecture du Nord, Lille, France	" —
Newmarket—Laying Water Mains (1½ mile)	Stewards of Jockey Club	E. A. Sanford Fawcett, C.E., 1, Victoria-street, S.W.	" —
North Staffordshire—Reconstruction of Entire Tramway Lines	N. S. Tramways Co.	J. G. B. Elliot, Secretary, 13, Eldon-street, E.C.	" —
Strasbourg—Steam Pump and Boiler	Alsace-Lorraine Railway	Stationmaster, Strasbourg	" —
Antwerp—Demolition and Construction of Covered Quay	Official	Eastern Railway Station, Antwerp	" —
Erfurt—Iron Bridge (215 tons)	Official	Prussian State Railway Department, Berlin	" —
Hartlepool—Construction of Electric Tramways	British Electric Traction Co.	J. V. Kitchener, Secretary, 1, Great Winchester-street, E.C.	" —

FENCING.

Barry—1,500 Light Wrought-Iron Tree-Guards	Urban District Council	J. C. Pardoe, Surveyor, Barry, Glam.	Nov. 10
Winwick Park, Warrington—6,000 Stones (3½c.ft. each and 12in. thick) to receive Iron Railings	Lancashire Asylums Board	Fred C. Halton, Clerk, County Offices, Preston	" 10
Friern Barnet—Iron Fencing	Urban District Council	E. J. Reynolds, Council Chambers, Friern Barnet	" 11
Deptford—Recreation Ground, Benbow-street	Greenwich District Board of Works	J. Spencer, Clerk, 141, Greenwich-road, S.E.	" 11

FIRE-ENGINE.

Weston-super-Mare—Steam Fire-Engine (£500)	Urban District Council	Wm. Smith, Clerk, Town Hall, Weston-super-Mare	Nov. 17
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FURNITURE AND FITTINGS.

Salford—Furniture, Marlborough Board School	School Board	O. Dutlia, Clerk, School Board Offices, Salford	Nov. 9
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LAYING OUT PARK.

West Bromwich—Laying-out Kenrick Park	Corporation	A. D. Greatorex, Borough Surveyor, West Bromwich	Nov. 16
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PAINTING.

Heywood—Painting P.M. Chapel, Bridge-street	Secretary, 41, Derby-terrace, Heywood	Nov. 9
Preston—Painting All Properties	Corporation	Borough Engineer, Town Hall, Preston
Blackheath, Marston Park, Wandsworth and Clapham Commons—Painting and Repairs	London County Council	C. J. Stewart, Clerk, Spring-gardens, S.W.
West Ham—Four Schools (Cleansing, Repairs, and Painting)...	West Ham School Board	C. W. Carrell, Clerk, Broadway, Stratford

PLUMBING.

Leeds—Plumber's Works, Thirty Houses	H. W. Thompson, 170, Harehills-lane, E.C.	" —
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ROADS AND STREETS.

Abergavenny—Widening Penbiddle-lane	Rural District Council	Jno. Gill, Surveyor, North-street, Abergavenny	Nov. 9
Ramsgate—Kerbing (1,600ft.) and Channelling (400ft.)	Corporation	M. Aspinall, Borough Surveyor, Broad-street, Ramsgate	" 9
Leamington—Making-up Streets (1,900 yards)	Corporation	W. de Normanville, Borough Engineer, Leamington	" 9
Bexley—Levelling, Asphalted Playground, Upland	Bexley School Board	Upland Board School	" 9
Hertford—Broken Granite (600 tons)	Corporation	T. J. Sworder, Town Clerk, Hertford	" 10
Frindsbury, Kent—New Road	Rochester Land Co.	J. W. Nash and Sons, Surveyors, Rochester	" 10
London, E.C.—Australian Hard-wood Paving, John Carpenter and Waithman-streets	Commissioners of Sewers	H. M. Bates, Clerk, Guildhall, E.C.	" 10
Catford—Making-up Shuckburgh-road, &c.	Lewisham Board of Works	Edward Wright, Clerk, Catford, S.E.	" 10
Kingston-on-Thames—Channelling (3,000ft.) and Kerbing (3,000ft.)	Corporation	H. A. Winsor, Town Clerk, Clattern House, Kingston	" 11
Greenwich—Norwegian, Guernsey, and Aberdeen Granite	District Board of Works	J. Spencer, Clerk, 141, Greenwich-road, S.E.	" 11
Tydesley—Setts, Kerbing and Channelling, Flags, &c.	Urban District Council	J. Brooke Smith, Surveyor's Office, Tydesley	" 11
Birkenhead—Flagging and Sewering Passages	Corporation	A. Gill, Town Clerk, Birkenhead	" 11
Preston—Paving Fishwick Parade	Corporation	Borough Engineer, Town Hall, Preston	" 13
Bridlington—Paving High-street	Urban District Council	Chas. Gray, Clerk, Bridlington	" 16
Church, Lancs.—Making-up Three Streets	Urban District Council	J. R. Reddish, Clerk, Church	" 16
Wealdstone—Making-up Four Roads, Middlesex	Urban District Council	Kirby J. Bailey, Clerk, Peel-road, Wealdstone	" 17
Eccles—Paving Works in Trafford Park	Corporation	G. W. Bailey, Town Clerk, Eccles	" 19
Edmonton—Making-up Private Streets	Urban District Council	W. F. Payne, Clerk, Town Hall, Lower Edmonton	" 24
Bucharest—Channelling Streets (£8,500)	Corporation	The Marie, Bucharest, Roumania	" 27
Southampton—Road Works	Corporation	W. B. G. Bennett, Borough Engineer, Southampton	" —
Withington—Drainage and Flagging Passages	Urban District Council	A. Roberts, Clerk, Town Hall, Withington, Manchester	" —
Portobello, N.B.—Tramway Extension to Joppa, Whinstone Setts (1,500 tons, 7in. by 4in.) and Portland Cement (200 tons)	Edinburgh Street Tramways Co.	J. S. Adams, Secretary, 63, York-street, Edinburgh	" —
Edinburgh—Carson-street Extension	Heriot's Trustees	— Gow, 20, York-place, Edinburgh	" —
Willington Quay—Making-up Two Streets	Urban District Council	W. S. Daglish, Clerk, 32, Sandhill, Newcastle-on-Tyne	" —

SANITARY.

Belper—Sewers	Rural District Council	R. C. Cordon, Surveyor, Duffield	Nov. 12
York—Sewers, Fulford Grange Estate	Isaac Pond	W. G. Penty, Surveyor, Clifford Chambers, York	" 13
Carshalton—Sewers, Manholes, &c.	Urban District Council	Baldwin Latham, 13, Victoria-street, Westminster	" 16
East Molesey—Drainage	Urban District Council	Council's Offices, Walton-road, East Molesey	" 16
Bromsgrove—Sewers at Webbeath	Rural District Council	T. W. Baylis and Son, Engineers, 3, Park-road, Redditch	" 17
Bucknall—Sewage Main (1,000yds. 9in.)	Stoke Rural District Council	Larner Sugden, F.R.I.B.A., Hanley	" 17
Bournemouth—Brick Sewer, Old Christchurch-road	Corporation	F. W. Lacey, M.S.A., Burgh Surveyor, Bournemouth	" 19
Eccles—Brick Culvert (745 yards, 3ft. by 2ft.), Liverpool-road	Corporation	G. W. Bailey, Town Clerk, Eccles	" 23
Monmouth—Sewage Disposal and Electric Lighting	Corporation	T. R. Oakley, Town Clerk, Monmouth	" 23
Monmouth—Sewers throughout Town	Corporation	T. R. Oakley, Town Clerk, Monmouth	" 23
Westgate-on-Sea—Sewers and Pumping Station	Thanet Rural District Council	Chas. Taylor, Clerk, Minster, Ramsgate	" 25
Paisley—Drainage at Poorhouse and Asylum	Parish Council	J. M. Campbell, Paisley	" —
Manchester—Glazed Earthenware (for 12 months)	Corporation	City Surveyor's Dept., Town Hall, Manchester	" —
Pelsall—Sewer and Catchpit, Heath End	Walsall Rural District Council	T. T. Fisher, Lichfield Chambers, Walsall	" —
Glasgow—Laying 36in. Mains (2,300 yards, 1in.)	Corporation	J. D. Marwick, Station Buildings, Nelson	" —
Brierfield—Sewer Extension	Urban District Council	Gas, T. Landless, Department, Town Hall, Manchester	" —
Manchester—Sewer Pipes for Twelve Months	Corporation	City Surveyor's Dept., Town Hall, Glasgow	" —
Glasgow—Laying 36in. Mains	Corporation	J. D. Marwick, Town Clerk, Glasgow	" —
Wharfedale—Sewage Filters	Rural District Council	C. J. Newstead, Union Offices, Otley	" —
Buxton—Pipes (500yds. 9in., 300yds. 3in.)	Urban District Council	G. Smedley, Town Hall, Buxton	" —

THE BUILDING NEWS

AND ENGINEERING JOURNAL.

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DEVELOPMENTS OF STREET ARCHITECTURE.

THOSE who ask for proofs of municipal and commercial progress will find them in the renewed activity and development of our street buildings. Visible manifestations of the movement are to be found in all our streets, and of these we may mention a few distinctive signs of modern progress. Size, height, profile, elaborate features are distinguishing qualities of the modern building. The new or rebuilt thoroughfare is characterised by higher and more pronounced façades, while the older ones are fast losing their individual character and sombre appearance. The level lines, painted stucco, and dull brick are quickly disappearing, and in their place lofty structures of brick, stone, and terracotta, with salient gables, turrets, and chimneys, have been erected. Height and a more varied profile are two of the chief features of the new architecture. We must be thankful for the improved skyline. There was something inexpressibly dull in the old house-fronts of many of our streets, as in those which lead out of the Strand to the Embankment—Norfolk, Arundel, and Surrey streets, to wit: they were the heritage of a time when plain brick and stucco succeeded to the more irregular and picturesque streets of the Caroline period. The plain-brick reaction seems to have set in after the Great Fire. But as to our new work. What is to be thought of it? Is it more solid or showy? Sometimes we are inclined to think the old work is the more substantial; but when we look at some of the demolished houses built about a hundred years ago, we are not so sure: their interior partitions are largely of lath and plaster. The new premises which take their place are solidly built under by-laws which insure their stability; the floors of the new shops and offices are often fireproof, and these are improvements. The fronts are certainly more showy than the old ones: they have, as we have said, a better skyline, and they are more imposing in elevation. Our new buildings are higher, and this is a development worthy of note.

The big-building mania which has been so long popular in the United States seems at last to have found its way into this country. The large "office buildings" of New York and Chicago have been introduced into our City and West-end streets—happily restricted as to height, but colossal in other dimensions. Monster hotels are not yet "played out." We hear of syndicates and companies being formed to establish hotels of more than ordinary size and completeness in different parts of the country, and residential flats of colossal magnitude for all ranks of social life have been built in many of our great cities. Like a tidal wave this movement has swept over the land, and has left its mark apparent in London especially, where in the same street may be seen the "old order of things" and the new; the old remaining houses which appear diminutive and low, and the new buildings of often double their height. This disparity in the sizes of new and old buildings is one that must have been remarked by all observers. Take, as an example, the houses facing the Strand and the monster buildings of the new Cecil Hotel, or go down Surrey or Arundel street and notice the sudden jump-up of the roof or skyline from the old to the new buildings. The former belong to a generation which is fast passing out of remembrance, and the newer blocks of

houses bear some kind of resemblance to the "high-water mark" which we find on the sandy or pebbly beach after the tide has receded. Indeed, if this kind of increase goes on, a future generation, when it comes to look on the few old streets and houses remaining, might believe the 18th-century citizens were a race of Lilliputians, and the proverbial "New Zealander" of Macaulay will be startled to find the predicted "ruins" of the great Metropolitan Basilica, even its mighty dome, if it still remained, completely dwarfed by the great warehouses that surround its site. Already a stone building of considerable frontage and elevation has been erected on the south side, whose lines and features, in a kind of modern Renaissance, obtrusively invite comparison with Wren's dignified structure. Its height and multiplicity of stories appear to dominate over the nave of the cathedral, and the effect of the number of divisional parts tends to dwarf the scale of the two orders which compose its west front. On this subject we may learn a little.

The general and distant effect of a number of horizontal stories and small windows is, undoubtedly, to minimise the scale and dignified proportions of a building of only two stories. By a kind of visual estimation, the larger divided building suffers, as the eye does not appreciate in their true proportions the heights of each order of which it is made up. When the spectator comes closer, the real magnitude of the greater building dawns upon him; he begins to realise the height and size of each columnar ordinance, in the same way as the traveller realises the vastness of the Great Pyramid, which in the distance looks insignificant; or as the visitor to St. Peter's at Rome sees how wrong his first impressions were of the real dimensions of the parts and details of that edifice. When seen together the more numerous divided building detracts from the one with fewer divisions and larger parts, and this fact appears to be lost sight of by architects in their street elevations. But the effect on the eye is different when we see two buildings near each other, one of greater height, subdivided into the same number of stories as its neighbour. In this case the eye immediately grasps the largeness of the parts of one compared with the smallness of the other, and at once estimates their comparative size. The smaller building looks a mere toy by the side of its greater neighbour, and it is this sort of contrast which we find impairs the impression we receive of many of the old houses in our streets which have become seriously dwarfed by their lofty neighbours. Prodigious size or height, is as much a mistake as smallness, and is often associated with a loss of refinement. There is a certain standard of size, regulated by our conceptions of the natural stature, for domestic buildings and hotels. When this proportion is much exceeded or altered, the result is failure. We may tolerate largeness in a public hall or a church which in a club-house or hotel would be ridiculous when certain limits are exceeded. The architect is the best judge of these limits. Where it would savour of wastefulness and extravagance to make a story higher than necessity requires, he may externally give dignity to his building by comprising the first two stories under one order, or at least the ground story and a mezzanine, as has been very effectively done in some of the tall office buildings in the States and in a few of our own modern structures, as in Mr. MacVicar Anderson's building in Victoria-street—developments of that Neo-Grec spirit which has animated many of the finest buildings in Glasgow as well as in London. Many of the Greek developments, such as those so ably handled by the late Mr. Thomson, show how this treatment of one order comprising two stories can be effected. It is one way of obtaining largeness of parts and unity in buildings which necessitate a number of superposed

stories. In the lofty office building, horizontal features should in no case be masked, as this would be dishonesty, and a disguise of the internal arrangement and uses; but it is certainly allowable and necessary, to give oneness and dignity to the façade, that the horizontal lines and fenestration should assert themselves with less distinctiveness in the upper or middle portion of the front than at the lower story, and this threefold division has been followed with much propriety in the most successful tall office buildings of New York and Chicago. It has been observed with truth that this is the greatest concession that can with artistic propriety be made to horizontality, for in all tall buildings oneness and grandeur of effect can only be gained by a free recognition of the vertical element. Architects have still to learn something on this score in their tall street buildings; they are, in our London streets, without this threefold division corresponding to the three parts of a Classic order. Often we see a huge modern Renaissance building with a multiplicity of small detail that is bewildering in its variety. There are horizontal members and vertical pilasters in abundance, neither pronounced. We cannot divide the façade naturally into two or three parts; the lower story is low, and its features look as small as the upper ones, or there may be a large division at the top. The eye is distracted with conflicting detail, while next door we see a building of dignified proportion and of few parts. In vain the eye seeks a scale or a natural division. How to combine the horizontal with the vertical features that will be satisfactory to the eye is one of the problems which has not been solved by the designers of many of our big office buildings. The London architect may learn something by an examination of many of the recent buildings in Glasgow, where we find a clearer recognition of this principle of division. Granted a wider sympathy and license in the southern provinces in the matter of style, yet we must see the greater dignity of the work done in the northern capital. The street architecture of Glasgow has undergone great change. It is not so sober or reserved, not so strictly, Classical as it was; but it still retains the spirit and traditions of its earlier work. Need we point to the Caledonian Hotel, the Glasgow Herald offices, by Messrs. Honeyman and Keppie—a building remarkable for its boldness of treatment, good proportion and detail—or to the Athenæum new buildings, by Messrs. Burnet, Son, and Campbell?

Modern typical developments in the Metropolis of Gothic and the Renaissance are to be found in the neighbourhood of Victoria Embankment and the streets leading from it to the Strand. To take a few examples, the new Arundel Hotel, Temple Hotel, and other large blocks in the streets we have named—as Messrs. Smith and Co.'s large offices and the new and extensive block of shops and offices at the corner of Strand and Norfolk-street—are buildings that show a diversity of handling and style, most of them, except the last, of red brick and terracotta. These buildings are lofty, have gables and various bays and projecting features, contrasting strongly with the older houses which they have replaced. But in several of them we fail to find any of the characteristics of good design. There is a lack of gradation and refinement in the detail and ornament of the more ornate specimens—an obtrusive elaboration of relief in the terracotta, and the skyline is often spoilt by clumsy profiles. In the large and important corner block of Portland stone, just finished, a kind of Palladian style is adopted. The two fronts, the longer façade being in Norfolk-street, have the three upper stories relieved by polished granite shafts. These look rather thin, and there is a want of coherence and strength in the design; the division into so

many parts increases the apparent size of the building, which in just the same proportion loses in dignity. The corner has a pedimental erection, which contains a clock, which is more prominent than pleasing. Here was a splendid opportunity, no doubt sacrificed to some extent by the commercial demands made on its designer. In Fleet-street, near Ludgate Circus, a new red brick and stone building has been erected for a public-house, set back 18ft. from the existing frontage of houses, and before long other houses on the south side will give way to make room for a more imposing street architecture. It is an opportunity for some new and picturesque designs. In Oxford-street, again, we have many examples of street architecture, which, when not commonplace, are eccentric. Architectural restraint is often absent altogether, there is no attempt to proportion the stories or the external features. Here and there we find in the City and elsewhere an attempt to emphasise the corner by an angle tourelle, with or without a cupola; but few are successful. We have either pointed cones or toy-like cupolas with miniature lanterns. Better examples of the cupola may be found in a few Glasgow buildings, where the elegant Greek flat-shaped profile is given to this feature, and with excellent effect. When will architects begin to see that pleasing proportions and restraint in details are quite compatible with picturesque effects and good profiles?

OPEN AND SOLID STRUCTURES.

WE do not find any suggestion in works of construction that all structures may be classified into two great kinds—skeleton and solid; the former being those in which the material is concentrated in the form of open trusses, girders, and ribs, either of wood or iron; the latter those structures which depend on the homogeneous and sectional solidity of the material, in which class we may place all masonry and concrete construction. This division of structures is rather important, and seems to us to demand more attention from theorists and constructionists. All timber and iron construction naturally falls under the first of these divisions. Every roof truss of timber-framing, bridge, bressummer, all kinds of cast and wrought-iron construction in buildings and bridges have this in common—that the forces resisting strains are centred in the ties, principals, string members, flanges, chords, and diagonals which compose them, and by virtue of this concentration the structure can be made light and open, as we see in the open lattice girder or the ordinary roof truss. There are decided advantages in this mode of construction, especially where lightness and openness of structure is necessary. The weight on walls and piers is reduced to a minimum, and the open spaces or voids are useful in a great many ways. But the system has not much to commend itself to the architect. For architectural dignity the solid masonry structure will always have the first place. Its solidity, also, has one thing which the open-webbed class of structures have not—it is more durable, there is less vibration, and sound does not pass through it. Compare, for instance, the ordinary iron railway bridge of plate girders or open-webbed construction over a street with one of masonry or brick. The one is subject to vibration, and is noisy when a train passes over it; the other has not these objections. There is nothing to keep in repair except occasional re-pointing, and when the solid structure or arch is well constructed it will bear a greater load, as the parts of the arch, if properly equilibrated, are chiefly subject to compression.

The combined use of concrete and rubble masonry in bridge construction is a practice well worth the consideration of our railway companies. Repeated failures of iron bridges,

due to the sudden impact of heavy loads, to atmospheric changes, temperature, and corrosion and other causes, must have drawn attention to materials of a more permanent kind. We do not say anything against the use and value of iron and steel. They are materials which, despite their physical defects, will always be accounted valuable in structures of the kind we are considering. The forms in which wrought iron can be used, in the shape of plates, bars, angle, tee, and channel iron, render iron construction easy as well as light and economical. In bridge construction also the demands of strength and space are important. A masonry structure, however light it may be, occupies a large sectional space; the piers must be massive, and the arched form requires depth of spandrel and crown, which diminish the void area or clear waterway. The iron or steel structure occupies much less space in the solids, and therefore larger openings can be made—a very important consideration. These are all advantages which cannot be underrated; but it still remains a fact that the solid masonry structure, although occupying more sectional space in the solid parts, is more permanent and economical. There are several forms in which solid structures of concrete and iron are known to the profession. Many of our fireproof floors are based on the solid system. Iron rods or bars, or lattice, webbed, or rolled-iron beams are, so to say, immersed in the concrete; the stresses due to the load are practically borne by these, stiffened by the concrete. The Dennett, the Moreland, the Metropolitan, the Hyatt, and other systems are of this kind. Perfect union of the iron and concrete is secured in these floors, which are solid. No one can doubt their superiority to the open floors where exposed wooden beams or girders are used. Domes and cupolas and roofs have been constructed in a similar manner; instead of open iron ribs, tied together by iron and covered with lead or copper, solid concrete, combined with ribbed metal ties have been carried out at San Francisco, also at Chicago, and other parts of the United States. At a place on the New Jersey coast we read of a useful application of concrete and rubble to a bridge which was erected to replace an old wooden structure. We give the particulars recorded. An iron bridge was first thought of, but ultimately it was decided a stone bridge would be more ornamental. As this material was too expensive to be adopted for a skew bridge of 56°, Mr. Alfred P. Boller, M.Am.Soc.C.E., recommended a "reinforced concrete system," which has been successfully carried into effect. The plans and specifications were prepared by the Melan Arch Construction Co., of New York, in which the concrete is faced with rustic stone. The bridge has a clearance over Grand Avenue of 50ft. at a skew of 53° 8', which gives 40ft. at right angles; the rise of arch is 11ft., and the springing is 8ft. 6in. above the grand avenue. The abutments were built of masonry in cement, and a falsework of six wooden arches on the skew, covered with 2in. lagging, was erected. This centring rested on wedges to allow for the gradual lowering of the falsework after the arch was completed. The stone face arch rings were first laid with Portland cement mortar, and these face rings were connected with the concrete backing by metal anchors placed in the joints between every two or three stones, and reaching back 2ft. into the concrete. Eight 6in. curved π beams were set in the arch space 3ft. apart, and held by transverse rods. The concrete filling was then commenced, embedding the steel beams, and the extrados was covered with a layer of mortar of 1 cement and 2 sand as a water-tight covering. All the concrete work was completed in five days, and the marble masonry face walls were then built. These are the general features of this bridge, as given in the *Engineering Record*. Other

structures have been erected of a like kind in which concrete and steel embedded ribs have been the materials used, making a solid arch of considerable strength and unquestionable durability. The concreting in these cases is generally commenced at the haunches, and the abutment forms a solid and wide skew-back to the concrete arch which practically carries the traffic. With a concrete of clean broken trap or hard limestone mixed with a proportion of gravel and Portland cement, in proper proportions, a bridge arch of considerable strength can be built, which has the advantage over stone that it is more durable, can resist a greater pressure than a stone ring of the same thickness, and also occupies less space in section. The question of maintenance is a very important one, especially in railway bridges crossing our Metropolitan streets. The cost of repairing, scraping, and painting the ironwork, often cased in or inaccessible to the brush, is a large annual item. The attachment of the web and lower flange, as well as the connection of the cross or road girders, have to be overhauled, and new riveted plates introduced occasionally. These expenses, with other drawbacks of iron structures, such as the noise and vibration they cause, are too important to be neglected in the choice of design for structures of this class, and the duty of railway and other authorities is to consider well the claims of the solid over the skeleton structure.

ADAPTABLE SPECIFICATIONS.—XVII.*

PLUMBERS', BRASSFOUNDERS', AND SUNDRY WORKS: FACTS AND MEMORANDA—(continued).

IN laying zinc roofs, Messrs. Braby recommend that a drip should be formed every 7ft. 6in. or thereabouts. The drips should be 2½in. deep, and it is desirable, in flats, to arrange for a fall between them of 3in. in 10ft. If a roof has a fall of 1ft. or more in 8ft., no drips are required, but only a fold at the junction of the sheets. Drips in gutters need only be 1½in. deep; but the gutters themselves should fall 3in. in every 10ft. Wall flashings should go into the wall 1½in., and be pointed with cement. They are usually formed into a kind of bead by curling the lower edge under; they are about 6in. deep. Zinc is also used for roofing in the form of tiles or scales. The tiles are fixed on boarding. When square, the ordinary sizes are 10½in., 13½in., or 17in. each way, and they can be had of Nos. 13, 14, and 15 gauge. They are fixed with clips or hooks, and can also be obtained of various shapes, and also ribbed or stamped. At temperatures considerably below its melting-point, sheet zinc expands rather more than ¼in. in a 10ft. length under a rise of 100° Fahr. On zinc flats and roofs there must often be as great a difference as this between a cold night in winter and a sunny day in summer, and it is even more important for sheet zinc than for lead that no resistance should be interposed to its inevitable change in dimensions.

3. *Copper*.—The specific gravity of copper is 8.96; in other words, it is about three-fourths as heavy as lead. In dry air pure copper undergoes no change. In a damp atmosphere it acquires a green coating which strongly adheres to it, and which appears to be in the main a carbonate of the metal. Copper melts at about 2,000° Fahrenheit. But this property is of little use for purposes connected with the arts, because the metal contracts so much in cooling that the castings crack and pull themselves to pieces. The addition of a very little tin is said to make the process of casting more practicable, but still difficult, unless enough tin is added to change the colour, and to form bell-metal or bronze. Cast copper, therefore, except in the state of ingots, is almost non-existent. Sheet-copper, on the other hand, is one of the most manageable and easily-worked of materials. It can be hammered and bossed out or sunk in, and stretched, without tearing, into a great variety of shapes. The surface can be left alone, with occasional dusting, to acquire something of the greenish hue that is admired in bronze. It can be lacquered to preserve its original colour, or it can be "pickled" in various chemicals, which will give a durable

surface, ranging from gold colour to Indian red. With a rise of temperature equal to 100° Fahrenheit, a 10ft. length of copper expands about $\frac{1}{4}$ in.

Copper is sometimes used for roofing, being laid on the same general principles as zinc. It possesses considerable durability, but is chiefly employed on account of its colour, though in smoky towns it is very liable to turn black. The following are the—

WEIGHTS OF SHEET COPPER ACCORDING TO THE BIRMINGHAM WIRE GAUGE.

Wire gauge No. 18	weighs 2lb. 4oz. per foot super.
" No. 20	" 1lb. 12oz. " "
" No. 22	" 1lb. 6oz. " "
" No. 24	" 1lb. " "
" No. 26	" 13oz. " "
" No. 28	" 10oz. " "
" No. 30	" 8oz. " "

CAPACITY AND WEIGHTS OF ORDINARY WASHING COPPERS.

To hold 5 gallons, 7 $\frac{1}{2}$ lb.	To hold 30 gallons, 45 lb.
" 10 " 15 lb.	" 40 " 59 lb.
" 15 " 22 $\frac{1}{2}$ lb.	" 50 " 75 $\frac{1}{2}$ lb.
" 20 " 29 $\frac{1}{2}$ lb.	

4. *Alloys of Copper, &c.*—Common brass consists of 2 parts of copper to 1 of zinc. Muntz metal, which is cheaper than copper, is composed of copper 3 parts to zinc 2 parts. Bronze is an alloy of copper and tin, in various proportions. It is remarkable that tin, though the softer metal of the two, greatly increases the hardness of copper when mixed with it in a fluid state. Nine parts of copper to 1 of tin form tough gunmetal. From 3 to 5 parts of copper with 1 of tin constitute bell-metal. There is a popular belief that some celebrated bells owe the beauty of their tone to an admixture of silver; but experiments have shown that the introduction of that metal by no means improves the sound. "Pot-metal," which is used for very common taps and fittings, is a compound of 2 $\frac{1}{2}$ parts of copper to 1 of lead. Pewter contains 4 or 5 parts of tin to 1 of lead. "Composition" tubing, used by gasfitters, is a compound of lead, tin, and antimony. Being easily fusible, it is a not infrequent cause of fires. A trifling leakage may occur in the pipe behind a burner. The gas ignites there with a small and almost imperceptible flame, which gradually enlarges the hole, and so grows bigger; then the pipe melts more and more rapidly, and the flame at the leakage, if not observed in time, may work its way back to some combustible part of the building.

WEIGHTS OF METALS AND ALLOYS.

A cubic foot of east lead	weighs 709lb.
" " " tin	" 456lb.
" " " zinc	" 428lb.
" " " copper	" 537lb.
" " " ordinary brass	" 519lb.
" " " bell-metal	" 502lb.
" " " Muntz metal	" 511lb.

Solders used for Brazing.—"Hard spelter solder" is a mixture of 2 of zinc to 3 of copper. "Soft spelter" consists of copper and zinc in equal parts. "Fine" solder for brazing is a compound of 2 of copper to 1 of zinc, or otherwise of copper 4 parts, zinc 3, and tin 1. "Hard spelter" is used for soldering copper, iron, and steel; "soft spelter" and "fine" braziers' solder for joining brass or copper.

Brass is treated in a great variety of ways, and can be cast, beaten or embossed, bent, engraved, or "spun." It does not, however, lend itself quite so well to the processes of *repoussé* work as copper does, not being so soft, or so capable of being stretched without cracking. Under continuous tension, even when this is small in amount, brass weakens, and ultimately breaks. It is not to be trusted, therefore, for the tubes by which gaseliers and similar fittings are suspended, since in the course of years their weight make it brittle and somewhat crystalline in its fracture. Bronze is superior to brass for many purposes, and being only very slightly dearer, is likely to supersede it to some extent in the near future.

5. *Plumbers' Fittings.*—A few notes on these may be desirable before beginning the specification. Among the principal are w.c. fittings, bath fittings, and lavatory fittings. Of the first, the advertised patterns are innumerable. They may generally be arranged, however, under one of the following heads: pan-closets, valve-closets, and wash-down closets. The first type is now almost out of date. Its characteristic is that the basin, which is open at bottom, dips into a hinged pan which holds the water, and this pan, again,

is surrounded by a large iron box or "container." When the apparatus is used, the pan turns on its hinge and discharges its contents into the container and thence into the trap. To allow the pan to turn in this way, the "container" must necessarily be of considerable size. It has, therefore, a large surface to be fouled, and holds a large volume of impure air, and this air, or some of it, is pretty sure, sooner or later, to find its way into the house. The valve-closet is a better, though a complicated and expensive, contrivance; but the wash-down closet is so much cheaper and so much less liable to get out of order, that it is largely taking the place of the older and more costly forms.

All these w.c. apparatus require a trap between the apparatus and the soil-pipe. In former times the D trap was the favourite one. This is practically a closed basin containing water, with a hole in the side to which the soil-pipe, or, rather, a branch from it, is connected, and another hole in the lid, through which a pipe from the w.c. apparatus passes and dips into the water. The objection to the D trap is that it is not self-cleansing, and soon becomes fouled and perhaps obstructed, and, moreover, if holes occur in the dip-pipe, its use as a trap is gone; it is, therefore, specifically forbidden by many local by-laws, and is now almost abandoned. A common siphon-trap fixed immediately below the w.c. apparatus is far better, and a lead anti-D-trap, which is still more perfectly self-cleansing, is better still. The lead of traps and of soil-pipes (where leaden ones are adopted) should not be thinner than 7lb. sheet lead. Stout cast-iron soil-pipes, however, coated inside with some preservative composition, and with the joints run with lead and made perfectly airtight, are more economical, and not liable to injury, as leaden ones are, by "creeping." They should be taken down outside the building.

Whenever enough water is discharged at once into a trap to fill completely for a moment the whole bore of the pipe just below the water-seal of the trap, a siphonage action is liable to take place, which will suck out of the trap much of the water that should permanently remain there. To prevent this siphonage action, an air-pipe an inch or two in diameter is connected to the upper part of the trap just below the water-seal, or to the branch from it to the soil-pipe. The other end of this air-pipe, or "anti-siphonage pipe," either opens directly into the external air, or is taken back into the soil-pipe (which, of course, is open at top) above the level of the highest closet on it. Then, if the anti-siphonage pipe has been inserted near enough to the water-seal of the trap, a sudden flush of water simply sucks some air down this pipe, instead of sucking the water out of the trap.

For flushing closets a small separate cistern, disconnected from that which contains the water for general purposes, is necessary. The water companies commonly insist on a "water-waste preventer," as it is termed, and make a rule that it must not supply more than two gallons at a time. Under ordinary circumstances this quantity is not enough. Three gallons would answer the purpose; but as this quantity is not allowed, it often happens that the small cistern has to be filled and emptied twice in succession, so using a gallon more water than is really needed. The two-gallon contrivance thus defeats its own object, and like the screw-tap, the use of which is in many places compulsory, it really acts a water-waste promoter. To prevent the escape of sewer gas into a house, it is of great importance that all joints should be airtight, and especially the joint of the trap immediately below the apparatus with the soil-pipe; lead traps are best connected to iron soil-pipes by means of a stout brass ferrule, strongly soldered to the lower end of the lead trap, then inserted in the socket of the iron pipe, and run with lead. Stoneware traps are connected to iron pipes by inserting the end into a socket on the latter, and making good the connection with cement.

Baths are now made in many materials, such as fireclay, cast-iron, zinc, and copper. It is desirable that everything about them should be open to inspection, and easily got at for repairs. Of course, the waste-pipe should not be connected directly to the drains, and it should have a good self-cleansing trap close to the bath. This trap, like that of a w.c., requires an anti-siphonage pipe, being specially liable to be sucked dry by the rush of water when the bath is emptied. The overflow-pipe is required by some companies to discharge on a roof or in some other place where

it is in full view. The inlet pipes ought to be above the highest possible level of the water in the bath, and quite separate from the waste and overflow. It is desirable that the bath should stand in a lead safe, with a waste-pipe discharging on the outside of the building.

Lavatories, as regards overflow and inlet-pipes, should be treated on the same principles as baths. They require a waste-pipe at least 1 $\frac{1}{2}$ in. in diameter, with a self-cleansing trap close under the opening, by which waste water leaves the basin. This trap should have a screw cap to give access to its interior—and all the pipes, as well as the underside of the basin, should either be at all times visible, or should at least be so arranged as to be got at without difficulty.

Protection of Pipes and Cisterns from Frost is a thing too frequently neglected. A few days' severe weather, therefore, cause an amount of inconvenience to the public, of which they bitterly complain, and which goes far to destroy their confidence in the architectural profession. The freezing of supply pipes, between the main and the building to be supplied, is, of course, a natural result of laying them too near the surface. They should be at least 3ft. down, whereas at present from 10in. to 15in. are a common depth. The shallowness, however, is not altogether the fault of either architects or of contractors. The water companies' mains, very often, are themselves too near the surface, and when this happens, the supply-pipes which are taken from them must inevitably, at one end, be too near the surface likewise. Inside a building, however, the architect has the matter in his own hands. Something can be done by providing stop-cocks and draw-off taps, so that pipes liable to freeze may stand empty and not full. Carefully wrapping pipes in thick boiler felt may do more; but the most effectual remedy is a well considered scheme, embodied in the original planning of the building itself, by which the main pipes can be kept together, it may be in a sort of shaft or flue, and by which this shaft or flue can be slightly and easily warmed when necessary. The cisterns may be so placed as to receive enough of the warmth to keep the water within from freezing. Frost, it is true, may generally be prevented from doing much mischief if the cold-water and hot-water pipes are carried up close together. But the objection to this is, that the drinking water is warmed in summer, and what really seems to be needed is a means of supplying special warmth to the pipes in specially cold weather.

SPECIFICATION, PART X.: PLUMBERS', BRASS-FOUNDERS', AND SUNDRY WORKS.

X.1. **LEAD IN FLATS AND GUTTERS.**—Lay all the lead flats, gutters, and chimney gutters—namely,, with 6lb. best milled lead on inch deal boarding, with all necessary laps, rolls, and drips. [The rolls are to be in the positions and of the sizes shown on the drawings.] The lead gutters are to have proper drips not more than 8ft. apart, and the gutters are to have a fall, between one drip and another, equal to 1 $\frac{1}{2}$ in. in 8ft. The lengths of the lead in the flats are not to exceed 8ft., and it is to have a fall equal to 1 in. in 8ft. The lead is to be turned up 6in. against the walls, and is to go up 10in. under the slates. Form soldered cesspools in the gutters, with domical copper wire gratings over them, and take from each cesspool a 3in. lead socket-pipe of thickness equal to that of 7lb. lead, and properly connect it to the iron rainwater pipes.

X.2. **LEAD IN VALLEYS.**—Lay all valleys with 6lb. lead, 2ft. wide, on inch valley boarding.

X.3. **FLASHINGS, STEP FLASHINGS, AND SOAKERS.**—Put flashings of 5lb. lead averaging 6in. wide over all horizontal edges of lead turned up against walls or vertical faces. Wherever a sloping slated roof abuts against a wall, each slate is to have a 4lb. lead soaker of the same size of the slate, slated in with it, about half of each soaker being turned up against the wall. Put over the turned-up edges of the soakers proper step flashings of 5lb. lead [let into grooves cut in the ashlar] [let into the joints of the brickwork]. All flashings and step flashings are to be let in at least 1in. full. They are to be wedged tight with cast lead wedges, and the joints are to be carefully pointed in neat Portland cement.

Memorial stones of a new Wesleyan chapel have been laid in Holyhead-road, Gobowen. The building will be of red brick, and will seat 250 persons. Mr. Griffiths, of Knockin, is the contractor.

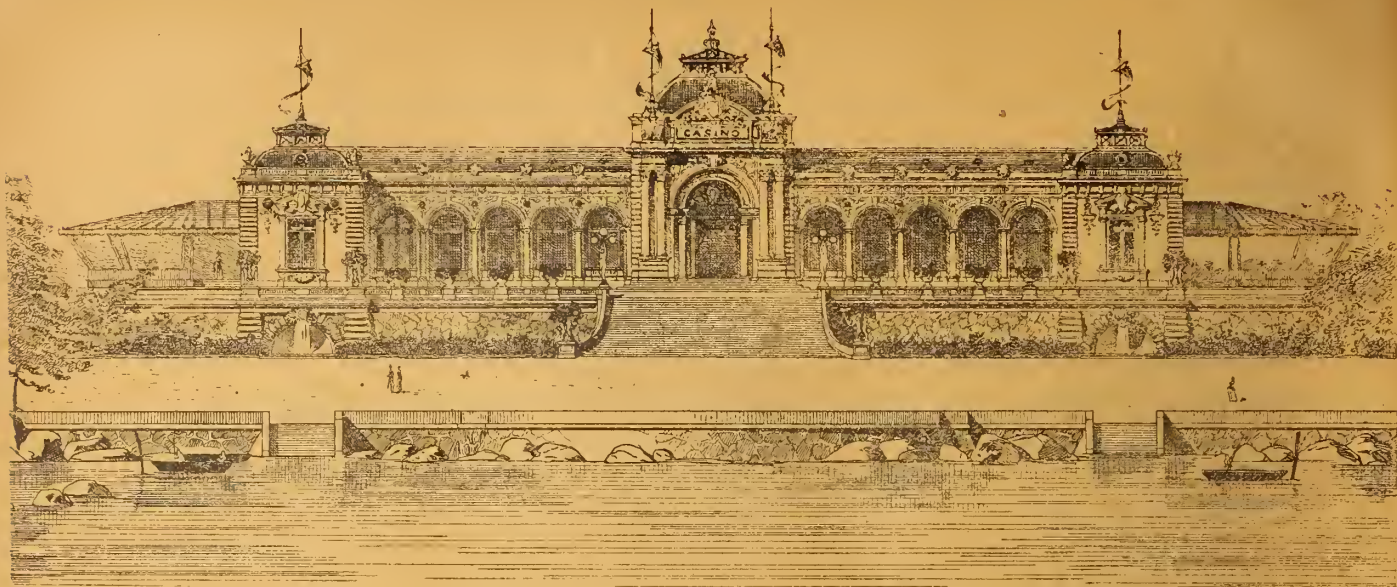


FIG. 2.

CONCERT-HALLS AND ASSEMBLY-ROOMS.—XXX.

By ERNEST A. E. WOODROW, A.R.I.B.A.

I HAVE already referred in a previous chapter to the casinos which exist in some of the fashionable watering-places on the Continent, and have illustrated my remarks by the plans and details of the famous Monte Carlo gambling-rooms, showing by that example how these pleasure resorts include places of public assembly and amusement within their buildings. There are, however, other examples of this type of concert-hall, which must not be overlooked in this series.

The casinos and pavilions which are erected at

The left wing consists of a cardroom and a billiard-room; while the right is occupied by a library, and by the manager's offices. The whole of the central block is devoted to the grand hall for banquets and fêtes; this is fitted up with a stage at one end, and broad flights of steps lead from it to the pleasure-gardens in the rear.

On either side of the entrance vestibule are the refreshment-rooms and café, so necessary in a building of this description. This casino fulfils all the requirements of an inland pleasure resort on the bank of a lake or river.

In designing a building of this class, the laying-out of the surroundings is a most important feature, and the forming of the terrace, promenades, and covered colonnades is as essential for

entirely of iron. Its height is 100ft., the form of the ceiling being vaulted. In the walls are enormous windows which can be let down into the floor in fine weather, leaving the sides quite open. The construction is, in fact, little more than a clever combination of doors, windows, and looking-glasses, and the design, which is Mr. Laurey's, is carried out in a semi-Renaissance character.

Outside the pavilion are two raised terraces, while on the other side of it is the dancing-saloon, with orchestra at one end. Music-rooms, card-rooms, billiard, club, and refreshment-rooms, all find a place in the grouping of the building. There is also the well-known Strangers' Club, with the gaming-tables. The superficial

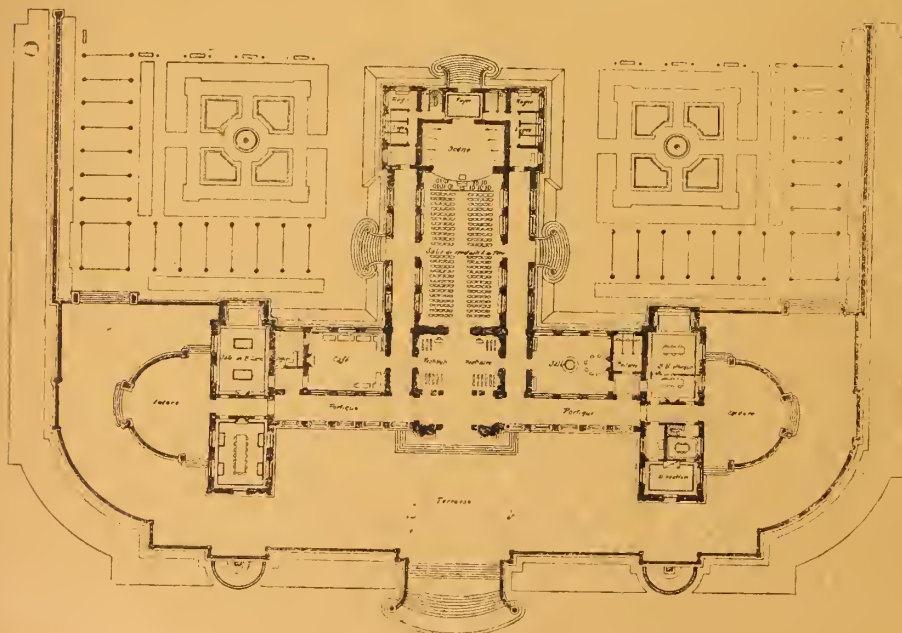


FIG. 1.

watering-places and pleasure resorts may be divided into two classes—viz., those which are erected within a short distance of the water's edge, and those built over the water itself, as is the case with pier pavilions. Of the first class, Figs. 1 and 2 show the plan and elevation of a typical example of a casino built on the edge of the water, being the Casino de Gerardmer, of which M. L. Mougenot was the architect. This casino, situated at an inland watering-place near the Vosges mountains, stands upon a raised terrace overlooking the water, and consists of a central building and two wings; nearly the whole of the front portion is treated as a colonnade.

the pleasure of the public as the creation of the banquet-hall and gambling rooms.

Of casinos erected on the shore, one of the most typical examples may be seen at Ostend. This structure is circular in plan, and is built of iron, with galleries, terraces, and esplanades surrounding it, and a club-room devoted to gambling purposes.

In Fig. 3 I give a plan of the Ostend Casino. The concert pavilion is the central feature of the plan, the surrounding rooms being grouped with strict regard to symmetrical planning. The plan of the concert-hall is based upon an octagon with sides of unequal length, and is constructed

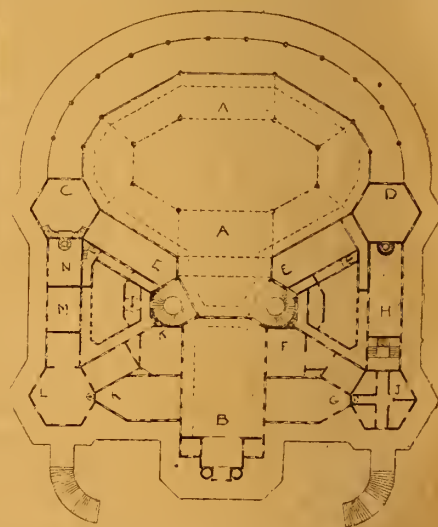


FIG. 3.—A, concert pavilion; B, dancing-room; C, gentlemen; D, ladies; E E, refreshment; F, card-room; G, billiard-room; H, club-room; J, administration bureau; K, music-rooms; L, reading-room; M, king's-room; N, dining-room.

area of the floor-space of the pavilion is 2,500 square metres, that of the dancing-room is 700 square metres. The cost of the whole was 1,500,000 francs.

As can be seen from the provisions made in the plan, the building is put to many purposes. Primarily, it is a fashionable rendezvous for visitors, and all kinds of fêtes are indulged in, bazaars, balls, assemblies, and theatrical entertainments are provided for the subscribers.

Fig. 4 represents the plan of a casino built over water. This casino is situated at Cannes: it is erected not far from the shore, and is approached by a promenade pier of sufficient width to allow

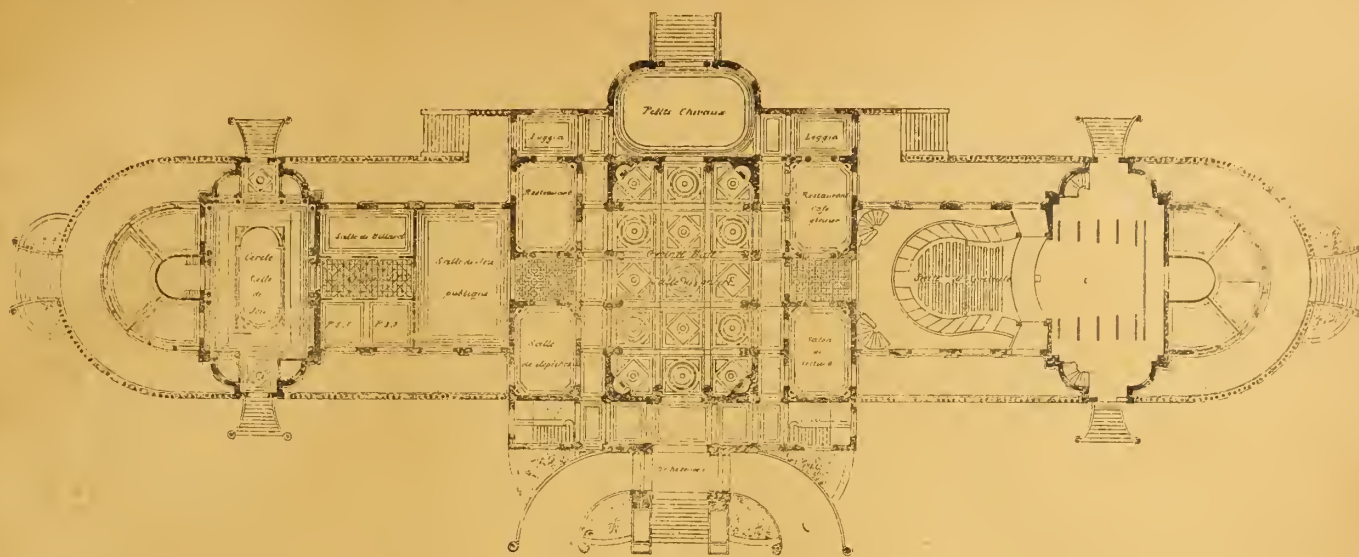


FIG. 4.

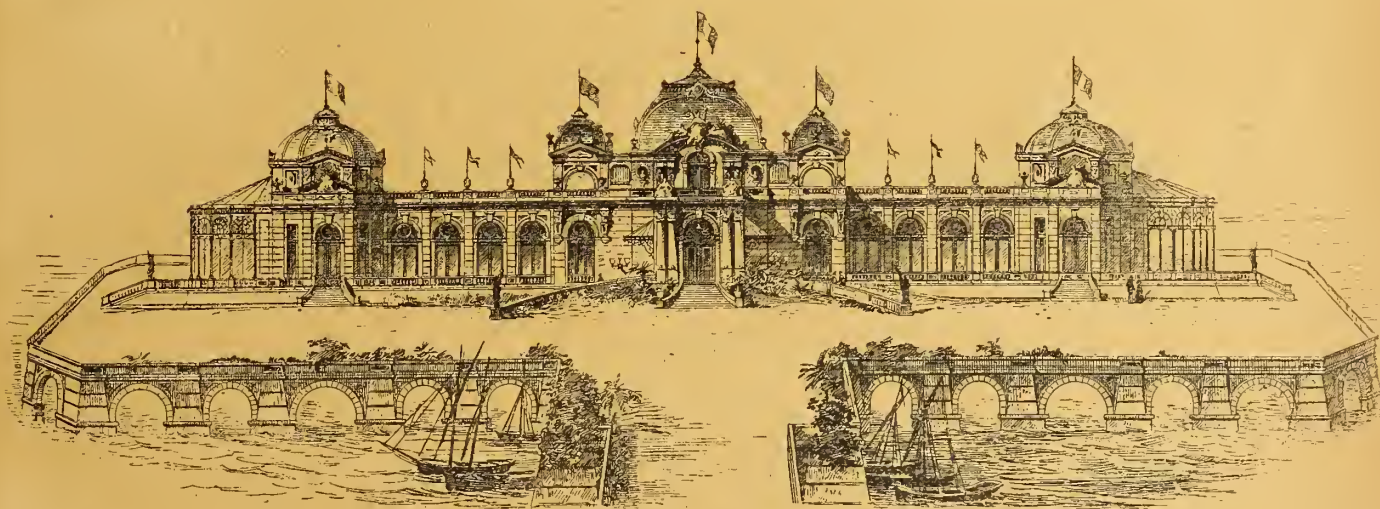


FIG. 5.

carriages to drive up to the entrance. The central feature is a large concert-hall; the right wing is occupied by a theatre, and the left by the gaming and billiard-rooms. Fig. 5 is a view of the exterior.

Most of the larger English watering-places have pavilions erected at the pier-head, which are devoted to all classes of music, concerts, theatrical entertainments, and variety shows; but in no case can we boast of buildings of any architectural merit. Perhaps the best typical examples are to be found at Hastings and Brighton, where various entertainments are given.

At Southsea there is a wood and iron structure

feature of this pier is, therefore, the fine concert-room placed in the middle of the pier, having a width of 75ft. and a height of 40ft. The seating capacity of the pavilion is for 1,000 persons, and in addition there is a promenade gallery running right round the building.

I do not remember having heard of any serious fire in a building of this character; but when we consider that theatrical representations are given upon a small, cramped, and ill-provided stage, and that the audience are in most cases divided from it only by a flimsy canvas screen, it is a great wonder that such an accident has never happened.

There is much for architects to learn who erect piers and pavilions, both as to architectural treatment and grouping of buildings, and also as to the arrangement for the comfort and safety of the audience, and the provision of more adequate accommodation for the performances. As a rule, the pier pavilion in England gives one the impression of a makeshift or after-thought, instead of being a portion of the structure of the pier itself.

THE ARCHITECTURAL ASSOCIATION.

THE second ordinary meeting for the present session of the Architectural Association was held on Friday evening, Mr. Beresford Pite, the President, in the chair.

Twenty-three nominations having been received, the following thirty-five new members were elected:—E. A. Ould, W. L. Dowton, jun., J. G. Ross, D. H. Bentley, C. L. Brierley, C. H. F. Comyn, W. J. Davies, F. H. Weedon, C. W. Beaumont, C. M. Berington, A. P. Brohier, R. H. Butterworth, W. C. Butterworth, P. B. Chatwin, T. Gray, B. Greig, E. Hale, F. L. Koelman, R. J. Pankhurst, P. Procter, F. A.

Richards, V. Wilkins, A. A. Carder, T. Gregg, J. D. Hunter, F. M. Kirby, H. C. Norman, R. Spelding, J. B. W. Weaver, S. Wheeler, L. G. Detmar, C. H. Gage, C. L. Steel, W. J. Prichard, and E. L. Hall. A vote of thanks to various donors to the library was moved by Mr. B. F. Fletcher, and a comprehensive vote of similar character to all those who assisted in making the recent conversazione at the Church House a success was accorded on the motion of Mr. E. Howley Sim, junior hon. sec.

ROOF COVERINGS.

Three papers on as many practical subjects, and illustrated by numerous specimens, were then read, by Mr. Frederick Walker on "Tiles," by Mr. Thomas Stirling, jun., on "Slating," and by Mr. G. Ewart on "Lead, Copper, and Zinc."

TILES.

Mr. WALKER explained that the manufacture of tiles was no part of his theme, but rather the practical part, as it would be likely to strike the operative tiler and the observant architect. He continued: In dealing with tiles as a roof-covering, the first thing to be sure of is that you have selected a tile capable of excluding all dampness from your dwelling, and at the same time withstanding the disintegrating influence of the weather. These two characteristics go together, the one following the other as a natural consequence. The characteristics of a good roofing tile are density, toughness, and incipient vitrification, the last-named quality producing, to some extent, that pleasing tint known as "bloom," one of the peculiarities of the Broseley tiles. Tiles of a bright red, or an earthy red colour, should be looked on with suspicion, and avoided. They are invariably absorbent, and will not "weather" well. To ascertain the comparative merits of tiles, as to their weathering properties, there is

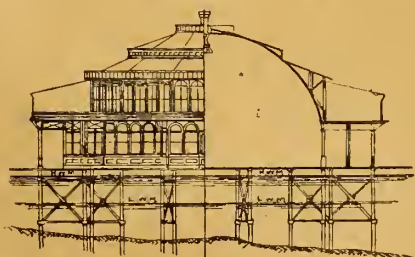


FIG. 6.

devoted entirely to promenade and orchestral music, as shown in the section, Fig. 6.

In the year 1858, when Southsea was an unimportant town on the outskirts of Portsmouth, a promenade pier, on cast-iron supports, was erected. In 1881 a second pier was erected, and upon this was built, for the convenience, comfort, and shelter of visitors, a large pavilion with reading and club-room attached. The chief

no better test than the amount of water they will take in. Most roofing-tiles are slightly absorbent, unless you get the highly-fired brindled and blue tiles; and for this reason old tiles have, in a few isolated instances, attained to a higher market value than new tiles, as by age and atmospheric deposit they have acquired an artificial surface coating, and lost the property of absorption—at least on their outer exposed surfaces, though perhaps they have been desired more from an æsthetic point of view than otherwise. The old-fashioned tiles have no nibs or stubbs for hanging, and must therefore be kept *in situ* by means of two wooden pins or nails. In the old days the oak pins, by reason of their unyielding hardness, were a fruitful source of breakage when driving them through the sometimes badly-formed pin-holes at the ends of the tiles. Still, as far as absorption goes, the best kind of modern tiles are capable of excluding all dampness from a dwelling if they be laid with due regard to other conditions. Where tiles are bedded in lime-and-hair mortar the tops only should be bedded, the mortar extending, say, not more than 3in. below the head of the tile. If brought too low it may become a source of dampness in exposed situations, by reason of its capillary attraction. As a matter of personal opinion and experience, I would slightly gauge with Portland cement all lime and hair used in the bedding of roof tiles, the additional cost being very small. Where your roof is close boarded (and sometimes felted) there is no need for bedding, though, of course, a covering of bedded tiles is less liable to breakage in climbing about a roof than would be one of unbedded tiles. By gauging the lime-and-hair mortar you make it practically non-absorbent, and therefore less likely to attract and take up moisture. Secret gutters at dormer cheeks and elsewhere often become a source of dampness as a consequence of the tiler thoughtlessly beating down the plumbers' lead welt or turn over, purposely formed to check or keep back the rain, that his tiles may lie more evenly and in the same plane as the general inclination or slope of the roof. Sometimes the battens, both in slating and tiling, are wrongly carried over the lead welt and nailed through it, in which case you are very likely to get water into your roof. The lead welt should stand its own thickness above the backs of the battens, forming a tilt for the tiles, so as to throw the water away from their edge on to the main body of the roof—the secret gutter performing its proper function by receiving and carrying off the water from the dormer itself, or from any gutter discharging immediately above it. The tiles overhanging secret gutters 1½in. should not be bedded on the lead, nor their edges pointed. Tiles, and tile-and-half, should be worked against all secret and other gutters, where practicable, alternately on each course. Secret gutters should be such, and in positions where they will always clear themselves; especially where the dwelling is surrounded with trees. Such gutters should have, at least, a clear space of 1½in. between the opposite edges of the tiles on each slope or plane whose intersection forms the re-entrant angle of the roof. Where the roof runs into a vertical plane or parapet wall, 4lb. lead-soakers, finished with a skeleton flushing, are always a safe arrangement, though they give the tiling an untidy appearance by preventing the tails of the tiles lying close on the backs of the tiles immediately beneath them. Where a wall cuts obliquely into a roof, this arrangement is indispensable. Stepped flashings, with the lead extending 6in. on the roof, should not be used because of the necessity of distressing the lead to fit the backs and steps of the tiles, and the likelihood of breaking the tiles in the act of so doing. In a tiled roof, valley and hip tiles should be used in preference to lead gutters, secret or otherwise, bedding the valley tiles at their heads to keep them *in situ* and steady while laying the plain tiles; but laying the hip tiles dry, keeping them in position by a single nail at their head. Hip and valley tiles should not be ordered without proper regard to their inclosed angle or pitch. The dihedral angle made by any two adjacent sides of the roof, intersecting at and forming the hip, should be geometrically obtained (for one cannot wait till the roof is framed before ordering the tiles), and the hips ordered, with a pitch of 10° greater than the roof, to allow for the tilt and the thickness of the tile under them. The inclosed angle of the valley tile is obtained in the same way, but reversed. The hip and valley should be in the same inclined planes of the roof, of which they form a part, though more frequently

than otherwise they are not so. One would like to impress upon architects the desirability of making the roofs of dormers and gables, springing from and intersecting the main roof, of the same pitch or inclination as the roof, their intersections with which form the valleys. If this is not done, purpose-made valley tiles must be obtained, for all hips and valleys stocked by tile-makers are for roofs whose sides have an equal pitch; or else lead gutters must be resorted to. If the ordinary stock valley tile be used, it will be found that the line forming the tails of the plain tiles in each course will fall either below or above the bottom of the valley tile in each case on one side of the roof. In the case of a complicated roof, a miniature model has been made of the complete roof, and sent to the tile-maker for his guidance. Where a minor roof runs in at right angles to a greater, or main roof, intersecting it at a point below the main ridge, it is desirable to use a piece of 4lb. lead dressed to the shape of the minor ridge, and the slope of the main roof, and called a saddle-piece. This, placed over the tiles on the lower roof, and under the tiles of the main or higher roof, prevents the possibility of rain getting in at the junction of the roofs; and the lead can be of such an area as to be covered by the ridge tile, the appearance of lead in a tiled roof being objectionable wherever it can be avoided. The verge should start with straight tiles running from the eaves to the ridge (unless interrupted by a chimney-stack), and be bedded on the outside ¼in. of the brickwork, the battens being cut back ¼in. for that purpose. The outside brickwork should be cut up to the rake of the roof, and nearly flush with the back of the hanging battens, that the verge, when completed, will have a tilt on its outer edge of at least ½in., to throw the rain on to the body of the roof, and so avoid rain-drippings from the verge. The tiles to be used on the verge should be soaked to saturation, and allowed afterwards to drain, and then bedded in Portland cement, as, by reason of the battens being kept back ¼in. from the face of the brickwork, there is fixing for one nail only (or stubb) for each tile. The verge generally projects from 2in. to 2½in. beyond the finished face of the wall, and is finished either with a plain or angular fillet at its junction with the brickwork. The roof tiles on the verge should be alternately tile and tile and a half (gable tile) in its line of direction, and the same remarks apply to the cutting up to hips and valleys; small strips of tiles being undesirable where they can be practicably avoided. The under-eaves tile is seldom used in practice in the way intended by the tile-maker. The tiler simply knocks off the two stubbs or hanging nibs and beds them on their backs, the reverse way intended, for the purpose of getting the under-eaves edge close fitting to the eaves-tile bedded immediately on it, the under-eaves being twice nailed, in addition to the security of position obtained by the tilt or spring of the roof. Ridge tiles should be of such a section as to admit of being pressed or made in one piece. Where an ornamental cresting is required, it should be made as a separate piece entirely detached from the ridge-tile proper, the latter being made with a groove to receive the cresting, as shown in Vol. II., "Rivington's Notes on Building Construction." Under no conditions should the cresting be stuck on the ridge-tile by means of semi-liquid clay while they are in the clay state. Such work is more or less defective and unsatisfactory in the end. The simplest form of ridge-tile, and, therefore, the best, is that used by the London School Board, consisting of the two wings terminating in a roll at their angle of intersection. Another good form of ridge-tile is that of a plain vertical blade rising from the angle of intersection of the wings, and with the square angle at each end of the blade cut off at an angle of 45°, and which can be pressed in one piece by a simple operation. The weakness of this form of tile is at the junction of the crest with the wings, where it is apt to get broken in transit or careless handling. Ridge-tiles should be well soaked before use, bedded in gauged lime and hair, and their vertical joints drawn up solid with cement, not simply pointed after they are fixed. The use of dowels is altogether unnecessary where this is done. A tile 9in. in length is made specially for the last course of plain tiles coming immediately under the ridge tiles. Where the roof is inclosed on the under side it is customary to bed in lime and hair the eave-courses only, for the sake of steadiness in the fixing. In one instance I have seen the rafters

pugged (in the same way that you would pug a floor) by nailing a fillet on each side of the rafters, about central in their depth, and then lathing between the rafters, and plastering the same from above with mortar and chopped hay, the rafters being afterwards open-battened to receive the tiles. In another instance the tiles had to be laid on open battens and bedded in straw, the architect claiming that the straw prevented the incoming of snow, and did not prevent the air getting at the roof-timbers for their preservation. Well-formed roofing tiles are straight in their width and hollow in their length, so that the tails of each course may lie close and tight on the backs of the undercourse. Straight tiles will not clear themselves one over the other, and should therefore be rejected. Where pointing is necessary—on the verges, for instance—it is customary in good work to grind down some of the broken tiles to mix with the Portland cement as a substitute for sand, that the finished pointing may approximate in colour to the general tone of the roof covering. In the case of vertical tiling, it was customary to hang and nail the tiles on battens fixed to a brick-nogged or to an ordinary 9in. wall. This is not now permissible. Under these circumstances, the proper alternative is the use of Wright's patent fireproof bricks—or bricks somewhat similar—which are capable of being nailed into, by the use of which the 2in. by ½in. hanging battens may be dispensed with, the tiles being nailed into the bricks, and the tilt obtained by one or two sailing-out courses at the level where the vertical tiling commences.

SLATING.

In his introductory remarks, Mr. STIRLING gave a short description of the formation of slate, and of the sources whence it is obtained, adding: The veins of slate run in the same direction, usually from south-west to north-east; they are not found to exist anywhere north of the carboniferous line. The largest vein existing in this country is the one known as the Bangor and Carnarvon; this runs, with little interruption, from the Penrhyn Quarry, through Llanberis, to the Nantlle valley, where most of the Carnarvon quarries are situated. Another well-known vein is the Festiniog, better known as Port Madoc; also a smaller one in the Corris valley, in the Aberdovey district, and another in Cornwall, in the vicinity of Delabole. These produce slates usually sold in regular sizes, from 24in. by 12in. downwards. The output from the districts mentioned in North Wales amounts to about 35,000 tons per month, and may be divided as follows:—Penrhyn, 9,000 tons; Dinorwic, 8,500 tons; Carnarvon district combined, 6,000; Festiniog, 9,000; and various isolated quarries combined turn out about 2,500 tons. Unfortunately, at the present time there is a strike at the Penrhyn quarry, which has entirely cut off about one-fourth of the whole supply of North Wales, which in the present state of the trade is a very serious matter. Some 3,000 men have left the quarry, and both sides have adopted a firm front. There seems little chance of an immediate settlement, and many of these men are scattered over the neighbouring district. Stocks amongst merchants are generally low, and the quarries have none. There is at the present time, and has been for some time past, a much greater demand than there is any possibility of supplying. The fact that a large number of the Penrhyn men have obtained employment elsewhere does not point to much increase in the production of the other quarries, as they have been in full work for some time, and the additional hands at their disposal are mainly occupied in opening fresh parts, which will probably not affect the market this year. Other sources of supply of regular-sized slates are widely apart, the largest regular one being Alsace. A large quantity of red, green, and blue slates are being sent over. The red slates are similar in colour to those found in the Bangor and Carnarvon veins, and are probably the best foreign slates at present obtained. The green is well known under several names—Pennant, Sedan, German, Belgian, and Imperial—and is the cheapest green slate in the market. They cannot altogether be recommended for London use, as they contain a large number of specks of iron pyrites, which, after a time, oxidise and break up the surface of the slate. The blue slates are not equal to Port Madoc, being soft and porous, but they harden with exposure. A fair number of dark blue slates are now sent from France; they are very thin, and not to be compared with Welsh slates of similar colour. I have no experience of their

durability in London or, in fact, in this country. America is the remaining source of supply, but from what we hear, this is not likely to remain steady. They are now sending a large quantity, but this is only the surplus and old stocks which have accumulated for some time. At present they find a market readily, principally amongst small merchants and builders. Generally, the larger merchants pin their faith to the Welsh slates, and, as long as they are supported by Wales, will not purchase these largely, if at all. Some of the slates they send are good, and very similar to medium Port Madoc, and it is difficult to tell the difference. They come in various sizes, and at present are cheap. Green slates are obtained from America, the best known being the Eureka, which is the best cheap green slate in the market, and has been used for some twenty years in this country. Lately another American green slate, of similar colour, has been introduced, and used in some of the London County Council buildings, the new "offices of the Works Department in Belvedere-road, Lambeth, being covered with them, where they have been on the roof five or six months. I have dealt with the supply of all regular-sized slates, and will now move on to the Westmoreland and Cumberland quarries. These quarries are situated principally in the Langdale and Conistone districts. Others are found in Honister Pass, near Buttermere, and at Kirkby-in-Furness; the latter belong to the Duke of Devonshire, and are worked by the Burlington Slate Company. The slates are of a dark blue colour, and very hard and durable. My father is of opinion that they are the best slates he ever used, and his experience is based on those used on the Manchester Town Hall and the Natural History Museum, London. They were also selected for the Houses of Parliament, and my grandfather delivered some 400 tons on the site, but before the building was ready for the roof iron was substituted. A good effect is produced by working in a light green slate, such as Elterwater, in bands or pattern, in the manner done at the Natural History Museum. Slates from Cumberland and Westmoreland are, as a rule, obtained in random sizes, and vary much in colour, size, and thickness. Generally, the colour of best and seconds are similar, especially in Elterwater and Newtons, where only one colour is worked; but in some of the quarries where two or three shades are found they are not very carefully sorted; the result is that a slightly speckled effect is produced when close to, but viewed from a distance this is not noticeable. One instance in which this effect has been purposely worked is the house erected for Mr. Beit in Park-lane. Buttermere thirds were used here, and a mixture of light green, dark green, and deep olive-green is seen. The average weight of Westmoreland slating is as follows:—Best slates, about $\frac{3}{4}$ in. thick, when laid, about 8 cwt. per square; seconds slates, about $\frac{1}{2}$ in. thick, when laid, about 10 cwt. per square; thirds slates, about $\frac{1}{4}$ in. to 1 in. thick, when laid, about 20 cwt. per square; Bangor or Port Madoc slating is about 5 cwt. per square. There is little difference in the cost of best and seconds Westmoreland slating; the slates are sold by the ton, and this will always insure good substance. The expenses are very heavy, amounting in London to about 22s. per ton, and as the covering capacity of the seconds is nearly one-third less, heavy carriage makes them nearly as expensive as the best delivered on the site. In addition to this, the labour is more expensive, and the slates being usually smaller require more nails per square. A few of the quarries supply slates cut to regular sizes, especially to order, and at a considerably increased price, which makes the work rather expensive. Westmoreland slates used in this way lose much of their characteristic effect, and do not look worth the extra cost above an ordinary green regular-sized slate. The chief features of Westmoreland slating are as follows:—First, the colour at a distance; second, the rough and broken effect close to; and third, and not least, the courses diminishing gradually from the eaves to the ridge. As a rule, the bottom one should show about 12 in., and, if the roof is not very deep, should diminish about $\frac{1}{2}$ in. a course; if the roof is a deep one, the courses should diminish more gradually than that. I do not think the total output from the Cumberland and Westmoreland district exceeds one-fourth of the North Wales district. The slate from the Whitland Abbey Quarries at Clynderwen, South Wales, is a slate which, when laid, is of a light green colour, but turns with exposure to a golden hue. It is a brittle slate, and should not be used where there is any vibration, as it is liable to

split from nail-hole to nail-hole; being cross-grained, the bottom part of the slate then falls down. They are supplied both in regular and random sizes, and the latter make the better work. The slates entitled to the term best Bangor are those produced at Penrhyn and Dinorwic Quarries. Unfortunately, few of the best slates from either of these come to London. It has been difficult to obtain these for some time, the reason being that during the times when trade was bad, and prices low, the demand for best slates ran down, and left the quarries with heavy stocks. After a time purchasers were found in Germany, and a large proportion of best slates are exported there, and the quarry owners will not deprive the Germans of the slates they took from them in bad times. This is particularly the case in the best red slates, which are second to none in Wales. The supply is small compared with other qualities, and it is difficult to see how the export to Germany can be stopped under the circumstances mentioned. One reason for the loss of the red slates may be that specifications generally used to read, "Best Blue Bangor"; this naturally, to some extent, shut out the red slate. Some very good slates are now being produced at the Dinorwic Quarry in large and increasing quantities—viz., the seconds new quarry and best mottled; the first named are not easily obtained owing to the great demand for them in the North of England and Scotland. In Scotland they take all the small sizes, in fact, anything under 16 in. by 8 in. in the second and third qualities; and this custom has almost worked down to a hard-and-fast rule, which is seldom broken—viz., seconds and thirds below 16 in. by 8 in. to Scotland; seconds of all sizes and qualities to North of England, and best and second best of all qualities but best red to the Midlands, London, and South of England. For London use, where appearance is a secondary object, I cannot suggest better slates than the best tons and best mottled. The best tons are capital slates for church roofs. They are laid in slightly diminishing courses, and show about 15 in. at the eaves, and reduce to about 9 in. at the ridge. They are of a bluish-grey colour, with a tinge of green. The best mottled are so called from the splashes of green in them, and are similar in colour and quality to the best tons, but are somewhat thinner, and are supplied in regular sizes. The quarries find great difficulty at the present time in supplying large quantities of any particular size; they are unable during the present demand to produce them, and if the term "Countess" (20 in. by 10 in.) were rigidly enforced in all cases, the value would rise to something approaching 50s. per square, as merchants would be compelled to reduce larger-sized slates to meet the demand. As a matter of experience, actual size has little to do with the quality of the work. If any preference is to be given, 16 in. by 10 in. is probably the best-sized slate of any. For very sharp-pitched roofs and curb work I recommend 16 in. by 8 in., or 16 in. by 9 in.; these slates are lighter and do not hang so heavily on the nails, and having more nailing in proportion to the larger sizes, lay firmer. For flatter pitches, the wider the slate, if of good quality, the better. In a slate 12 in. wide you have quite $\frac{1}{4}$ in. clear from the joint of the slate above to the nail hole; whereas in a 10 in. slate you only have $\frac{1}{8}$ in. For medium-pitched roofs, slates sized 16 in. by 12 in., 18 in. by 12 in., and 20 in. by 12 in. make good work. The neatest sized slate I know of is 18 in. by 9 in., and for a roof of 105° this will make good and very neat work. While on the question of sizes, fifty to sixty years ago there were only three regular-sized slates made, and this was then considered as a great concession on the part of the quarry owners, who, until that time, used to send the material up in the rough; this will account for all buildings of 70 or 80 years' standing being covered with random slates, and some fully 1 in. thick. The three sizes then introduced were 24 in. by 12 in., 20 in. by 10 in., and 16 in. by 8 in.; these were gradually extended till we have now some fifteen between 24 in. by 14 in. and 16 in. by 8 in. A fact worth noting is that the rougher the slate the less chance of any leakage through rain blowing over the lap; this is accounted for by the greater quantity of air between rough slates than between smooth ones. In proof of this, try and separate slates that have been piled on top of one another after a day's rain. You will find that the moisture has worked in between the slates and excluded the air, and that considerable force is required to separate them. The same action takes place on a roof where the slates fit

closely on top of each other: the moisture gathers and finally spreads over the lap or finds a vent through the nail hole. In the slates used largely in Devonshire and Cornwall this is very liable to occur. They are very smooth, and the rain there is more like mist, and quickly finds an inlet, so much so, that in most cases the slates are bedded solid in putty. Formerly they were bedded in lime and hair, but that is worse than none at all. It simply acts as a sponge, soaks the damp in, and although it prevents leakage in any quantity, keeps the whole roof damp, and in course of time rots the woodwork. The action of the lime in time destroys the slates. The most effective way of dealing with this trouble by means of cement or compositions of that nature is torching; but this is not an entirely satisfactory job, as any vibration in the roof is liable to break the joint, which of necessity is a very fine one; torching can only be done on battened roofs where there is no boarding. The above remarks apply to nearly, if not all, slates of a smooth surface. The Carnarvon slates are, as far as durability is concerned, much the same as Bangor, as they are of nearly the same vein. They are rather more brittle, but when once secured on the roof, and all traffic over them has ceased, generally make good work. The Port Madoc or Festiniog slate is perhaps the best vein existing. The slates can be split thinner, which is rather against them than otherwise, as the men vie with each other in getting the greatest number of slates out of a given quantity of rock. The slate from this district is of a better cleavage than any other. The following facts prove this:—In the two principal quarries in this district it takes about twelve to thirteen tons of rock to make one ton of marketable slates, which compares favourably with Penrhyn and Dinorwic; in the latter quarry the waste is about 16 to 1, and in the former about 17 to 1. When at Port Madoc I was informed that London and England generally were not favoured with the best slates. By this they mean that the thinnest of the best slates are carefully sorted out and exported to Germany, where they receive prices for them in advance of those demanded in this country. The quarries in the Festiniog district are usually worked on the mine principle. Those of which I have experience are gallery and chamber quarries, and run right into the heart of the mountain. They are worked from five or six levels, and the rock between each chamber has to be left to support the mountain. The chambers are about 50 ft. wide, and work down to each other from level to level in steps. The pillars of rock dividing these are some 45 yards thick. By this means of quarrying they follow the good veins and leave a great part of the bad rock, and this partly accounts for the small quantity of waste compared with the quarries worked on the open system; but, on the other hand, the cost of mining is greater than the ordinary method of quarrying. The loss of so much good rock has caused the owners of the Oakley Quarry to consider the advisability of opening the face of the mountain, and working both ways. The cost of this will be great, approaching £750,000, before they can obtain any considerable supply. The supply in the North Wales district remains practically inexhaustible. The Penrhyn Quarry has been in full swing since the time of Queen Elizabeth, and the Dinorwic for some hundreds of years. The workings were originally some six miles apart, and they are now nearly five; so there is no prospect of their joining for the next thousand years. To do this they will have to remove two mountains, each over 2,000 ft. high, and form a cutting one mile and a half wide. The Delabole Quarry is a huge pit sunk some 300 ft. into the rock. This has been at work about the same time as the Penrhyn, and possibly longer. The slates obtained from this quarry are of a dark olive green colour, and are at first brittle and soft, but harden with exposure, and are a very durable slate. In course of time they turn a lighter colour. These slates are of a peculiar grain, and randoms, which are used locally, make the best work. The supply is not large, and they are unable to do much more than satisfy the requirements of the two or three adjacent counties. Hitherto their isolated position has kept their material out of the London market, but the South-Western Railway now run their traffic through Delabole, which places them in a much more favourable position. There are several other quarries in the neighbourhood, but they have been allowed to go out of work, and it will be difficult to resume operations in many of them,

as they are nearly full of water. The slates from the Westmoreland and Cumberland districts make the most picturesque roof covering of any kind of slate, and this, combined with their extreme durability and the necessity of having men specially trained to use them, as a rule insures good work. Slating is usually laid piece work, but in this particular class of work we do not make this arrangement, as much for our own benefit as that of our customers. The slater has more work in sorting, trimming, and holing the slates than in the actual laying, and it is necessary for him to set out the whole side of a roof on a rod in the various courses before he can lay a single slate. This frequently causes delay, especially where the builder has been late in giving the order. This is particularly the case where very deep slopes have to be covered, such as church roofs. Nearly all the slates must be sorted before the slater can give the gauge, otherwise it is not possible to obtain regularly-diminishing courses. To sort the slates properly a good deal of space is required, and in large City jobs we are often in conflict with the builders over the space taken up. In using slates of random widths it is, of course, impossible to lay the slates with the joints lining vertically. If this were done much of the characteristic appearance would be taken away, and the effect little better than in ordinary cheap green slates, and the extra substance would be the only advantage. Nails used in this kind of slating are very much stronger than those required in ordinary slating. They should be of the following numbers to the pound:—2in., 90 = 1lb.; 1½in., 100 = 1lb.; and 1½in., if any are used, 130 = 1lb. It is impossible to use these heavy nails with thin slates; the spall made in ordinary slates when holing is not large or deep enough to take the extra heavy heads, which, if they are not properly recessed into the slate, have a great tendency to break the slate laid over them, and if they do not do that, prevent the slates from laying properly. We have had at various times considerable trouble in remote country places when using Westmoreland slates: they seem to frighten the country slaters. Certainly they do not appear to advantage when roughly staked up, and the inexperienced eye of the local slater, whose occupation is usually of a composite character, and who is probably a better authority on rough plastering, pan-tiling, painting, and brick-laying, &c., cannot see how a sound job can be made. To such an extent does this feeling exist that they have, in most cases, succeeded in thoroughly upsetting the proprietor; it is, however, surprising to find how their mind alters during the progress of the job. I cannot recall a single instance where we have had to return to remedy any defect in Westmoreland slating beyond the repairs inevitable before the various trades have finished. At a job lately finished in the West of England we had to follow the local practice to some extent. The building is situated on the seashore, and in a very exposed place. Our man had instructions to take any precaution he considered necessary to make the job perfect, and, finding the rain during storms driving at an angle approaching 180°, he thought it as well to use putty in a different form. He put two rolls of putty in the form of an arrowhead, the point about 2in. above the nail hole, and extending downward to about 2½in. below. This will make it impossible for any driving rain to blow in, and is quite as effective as solid bedding, and if the job had been covered in the early summer the oil from the putty would not stain the slates, as it certainly would if the slates had been bedded solid and a strong sun pouring down on them. In places away from the sea, if the roofs are boarded, felted, and battened, I should suggest the addition of vertical battens if the situation is very exposed. This course will be quite effective, as any moisture that may be blown over the lap will disperse, and quickly dry up before it has had time to do any damage, whereas if the roofs are battened in the usual way there is a stoppage; the batten prevents the moisture dispersing, and the leakage will in course of time prove serious. In addition, the current of air keeps the roof very cool during the summer months, and also preserves the slates, which, if cut off from ventilation, are subject in course of years to dry rot, which takes place particularly where slates have been laid in felt on boarding only, reducing the parts of the slates not exposed to the atmosphere to a powder. I am certainly of opinion that if Westmoreland and other random-sized slates are used by competent men, a much sounder, better, and more durable roof is the result. Unfortunately, the roof,

originally specified to be covered with good slates, is the first thing to be cut down in cost, if circumstances demand a reduction. There is a growing demand for thicker slates; they are, as a rule, much too thin. In the covering of domes we can make a good and effective job by using small slates, 8in. long. On a small scale this has been done lately at the Royal Observatory Greenwich, with good effect. It is not possible that ornamental work, except in variation of colour, could be worked, owing to the gradual tapering of the slates used as the summit is approached. For a good example of slating in a variety of colours I would refer you to the main building of the Oxford University Museum; additions have been made since, but a great deal of trouble was taken by the architect, Sir John Dean, to have his idea carried out, and each section was carried up to the ridge temporarily, and any alterations made that suggested themselves, till the effect desired was obtained. As to slate slab roofs, I will not do more than refer you to two or three instances. Front of Camberwell Church covered with Delabole slabs and roll; Herbert Hospital, Woolwich Common, covered with blue Welsh slabs; Sun Fire Office, Threadneedle-street; Registry Office, Edinburgh, covered with Bangor slabs. Slaters have one grievance, that is the ugly stains made by the drainage of lead flats down green slates. This is very noticeable at the new Admiralty Buildings in St. James's Park, and has partly spoilt the effect of the green slates on the roof there. The following is an analysis of old-vein slates:—Silica, 55.25; alumina, 24.60; iron oxide, 10.40; lime, 1.00; magnesia, 2.09; loss on ignition, 4.62; alkalis, 2.04; total, 100.00 per cent. As to how green veins came about, and the cause of green spots, I do not know of anyone (geologist or otherwise) who has explained this question satisfactorily, but general opinion is that these varieties in colour are the effects of different chemical processes. Another analysis of an ordinary roofing slate is: silica, 60.50; alumina, 19.70; protoxide, 7.83; lime, 1.12; magnesia, 2.20; potash, 3.18; soda, 2.20; water, 2.30.

COPPER, LEAD, AND ZINC AS MATERIALS FOR ROOFING.

Mr. EWART remarked: As against slates or tiles, sheet metal as roofing material has obvious advantages. The sheets of metal may be depended upon to keep the water out from roofs constructed very nearly on a level, that is to say, with only just slope enough to give a fall for water, while tiles or slates require a considerable pitch. Then, if the metal is either zinc or copper, there is the important advantage of lightness; and finally, sheets of metal are not liable to the dangers of being cracked or slipping off, as tiles and slates are. As to the difference in weight for 100ft., whereas copper, well laid, will weigh only about 1cwt., and zinc 1½cwt., slates to cover the same area will weigh from 6cwt. to 7cwt., and tiles about 14cwt. In attempting to compare the relative claims of each of the three metals—lead, zinc, and copper—as materials for roof covering, one has first to consider what are the chief requirements for a material used for this purpose. These may be stated in the following order: First of all, durability; then lightness; then workableness; next, capacity to resist fire; and lastly, insonorousness. Although the question of durability must be decided chiefly by experience and observation of special instances, yet something may be predicted as at least highly probable from a consideration of the texture of the metal and its liability to corrosion from acids, &c. Into this inquiry the element of weight largely enters, and I therefore name the specific gravity and atomic weights of each of the three metals:—

Specific Gravity.		Atomic Weights.	
Lead	11.4	Lead	207
Copper	8.8	Copper	63.5
Zinc	6.9	Zinc	65

Or, taking the weight of a superficial foot 1½in. thick, we find it:—

Lead	About 3½lb.
Copper	" 2½"
Zinc	" 2½"

Thus, if weight were the only consideration in this inquiry as to durability, lead would be nearly twice as durable as zinc and at least a third more durable than copper. But there is another element which must be equally considered—namely, the hardness, or rather firmness, of the material, and

perhaps this property can best be indicated by the relative amount of conductivity, which in lead may be represented by 230; nearly twice as high in zinc, say 430; while in copper it is more than twice as high as zinc and more than four times as high as lead—viz., 1,000. And the conclusion which we might derive from these figures is corroborated by those which represent the fusibility of the different metals—viz., lead 630° Fahr., zinc 800° Fahr., and copper nearly four times that of lead, and nearly three times that of zinc—viz., 2,143° Fahr. It thus appears that, though lead is so very much heavier than the other two metals, its want of firmness is still more conspicuous, and on the whole, roughly, it might be guessed that lead and copper would, surrounding conditions being equal, be of about equal durability, particularly as neither of these metals is easily acted upon by acids. As to zinc, although it occupies a middle place between lead and copper, both in the matter of weight and also of firmness, it is yet quite out of the competition as to durability from the fact that acids act upon it with great facility. The softness of lead has its advantages, since it is easy to use it of great thickness, while at the same time the low price makes it possible to do this without a prohibitive outlay; so that lead may be laid of a thickness weighing perhaps 6lb. or 7lb. to the foot as easily as copper weighing only 16oz. or 18oz. to the foot. And at these relative weights it would be fair to assume that the metals would be about equally durable. Experience endorses these assumptions, and it is found to be practically the case that zinc, laid of the best thickness which it is worth while to use, say about 1½lb. to the superficial foot, will keep a roof sound for twenty to thirty years, while copper of 16oz. to the foot, or lead of 7lb., form either of them a practically permanent covering lasting 100 years or upwards—that is to say, if properly laid and in favourable situations. But the question of durability cannot be disposed of without a consideration of the property of expansion. When a zinc flat lets in water, and has to be taken up for renewal, it is often seen that the metal is not perished, but is split into cracks. The heat of the sun has so increased the size of the metal that, having been fastened by nails, or soldered together in large sheets, it has risen in buckles. When a shower of rain or a cold night has followed, the metal has contracted, and so caused the cracks. Zinc expands more than either of the other two metals, but lead is nearly as bad. Here copper has an immense advantage, as it expands only a little more than half; or, taking exact figures, if the expansion of zinc is set down at 30, lead will show 28, and copper only 19. In laying either of the metals care has to be taken to allow for expansion, and if the proper methods are adopted much can be done to prevent the injurious effects of it; but in considering the relative durability this property must not be forgotten. There is one other thing to consider—viz., the capacity to bear traffic without injury. Flat roofs are very likely to be walked over, and to have things placed upon them, round or under which dirt and moisture can collect. On account of its extreme softness, lead, unless very thick, is easily damaged by traffic, and zinc, although harder, is brittle, and is also easily corroded by foreign matter; and both are exceedingly liable to buckles and cracks. Copper, on the other hand, is so tough that it is practically uninjured by traffic and little liable to corrosion. It should, however, be laid with wood rolls and welded caps, and not according to the old method of stand-up welts. So far for flat roofs. For pitched roofs and towers or spires the great weight of lead is much against its use. In such positions lead has a way of crawling down, and this is a very destructive process and greatly shortens its usefulness. Some years ago we had an order to cover the spire of St. Peter's Church, Cornhill, with copper. It was then covered with lead, which had been laid in the year 1804. When the lead was stripped off it was found to be very thick—some of it at least from 10lb. to 12lb. to the foot, and was not perished, but was very badly torn and cracked through the expansion and contraction and the creeping down in some places, and the giving way of the wood supports in others. In fact, its own weight had destroyed it. The copper which we put on in place of it would weigh perhaps not more than one-eighth or one-tenth of the lead, and would rather tend to support the woodwork than require to be supported by it. The key which forms a sort of finial on the top of the spire was in good repair

and did not require renewal—it was of copper. The extreme softness of lead makes it also unfit for ornamental work. It is always necessary, when lead is being used, that the wood should first be formed into the shapes, and the lead dressed closely over these; on account of their stiffness zinc and copper do not require the mouldings and ornaments to be formed in the wood, but are sufficiently supported by a rough wood core. Zinc, however, suffers in the process of stamping and hammering, as it is seriously injured by the application of heat. Copper, on the other hand, may be heated to a red, or even a white glow, and then immersed in cold water without being in any way injured, but by this annealing is rendered soft and pliable, and regains its stiffness under the hammer or stamp. On these accounts copper has come to be very much used for ornamental roofs and for spires, flèches, finials, figures, &c., for which it is also specially adapted on account of the little weight per foot which it is necessary to use. The tower of the parish church of Hampstead was covered with copper in the year 1784, and the copper is still in good condition, being of a beautiful green colour. Some years ago, however, in a severe gale, two or three of the sheets were blown off, and had to be replaced by new sheets, which, of course, have still the dark look. A few years ago we had to replace a copper flat on the roof of Somerset House. The copper itself was not perished, as may be seen by the sample which we kept. The reason it had to be replaced was that it had been laid in the old style with stand-up welts, and these had been trodden down and broken. There is good reason to believe that this copper was laid when Somerset House was built. Next to the paramount question of durability comes that of weight, or, rather, of lightness. Here, of course, lead cannot stand comparison with either zinc or copper. Lead is so soft, and has so little coherence, that in order to make a good job it is found necessary to lay it very thick—nearly $\frac{1}{2}$ in. But at the same time lead is exceedingly heavy, so that a square foot of this thickness weighs upwards of 7lb. It thus happens that when allowance has been made for the necessary rolls and laps, the lead necessary to cover a square of 100ft. weighs rather more than the slates which would be necessary to cover the same area, and at least half as much as plain tiles. Zinc, on account of its superior firmness, is laid in the best manner at about one-fourth of this thickness and less than one-fourth of the weight, say 1 $\frac{1}{2}$ lb. to the foot; but then zinc cannot be relied upon to stand more than about one-fourth of the time that lead will. With copper, however, the case is different. Here we have at least equal durability to that of thick lead, with a thickness still less than that of zinc, and a weight of only 16oz. to the foot. On new structures, substantially built, the question of a few tons, more or less, upon the roof is not of very serious consequence. Yet, even in such structures, it may be often worth while to be able safely to use lighter timbers; but for an old roof, where the supports are not too strong, a few tons, one way or the other, may make a very great difference. We found the flat roof of the Portman Rooms covered with lead and leaking all over. In many places the woodwork had sunk, and to cover it with lead would have been exceedingly dangerous. But a perfectly safe and a perfectly sound job was made with copper. As a covering to spires, flèches, domes, and such-like erections, the comparative lightness of copper makes it exceedingly appropriate. Coming now to the next desideratum in a roof-covering, “workableness,” I mean by this the possibility of being turned up with moderately sharp angles and twisted over into welts. All the three metals under consideration expand and contract with changes of temperature—though copper very much less than either zinc or lead—and therefore all require some arrangement which will leave them free to expand and contract without blistering. And then the sheets have to be somehow joined together, and the joint is to be made, if possible, without solder. For it is found that the places where soldered seams have been made perish long before the rest of the metal is worn out. Although lead is so soft, yet on account of its great thickness it cannot be easily welted, and requires large rolls. On the other hand, its weight and softness incline it to lie close even without joints—only then, of course, it is easily displaced. Zinc, being the most expansive of the three metals, and being also more brittle than lead, requires great care in laying, and the pro-

vision of very free play for each sheet, both at the ends and sides. On this account many drips are needed. This is sometimes very objectionable on account of the increase in height. Copper, on the other hand, expands so little that if wood rolls are used at the sides of moderately-wide sheets the ends may be safely welted together in considerable lengths, and so few drips are necessary. At the same time, copper is so easily worked that welts are readily made, and may be used not only to connect the sheets in lengths, but also to fasten them to the roll-caps at the sides, thus making a very firm and light covering. As a fireproof material, copper is immensely the best of the three metals. Lead melts at 630° Fahr., and, therefore, in a fire is soon poured down in a terrible stream, more dangerous than even falling timbers or bricks. Zinc melts at 800° Fahr., and blazes brightly if thrown into an ordinary coal fire. Copper requires a temperature of 2,143° Fahr. to fuse it, and retains its shape even at a white heat. The last property required in a roof-covering is insonorousness. Here lead has the immense advantage of its exceeding softness, and the same quality of softness makes it a non-conductor of heat. For a long time lead was almost the only metal used for covering roofs, sheet zinc being practically unknown, and the high price of copper almost prohibiting its use for buildings where economy had at all to be considered. The introduction of sheet zinc about sixty years ago, and a great reduction in the price of copper during the last twenty years, have altered this state of affairs. The change would have been greater still, but for the fall which has at the same time taken place in the price of lead, partly on account of the improvements in the methods of separating the silver from it. At the present market rates sheet zinc is, weight for weight, nearly twice the price of lead, and sheet copper, weight for weight, nearly three times the price of zinc, or about five times the price of lead. It is evident, therefore, that for temporary work sheet zinc is by far the cheapest metal covering, being properly used at one-fourth the thickness, while it is not quite twice the price of lead, and at the same time it has the advantage of lightness. On the other hand, compared with copper, although it is not much more than one-third of the price, it requires to be laid at least half again as thick. For a covering to permanent buildings, zinc, for reasons already stated, is inadmissible; while copper and lead are, perhaps, about equally durable, so far as the metal itself is concerned. Lead has the advantage over copper of making much less noise in driving rain or a hailstorm; but copper has, perhaps, still greater advantage over lead, being only about one-sixth the weight, being almost absolutely fireproof, requiring very little support in ornamental work, having only a little more than half the expansiveness under heat, and consequently requiring fewer drips. To which may be added its capacity for being easily welted, and, finally, the beautiful colour which it takes on from a damp atmosphere after a few years of exposure.

A vote of thanks to Messrs. WALKER, STIRLING, and EWART was passed by acclamation on the motion of Messrs. B. F. FLETCHER and W. H. SETH-SMITH, supported by Mr. H. W. PRATT, and was briefly acknowledged.

THE SURVEYORS' INSTITUTION.

THE Surveyors' Institution held the opening meeting of the current session on Monday evening last in the lecture hall attached to their temporary premises in Savoy-street, Strand. It will be remembered that, as stated in the President's Address, the Institution has for many years had in view the advisability of providing for the time when the increase in the membership and the falling-in of old leases would necessitate the extension and rebuilding of their premises, and when the accumulated funds at the disposal of the council would enable them to make the alterations, such as would be worthy of the Institution, now numbering nearly 3,000 members. They have recently acquired a lease for 999 years of their old premises and of other houses—numbering five in all—in Great George-street and Little George-street, and propose to erect on this very convenient site a block of buildings designed by Mr. Alfred Waterhouse, R.A., which will meet all the requirements of at least the present and the next generation of the surveyors and land agents of the United Kingdom.

Meanwhile the council of the Institution have secured temporary offices with ample accommodation for evening meetings, for arbitrations, and for the housing of the very valuable library, in the buildings of the Joint Examining Board of the College of Physicians and Surgeons, facing the Thames Embankment next to Waterloo Bridge, in which building the examinations for the diplomas of the Surveyors' Institution have been for many years held.

Mr. DANIEL WATNEY, for the second time elected president of the Institution, began his address by lamenting the lack of material at his disposal, but pleaded that, however uninteresting each successive president's address might be to his actual audience, each had, in the future, some possible value as the expressions of the opinions and convictions of a practical man on the subjects current at the time of its delivery. If he were right in thinking this to be the case, he hoped his remarks might not be altogether without value as a contribution to the professional *Transactions* of the Institution. The Agricultural Rates Act had, he thought, been somewhat unfairly treated by the opponents of the landed interest. It had been called by some very hard names, and had been stigmatised as a “Landlords' Relief Bill” and “a robbery of the taxpayer for the benefit of a privileged few”; while everyone conversant with the subject knew perfectly well that the proposed relief to agriculture was not to come from any taxation of the people's bread, but that the deficiency was to be made up from the duty on the estate of the defunct capitalist, who could not appeal against it. The relief to the farmer would undoubtedly be small; but the value of the Act lay in the recognition of the principle that the State was justified in trying to save, if possible, a staple industry from utter ruin. The President proceeded to criticise very severely the recent remarks of an eminent politician on the condition of agriculture generally, and on this Act in particular. The speaker in question took in the first place the rent as actually returned, and not the net income of the landlord after deducting outgoings, improvements, and other similar drains on his profit; but, taking 27 out of the 30 estates quoted, (there being an actual deficiency in two of them, and an incomplete return in another), he found that the net rent actually received by the landlord ranged from 5s. 4d. to 25s. 4d., or an average of 12s. 10d. per acre. But the rent, instead of being merely the price paid for the user of the land, was largely composed of the outlay by the owner, or his predecessors, on permanent improvements. He should not be at all surprised to find that, out of the alleged forty millions of rent, only about fifteen millions went into the pockets of the landowners, numbering (according to Sir James Caird in 1878) some 330,000 persons. The President next dealt severely with the Floods Prevention Bill, which, he said, had happily not passed, and which entirely ignored any private rights and gave to the county councils complete power to interfere, without notice to the owner, with any watercourse—using the term “watercourse” in an unduly extended sense. The fall in the importation of foreign corn and cattle was, from the British farmer's point of view, a sign of more prosperous times, while the efforts so strenuously made by reformers like Lord Winchelsea, to bring the producers within easy reach of the markets and the markets nearer to the consumer's door, were worthy of all encouragement. The Light Railways Act would also seem to be a step in the right direction. The President then touched on the question of small allotments, the success of which did not seem to him to be quite so assured in these days of low prices as some of the advocates of the system wished to persuade themselves it was. But he kept an open mind on the subject, preferring to trust to experience rather than prevision. The new Irish Land Act was next dealt with. This measure touches more intimately the land agent class of the Institution than that to which our readers belong; but it was interesting to learn that counsel had advised that the Institution was a “public body,” capable of “suggesting alterations” in rules framed under the Act. Irish Land Laws and the suggestions of the Welsh Land Commission, which recommended the formation of a Land Court in Wales, were next dealt with by the President, who, referring to the Report on Welsh Land, expressed surprise that, in recommending that persons having the management of land should form themselves into a professional body, the commissioners had

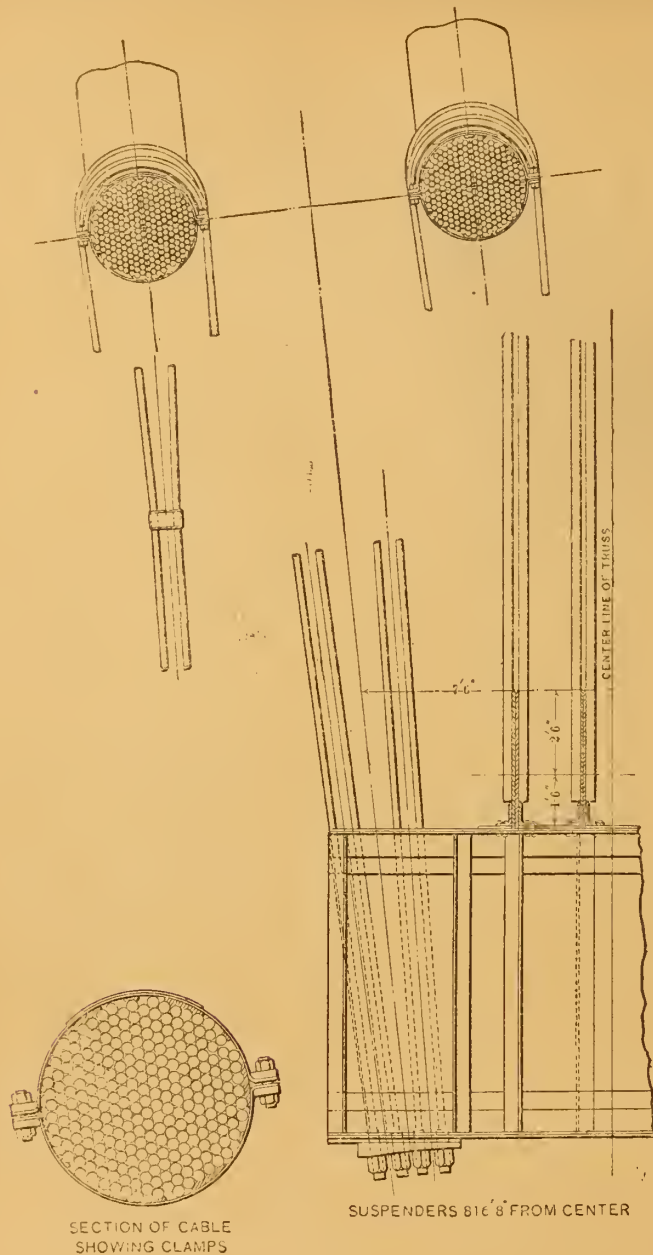


Fig. 9.

entirely overlooked the existence of the Surveyors' Institution and its influence in regulating the training of land agents in the Principality. Forestry, the President said, was a favourite subject with him, and had always been so. Were it placed in England on the same scientific basis established in Germany, for instance, it would be better for English landowners; but the Institution, with the new Forestry Museum and with its other resources, might hope to do a great deal to attain this ideal, and to help, if not to outstrip, other societies working for the same end. Turning then from rural to urban matters, the President reviewed the proposals of the London County Council advanced during the past year. The long-deferred Holywell-street scheme had been revived, Bozier's-court, at the southern end of Tottenham Court-road, was threatened; and meanwhile, as the Chairman of the London County Council put it, "speculators in real property were discouraged from investing, with an eye to the policy of the County Council." The County Council itself had contemplated a sufficiently magnificent scheme of re-housing on one of the most expensive sites in London, facing Cockspur-street and Charing Cross, and the Government Departments had also a project for improvements in Westminster in which the Institution felt some considerable interest, which would, when carried out, considerably enhance the value of the neighbourhood, whether from an artistic or from a practical point of view. Whichever of the proposed alterations at the foot of Whitehall was adopted, it could not fail, by opening up the view of the

Abbey and affording increased facilities for traffic, to improve Westminster. A great many professional men would be evicted, but not being "working men," they must "re-house" themselves. The extensions of the activity of the Institution and of its influence in the direction of embracing all the leading land agents in Ireland, of inducing the surveyors and valuers in Scotland, and the civil staff of the Royal Engineers to join its ranks; and, still further, of including in its membership all the Colonial Government surveyors, were, he thought, indications of its determination to progress towards the ideal contemplated in the charter—the inclusion of all qualified surveyors in the British realm within its membership.

Mr. J. W. FAIR having proposed, and Mr. R. VIGERS having seconded, a vote of thanks, which was carried by acclamation, the PRESIDENT briefly replied, and the meeting then adjourned.

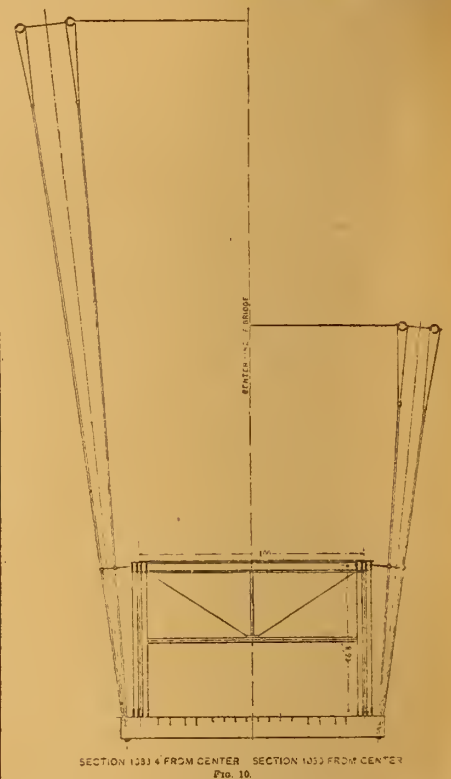
SUSPENSION BRIDGES—A STUDY.

By GEO. S. MORISON, Past-President Am.Soc.C.E.

(Continued from page 628.)

THE next work, which can be done before the covering is put on the cables, is to cradle them. This cradling will be accomplished by by tying the cables on each side together by steel tension bars of varying length, and tying the pairs of cables together by cross ropes at intervals. These cross ties and ropes would be attached to every fifth clamp, and the stress in them is com-

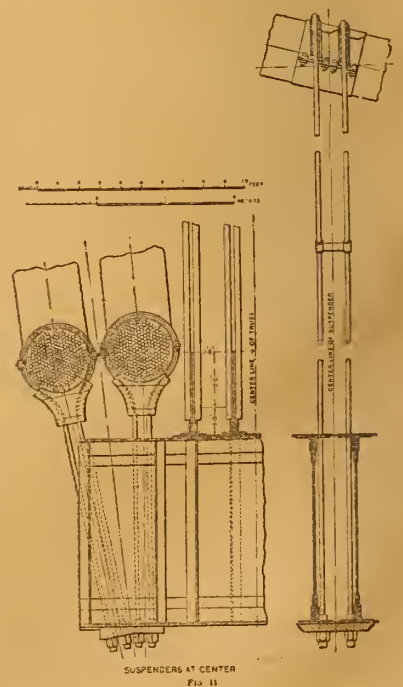
paratively low, amounting to only 90,000lb. each, so that ropes of $2\frac{1}{2}$ in. diameter will be sufficiently large. There will be twelve of these ropes in all, and the total estimated weight of these ropes, together with the ties between cables, is 23,000lb.



As soon as the cables are cradled and tied up, everything will be in readiness to attach the suspenders. The total weight of each main cable between vertical intersection points may be taken as follows:—

3,325ft. of cable, at 2,590lb. per foot...	8,412,250lb.
84 clamps, at 1,800lb.	151,200 „
Cradling-ties	5,750 „
	8,569,200lb.
3,000ft. of covering, at 50lb.	150,000 „
Total	8,719,200lb.

This divided by 3,200 gives 2,725lb. as the average weight per foot of bridge for each cable and



connections, or 10,900lb. for the four cables. As the total weight for which the bridge is proportioned is 50,000lb. per lineal foot, or 12,500lb. for each cable, the weight which must be carried

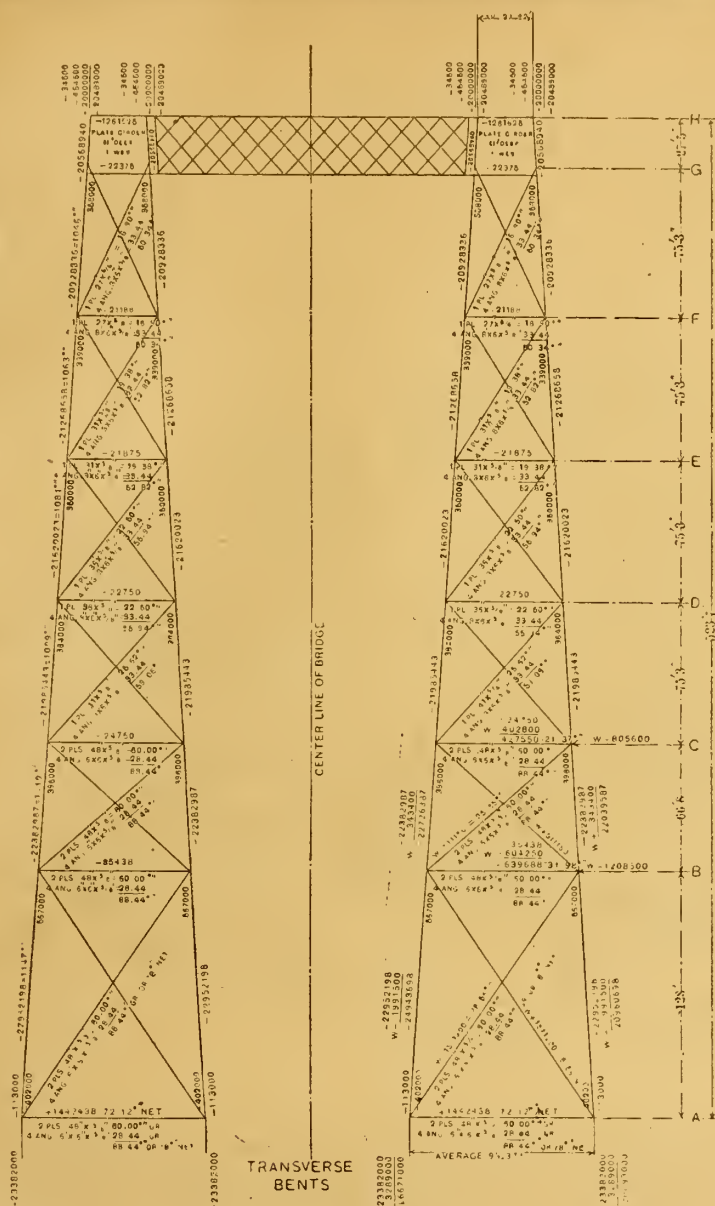


Fig. 12.

by the suspenders will be 39,100lb. per lineal foot for the four cables, or 9,775lb for each cable. There are three suspenders to each 100ft., so that the weight to be carried by each separate suspender is 325,833lb. The arrangement of the suspenders is shown in Figs. 9, 10, and 11. They are wire ropes of the same character and dimensions that are used in the main cables. The detail selected provides for four suspending ropes at each clamp. Each rope would therefore have to carry 81,458lb., equivalent to 27,153lb. per square inch, or less than half the stress allowed in the main cables. There are really but two ropes used at each point, each rope being twice the length of the suspender and fitted at each end into a long socket on which a screw is cut. Each rope passes over the saddle, and so forms two suspending ropes; the long sockets pass through washer-plates under the floor-beams, and are adjusted by nuts under these washers, a detail which might be modified in construction. The suspenders are clamped together about 36ft. below the cables so as to prevent unnecessary vibration, and where it can conveniently be done the cables will be connected with the stiffening trusses. The estimated weight of the suspenders, including the sockets, is 1,699,500lb., to which may be added 30,500lb. to provide for the small vibration connections and extras, making the total weight of suspenders 1,730,000lb. The wind strains are transferred to the towers where the stiffening truss passes the towers by cables. There will be 16 of these cables in all, and the estimated weight of these 16 cables, including sockets, is 36,650lb. The details of this arrangement, which is very simple, will be explained hereafter. The total weight, therefore,

of the rope-work in the bridge, including sockets, will be as follows:—

Main cables, as above	58,553,352lb.
Suspenders and connections	1,730,000 "
Wind cables	36,650 "
Total	60,320,002lb.

These finished ropes can be furnished at the bridge site at a price from 5½ to 6 cents a pound, and the cost of placing them ought not to exceed one-half cent a pound. In these estimates the cost of these ropes has been figured at 7 cents a pound, erected, this including both main cables and all other rope-work, which makes the total cost of cables, suspenders, and other similar matters, 4,222,400dols. The special details which form the cable connections at the tops of the towers, and in the anchorage, are shown plainly in Figs. 2, 7, and 8. The cable connection on top of each tower-post weighs 454,461lb. As there are sixteen posts, the weight of these top connections, including the steel castings, is 7,271,376lb. The connections at the foot of each backstay, including castings and temporary anchorage in the rock, weigh 645,451lb., and as there are eight of these, the total weight will be 5,163,608lb. The total weight, therefore, of all material in the special details by which the cables are connected, both at the top of the towers and at the bottom of the anchorage, will be as follows:—

Details at top of tower	7,271,376lb.
Details at bottom of anchorage	5,163,608 "
Total,	12,434,984 "

This work is generally heavy and simple, but there is in it some nice machine-work, and it will

probably be expedient to make all the castings of steel; it is, therefore, estimated at 5 cents per pound in position. This makes the cost of these details 621,749dols. The cost, therefore, of the cables, including all wire rope and connections, will be as follows:—

Rope work, &c.	4,222,400dols.
Connections at towers and anchorage	621,749 "
22,000ft. cable covering, at 1dol.	22,000 "
Total	4,866,149 "

Towers.—The towers naturally follow the cables in studying the design. The support of the cables at each end of the main span consists of two towers, which form a double tower. Each tower is of approximately square section, with four corner posts, each battering one in sixteen in both directions. In designing these towers the special functions which they have to perform must be considered. The arrangement by which the cables are attached to the top of the towers holds the towers absolutely, there being no movable saddles. Any change of length in the backstays must be taken up by a change in the position of the top of the tower. These

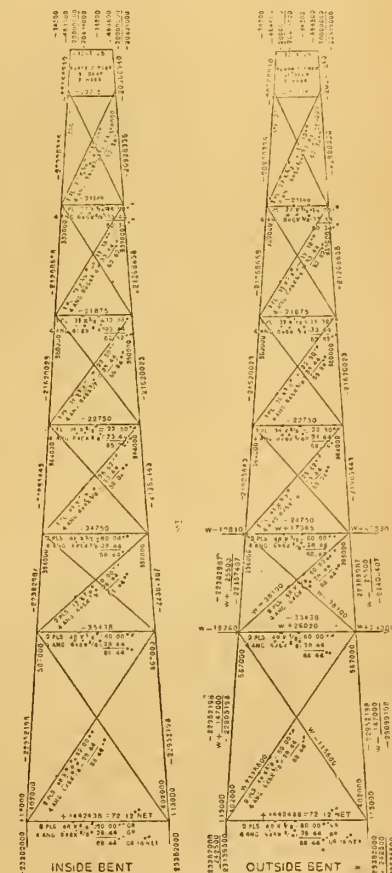


Fig. 13.

movements at the top of the tower, combined with changes in length in the main cables, regulate the position of the suspended superstructure. It is important that the towers should be comparatively slender, so that they can bend without overstraining the metal. As the top of the tower is anchored by the backstays, a broad base is not necessary for stability. The tower is not exactly square, but on the top the north and south sides are in line with the backstays, and the distance between theoretical intersections is 28ft. on each side. As, however, the outer cables are lower than the inner cables, the actual distance between centres at the bottom of the castings, or at elevation 559.08, will be 29.18ft. and 29.55ft. for the north and south sides, and 28.42ft. and 27.58ft. for the east and west sides of each tower. At the theoretical intersection point between the bottom strut and the posts at elevation 36, the north and south sides of the tower measure 92.94ft. and 93.8ft., and the east and west 93.93ft. and 94.32ft. Although the tower is not exactly square, it is so nearly so that the irregularity would seldom be observed. The towers, however, are twisted with reference to each other, and this would be manifest.

Strain sheets have been prepared for these towers, and are given in Figs. 12 and 13, these



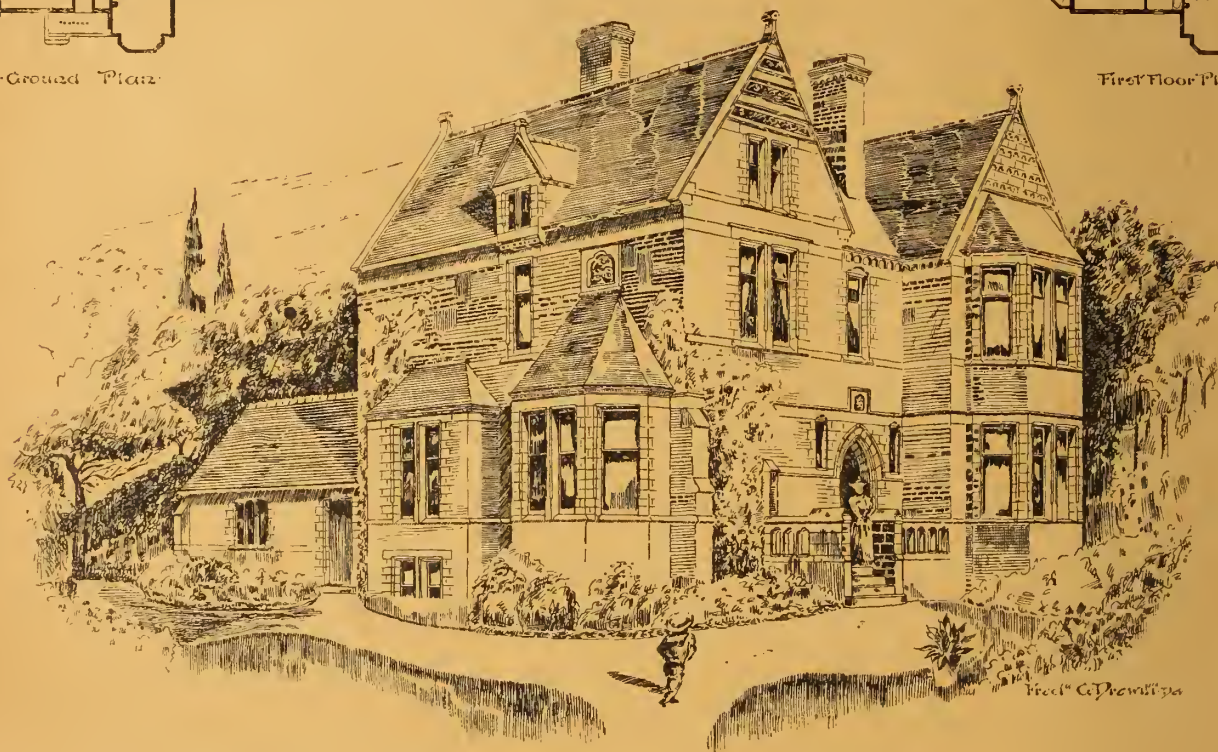
Ground Plan

St. Philip's Vicarage Southport.

Goodwin & Packer, Architects



First Floor Plan



Fred. C. Thompson

strain sheets showing the calculated results from the 20,000,000lb. imposed on the top of each post, and from the weight of the tower itself, beside the strains due to wind. The towers have been proportioned on the basis of a stress of 20,000lb. per square inch from weight alone in the posts, no additional provision being made to resist wind or other extraordinary strains, as they will in no event be more than 25 per cent. greater than the strains produced by weight alone. The assumption supposes the cables to have an inclination of two horizontal to one vertical. The real strains in these towers are, therefore, from 1 per cent. to 10 per cent. less than the calculated strains.

The actual motion in the top of the tower after the completion of work, due to changes in the length of the backstay caused by a maximum moving load, on the basis of a modulus of elasticity of 26,000,000, will be 6½in., which corresponds to a stress of 2,173lb. per square inch in the posts of the tower. This is less than 11 per cent. of the 20,000lb. stress for which the posts of these towers are proportioned, and the towers have been proportioned on the supposition that the angle of the main cable is two horizontal to one vertical, whereas it is 10 per cent. greater, and the reaction on the posts 10 per cent. less. The stresses in the posts, after allowing for bending, are only 1 per cent. more than the calculated strain. The motion at the top of the posts, caused by a change of temperature of 60°, will be less than 5½in., corresponding to a stress of 1,450lb. per square inch in the posts, which may exist in either direction from a mean.

(To be continued.)

ST. PHILIP'S PARSONAGE, SOUTHPORT.

THIS building is from the design of Mr. G. S. Packer, architect, Southport. The total cost was £2,300. The building is faced with Longridge dressed stone and Burnley parpoints. The inside joiner's work is all pitch-pine, varnished. There was no sole contractor, the work being let direct to the different tradesmen, and all working under the architect.

CHIPS.

The scheme for making a new street in Hull from Prospect-street to Junction-street and continuing George-street through to Carlisle-street is making satisfactory progress. The estimate and scheme submitted by Councillor Gelder have been verified and approved by the borough engineer, and the town council will seek Parliamentary powers next session for carrying out the improvement.

A district police-station is about to be built in Hatters-court, Pleasance, Edinburgh, from plans by Mr. R. Morham, city superintendent of works. The building will be in the Old Scottish style, three stories in height, and constructed of brick. Over the charge-room, muster-room, and cells will be dwellings for nine constables.

The London, Brighton, and South Coast Railway Company have opened their new main line station at East Croydon. The public offices and waiting-rooms, which front on the Addiscombe-road Bridge, are of red brick, the interior being of pitch-pine throughout. The platforms are reached by covered slopes, and communicate with each other by subways. There is a sheltered carriage-way in front of the station.

The corner-stone of the new State House for Rhode Island at Providence was laid on October 15. As planned, the edifice will be 123ft. wide, 333ft. long, and will have a dome 244ft. above the ground. The rotunda will be 53ft. in diameter and 149ft. high. The stone to be used is Georgia white marble resting on foundation walls of pink granite. The contract price for the building is £300,000 sterling. Messrs. McKim, Mead, and White, of New York City, are the architects.

The Peterborough Cathedral Restoration Committee have adopted the reports of Sir A. W. Blomfield and Mr. Pearson as to the condition of the west front, and have this week issued a fresh appeal for £11,000 to rebuild the north and south gables of the west front after underpinning it, as recommended by both architects. Towards this amount £1,250 has been subscribed.

Messrs. Coode, Sou, and Matthews have been engaged by the directors of the South-Eastern Railway Company to survey Folkestone Harbour with a view to deepening and enlargement. The company have also given instructions for the existing pier at Folkestone to be extended 300ft. seawards, so that ample accommodation may be provided for a new afternoon service between London and Paris, which is to be inaugurated on May 1, 1897.

The large scheme of city improvement in contemplation by the improvements committee of Glasgow Corporation has been very greatly modified. The committee have now agreed only to ask Parliamentary powers for the compulsory purchase of a number of minor insanitary areas, scheduled by the city medical officer and the health committee, and of the property on the east side of Nelsou-street, City, necessary for the widening of that thoroughfare.

A series of frescoes have just been painted upon the walls of the chancel, nave, and south transept of Emmanuel Church, Leeds. The subjects in the chancel are the Expulsion, the Annunciation, and the Adoration of the Magi. Upon the large space above the chancel-arch is the Lamb with the Flag, and on either side groups of angels in the act of adoration or playing upon musical instruments. Down the whole length of the nave are figures of the Twelve Apostles, and above these are figures of prophets and martyrs, in niches in the clerestory. The figures are painted in rich colours on gold and blue backgrounds, and are almost life-size. A large processional subject of Christ's Entry into Jerusalem, is painted on the east side of the south transept, occupying a space of about 19ft. by 7ft. The work has been executed by Messrs. Powell Brothers, of 30, Park-square, Leeds, under the personal supervision of Mr. Henry Walker, architect, of the same city.

Plans for a new factory on the Park-side have been submitted by the Beeston Tire Company to the Corporation of Coventry. It is proposed to erect premises with a 90ft. frontage, having the offices two or three stories in height, and the necessary shed accommodation in the rear. Mr. E. J. Purnell, jun., of Coventry, is the architect.

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Our Illustrations.

CITY GUILDS: NO. XXIX.—THE IRONMONGERS' HALL.

THE historic home of the Ironmongers' Company furnishes one of the most interesting façades in Fenchurch-street, and as a sample of the Italian mode, this handsome stone front, with its Ionic pilasters surmounted by a sculptured pediment, holds its own among the architectural buildings of its date still standing in the City of London. It was erected in 1748, from the designs of the architect to the Company, Mr. T. Holden, who treated his fenestration with a degree of picturesqueness within the rigid confines of a dignified formality which the taste of his times imposed upon him. To-day we illustrate the interior of the banqueting-hall, which occupies the upper part of the front building, the offices, as well as the court and drawing-rooms, being grouped round an internal yard to the rear. The entrance hall or vestibule under the banqueting-chamber is groined in plain vaultings supported by a series of Tuscan columns, and a large stairway leads to the first-floor. The sumptuousness of the place may be gathered from our photographic plate, which illustrates the wainscot panelling emblazoned with cartouch records in each compartment, giving the names of the several past masters or wardens of the guild, with their dates set forth on a gilded ground. This device supplies colour and richness to the dado encircling the room which is further elaborated by carvings, pilasters, and cornices in oak and cartoupe imitative of oak. The ceiling, too, is in harmony with the rest, while the full-length and other portraits in oils on the walls complete the magnificence aimed at by the fraternity, whose feasts in this hall were so costly and characteristic that the ostrich, said to be able to eat and digest iron, was employed in connection with their pageants. A large timber carved representation of this voracious bird stands on the staircase, and forms one of the features of the place. The Company's possessions are rich in fine plate, and some exceedingly interesting exhibitions of metalwork have of late years been held in this hall. A very handsomely bound catalogue with capital illustrations of representative exhibits was on one occasion issued at the cost of the Court. Among the Ironmongers' treasures is the Richmond Cup, dated 1460, and regarded as unique. A Mazer Bowl, inscribed round the silver gilt rim with the legend, "Ave Maria gratia plena, Dominus tecum, benedicta tu in mulieribus: et benedictus fructus ventris tui"; the Ironmongers' Arms; pair of Hour Glass Salt-cellar early 16th century. Also the following:—Grant of Arms by Lancaster King of Arms to the Company, dated 24 Henry VI.; Confirmation of Arms by William Hervey, Clarenceux, to the Ironmongers'

Company, May 28, 1560; Charter of Incorporation to the Guild or Fraternity of Ironmongers, March 20, 3 Edward IV.; the Pall given to the Company by "John Gyva, late ironmonger of London, and Elizabeth, his wife"; the Master's Garland, of velvet, and ornamented with the arms of the Company engraved on silver; grant from the Prior of Rochester to Matthew de la Wyke, of the manor of Norwood in Middlesex, A.D. 1241. To this Charter is appended the very beautiful green wax seal of the Church of Rochester; two volumes of the manuscript collections for a history of the Ironmongers' Company, compiled by John Nichols, F.S.A., when he was master. From this inventory it will be gathered that the Ironmongers are among the favoured guilds, at least in the matter of records. Among their charities are the famous old brick-built almshouses in the Kingsland-road at Haggerston, and founded by Sir Robert Geffery, Lord Mayor in 1686. The pictures of the Company are chiefly portraits of benefactors, including Mr. Thomas Betton, a Turkey merchant, who in 1723-24 left £26,000, half the interest of which was to be expended in ransoming British subjects in Barbary or Turkey. Gainsborough's portrait of Admiral Lord Viscount Hood, presented in 1783 on his admission to the Court and freedom of the Company, is one of the principal works of art in the hall. Sir Christopher Draper is depicted in curious glass in one of the windows dated 1639. The Ironmongers were first incorporated by Edward IV., in 1464; their first "house," built upon the site of the present hall, had a gatehouse, the refectory strewn with rushes, court-chamber hung with tapestries, and an armoury containing, in 1556, 17 back and breast-plates, 17 pairs of splints, 12 gorgets, 12 swords, and 11 daggers, to which were afterwards added corslets, skull-caps and red-caps, black bills and Morris pikes, white coats and red crosses, 14 sheaves of arrows, &c. At the raising of the army of the Earl of Essex in 1642, the Company lent, "to be returned and paid for," 10 russet armours, 10 pikes, 10 swords with belts, 10 head-pieces, 10 musquets with bandelores and rests, and 10 murrions. In 1523 the Company lent Henry VIII. a large sum of money by selling some of their plate, and pawning the rest; and Elizabeth compelled the Company to lend her money, which forced the citizens to borrow of her at 7 per cent. on pledges of gold and silver plate. In the list of wardens is John London, Esq., 1727, who gave name to London-street, nearly opposite Ironmongers' Hall, which is quite close to Mark-lane. Our illustration was specially photographed for us by Mr. J. T. Sandall.

NEW SHOPS AND OFFICES, KING STREET, NOTTINGHAM.

THESE buildings have recently been erected at the corner of King-street and the market place, Nottingham, for Mr. H. Butler. They comprise three shops and an extensive range of offices on the first, second, and third floors, with caretaker's apartments on the fourth floor. The entrance to the offices is seen in the view. The buildings are erected of local bricks and fine Hollington stone, the floors being of fireproof construction. The contractor's work has been carried out by Mr. T. Barlow, at a cost of about £5,500, under the supervision of the architects, Messrs. Marshall and Turner, of Nottingham.

COTTAGE NEAR HASLEMERE, FOR THE HON. F. S. R. RUSSELL.

THIS house is situated about a mile from Haslemere, on the wooded side of a hill. The site, therefore, lent itself readily to terracing, as will be seen from the drawing. The materials of the building on the ground floor are red brick; on the upper, studding and rough-cast. In order to avoid the expense of beams and leadwork at the junction of the two different materials, and as well to protect the bricks below, the rough-cast, which oversails, was weathered. Owing to the limited amount of money available for the building, it was only possible to give decorative interest to the interior of the parlour, which has an open timber ceiling of simple design, and an arched brick fireplace. The drawing appeared at the late exhibition of the Royal Academy. The architect is Mr. W. L. Lucas.

JACOBEAN FIGURES FROM THE STAIRCASE AT ALDERMASTON COURT.

THE illustration we publish of some of the figures on the grand staircase at Aldermaston Court are

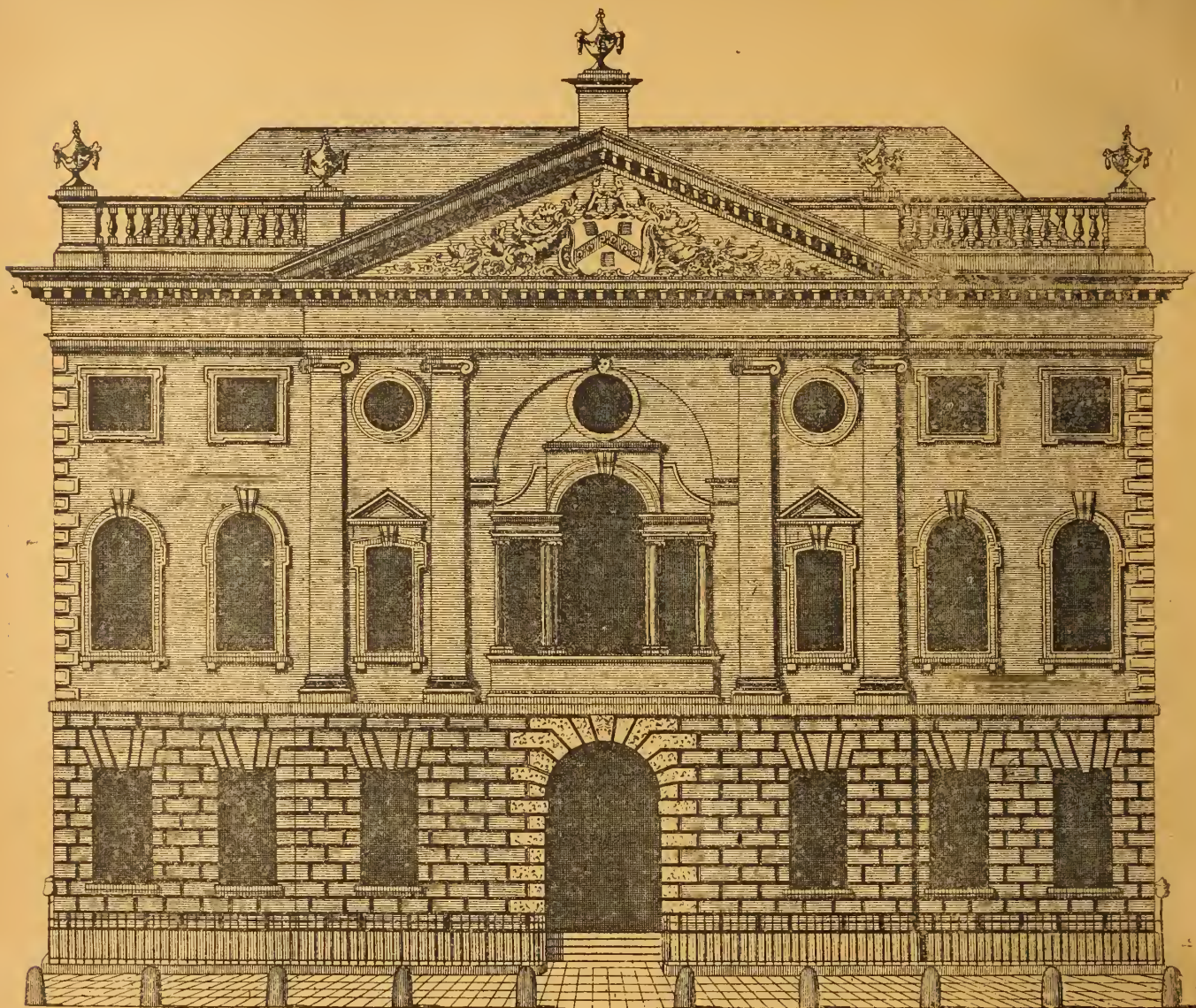
from water-colour drawings by Mr. Brightwen Binyon, A.R.I.B.A., from whose designs the house has recently been enlarged and altered. We gave an illustration last year of the new wing. The figures are selected from a large number which ornamented the newel posts of the house erected in the 17th century, which was in great part burnt down in 1843. The house and park were soon after sold to Mr. D. Higford Burr, who, in 1849-50, built the present house from designs by Philip Hardwick. The old staircase was reused; but, unfortunately, it was thought best to turn it round. This, of course, made it necessary to cut fresh housings for the strings, and cover up some of the old ones. Notwithstanding this and the injuries sustained at the time of the fire, when many of the figures were hastily taken down or knocked off, it is still a fine example of its period. The old staircase was depicted by Nash in his "Mansions of England."* Only one of the figures shown by him is among those we now illustrate—namely, that of Neptune, whose trident has evidently since been added; but from the form and pose of the hand and arm it is evident there originally was one. The figures are carved in elm, and show the work of a more skilful hand than the newel posts and balustrade. The figure of Mercury is one of the most refined, and, like several others, wears a breastplate, with beautiful shoulder pieces, ornamented with lions' heads, whose mouths form the openings for the arms. He has, unfortunately, lost the caduceus from his right hand, and the left appears to have also held some symbol—possibly a palm or purse. The wings on his helmet, or petasus, are small, and have apparently had their tips broken or burnt off. He also has wings attached to his boots, which are a good deal hidden by the cock which stands by his side, and by his cloak. The figures comprise, besides, several of the Olympian Gods, some Scripture heroes, and symbolical representations of the Virtues and the Five Senses. The figure of the king illustrated is supposed by some to represent David. There is also a very quaint figure of Chronos commencing to eat one of his children, who is doing his best to defend himself by pulling his unnatural father's hair.

RECENT FURNITURE IN WHITE WOOD.

THESE two examples, illustrated in our pages this week, show what can be accomplished, by thoughtful restraint and consideration to detail, in producing freshness of design without indulging in astonishing vagaries or over-elaboration. Good proportion and simplicity of outline characterise both the subjects of our sketches, whilst the workmanship, which can easily mar the intent of the artist, seems in these cases to be admirable. Mr. C. F. A. Voysey designed the Mantel and Fireplace, which was executed by the Portland Metal Works. The woodwork is enamelled white, the small glazed tiles round fire-opening being pale grey-green. The total width is just over 8ft., and the height 6ft.; the long centre panel is fitted with a mirror. Of the accessories shown in sketch, the brass Fender with polished iron bars, the hammered copper Coal-scuttle, and the brass Footman were designed by Mr. A. S. Dixon, of the Birmingham Guild of Handicraft; while Messrs. T. Birkett, and A. Allbutt, and A. Williams, of the same school, are responsible for the execution. The Hall Settle was executed by Messrs. J. and W. Guthrie, of Glasgow and London, from the design of Mr. Chas. A. Mackintosh. It is finished in green, with painted canvas back, and peacock frieze, executed in lead, with coloured glass "eyes" in the birds' tails, this frieze being screwed to back. The dimensions of this settle, which possesses a locker under lift-up seat, are 6ft. high, 4ft. 2in. wide, and 2ft. deep. Both fireplace and settle are to be seen at the Exhibition of the Arts and Crafts Society, at the New Gallery, Regent-street.

At Broad Street Station, on Monday, Colonel Newton, the general manager of the North London Railway, presented to the resident engineer, Mr. Thomas Matthews, an illuminated address, containing 500 names, together with a service of silver plate, subscribed for by the officers, staff, and employés of the railway company, to commemorate his 50 years of service with the North London Railway Company. Mr. Matthews was engaged in the construction of the line in 1846, and has for 35 years been the resident engineer.

* See our issue for May 17th, 1895.



HALL OF THE WORSHIPFUL COMPANY OF IRONMONGERS, FENCHURCH STREET, E.C.

LOADING COLUMNS.

THE effect of bracketed capitals cast to columns is to reduce very seriously the sustaining strength of iron columns by eccentric loading. The engineering department of the Yorkshire College, Leeds, has been making tests. One of these was on a hollow cast-iron column, 11in. in diameter, 1½in. thick, and 10ft. in length. The pressure was applied on one edge of the bracket-cap, designed to carry floor-beams on both sides, and was therefore not a central pressure, but 17in. from the centre. The column failed at 65·5 tons, the fracture beginning at the opposite side to the pressure, and about a foot below the bracket. Test pieces cut from the same column showed a tensile strength of 8·45 tons per square inch, and a compressive strength of 30·4 tons per square inch. "The sectional area of column was 34·3sq.in. at point of fracture, which would give," it is said by *Engineering*, "a total compressive strength of over 1,040 tons, about 16 times that at which it was actually ruptured." Thus it is shown the column failed not by compression, but by tension on the side opposite the load due to bending. The conclusion arrived at ought to make architects more careful in loading columns which have these bracket-heads; that is to say, they must not expect columns loaded on one side to bear anything like the load that the column is estimated to carry if the load is applied centrally. *Engineering* points out the utter folly of loading columns in this manner—a practice far too common among architects.

At a general meeting of the Royal Institute of Painters in Water-Colours, Piccadilly, held on Tuesday evening, Mr. Frank W. W. Topham was elected a member, and Professor Haus von Bartels an honorary member.

BUILDING TRADES EXHIBITION, 1897.

THE first meeting of the consultative council in connection with the forthcoming Building Trades Exhibition at the Agricultural Hall in March next was held on Thursday, Nov. 5, at the offices of the Exhibition, Essex-street, Strand. There were present Professor Banister Fletcher, F.R.I.B.A. (in the chair), Messrs. Ernest Benedict, C.E., H. Chatfield Clarke, F.S.I., A. J. Gale, F.R.I.B.A., T. Lidiard James, F.R.I.B.A., H. Riches, A. Ryan Tenison, A.R.I.B.A., Hampden W. Pratt, F.R.I.B.A., Gilbert Wood, G. M. Callender, H. Greville Montgomery (manager); and the hon. secretaries, H. Phillips Fletcher, A.R.I.B.A., and A. T. Bolton, A.R.I.B.A.

The question of the craftsmanship competitions was gone into and approved, and it was resolved that the hon. secretaries should write to the City companies to ask them to co-operate in these competitions, and to nominate a representative as one of the judges to act in conjunction with the Science Committee of the Royal Institute of British Architects, who have already promised their services.

It was also agreed to ask for similar support from the Architectural Association, Institute of Mechanical Engineers, Civil Engineers, and Sanitary Institute. A competition for architectural students was decided upon.

It was resolved to accept the offer of a premium of £10 from the management for the best design for a poster and catalogue cover. This to be open to all. Messrs. Seymour Lucas, A.R.A., Professor Banister Fletcher, F.R.I.B.A., and Mr. H. Greville Montgomery were nominated to act as judges of the same.

Arrangements were set on foot for holding an exhibition of working drawings by architects at the hall during the time of the exhibition.

CHIPS.

At the annual meeting of the town council for Birkenhead, held on Monday, it was announced that the purchase of the picturesque ruins of St. Mary's Priory, by subscription, had now been completed. The deeds were formally presented to the corporation, which will now undertake the custody of the grounds.

The parish church of Eddleston, about four miles to the north of Peebles, was gutted by fire on Monday, only the organ being got safely out. The church, which is now roofless, was a substantial building, and was erected about 1829. The fire is supposed to have originated in the heating apparatus, which was in use on Sunday.

The hall of the Cutlers' Company in Warwick-lane, E.C., has just been redecorated, from plans by Mr. A. R. Stenning. The work was carried out by Messrs. Harrison and Spooner, of College Hill. The electric light installation has been executed by Messrs. Laing, Wharton, and Down.

The contract for the construction of the new graving-dock at Troon has been let to Mr. George Lawson, contractor, Govan, who, some years ago, constructed the new docks at Ardrossan. A large bothy for the accommodation of navvies to be employed has been erected on the level stretch of turf north of the ballast bank. The working plant, including a pug-locomotive, has been brought to the spot, and ground has now been broken.

A casket, containing the resolution congratulating Lord Glenesk which was passed by the Court of the Plumbers' Company on his elevation to the peerage, and recognising his services to the cause of domestic sanitation, was formally presented to Lord Glenesk at the Goldsmiths' Hall, Foster-lane, on Tuesday. Mr. Philip Wilkinson (Master of the Plumbers' Company) presided, and remarked that the recipient of the casket sat for nine years on the court of the Company. The casket was designed by Mr. W. D. Caröe, M.A., F.S.A., architect to the Ecclesiastical Commissioners, and has been executed by Mr. Walter Pull, an operative plumber.

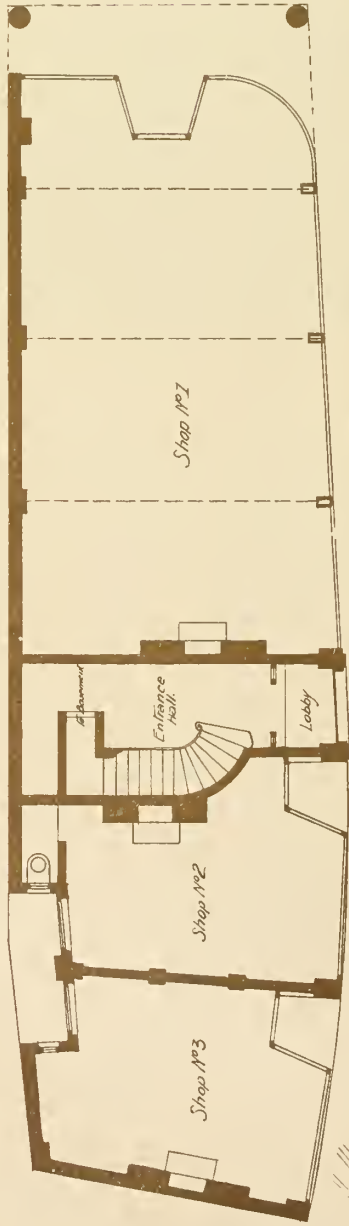
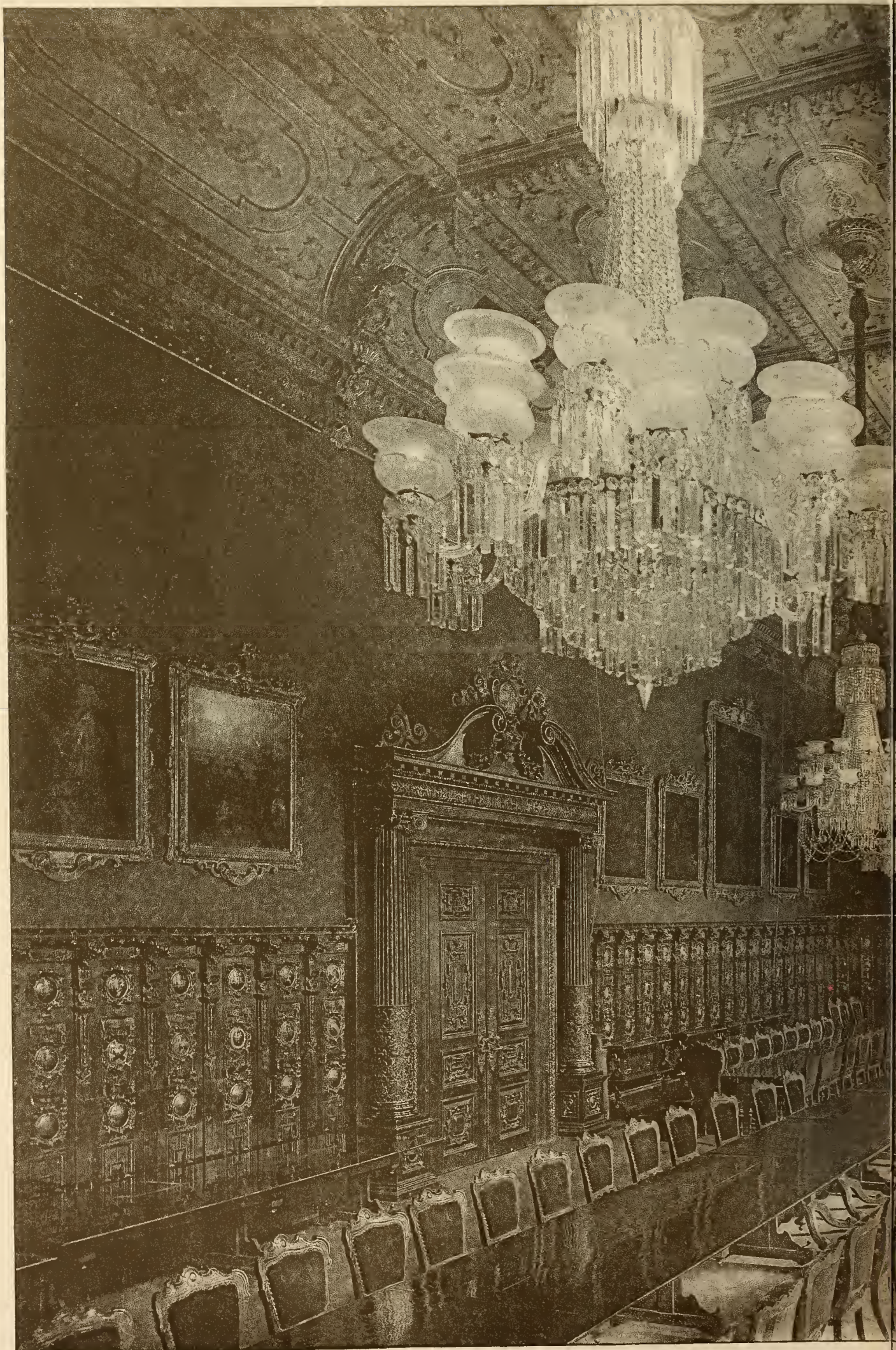




Photo Engraved & Printed by James Alderman, 6 Queen Square, W.C.

SHOPS & OFFICES, KING ST. NOTTINGHAM. MESSRS MARSHALL & TURNER ARCHT.^S



·PHOTOGRAPHED WITH A SANDELL PLATE·

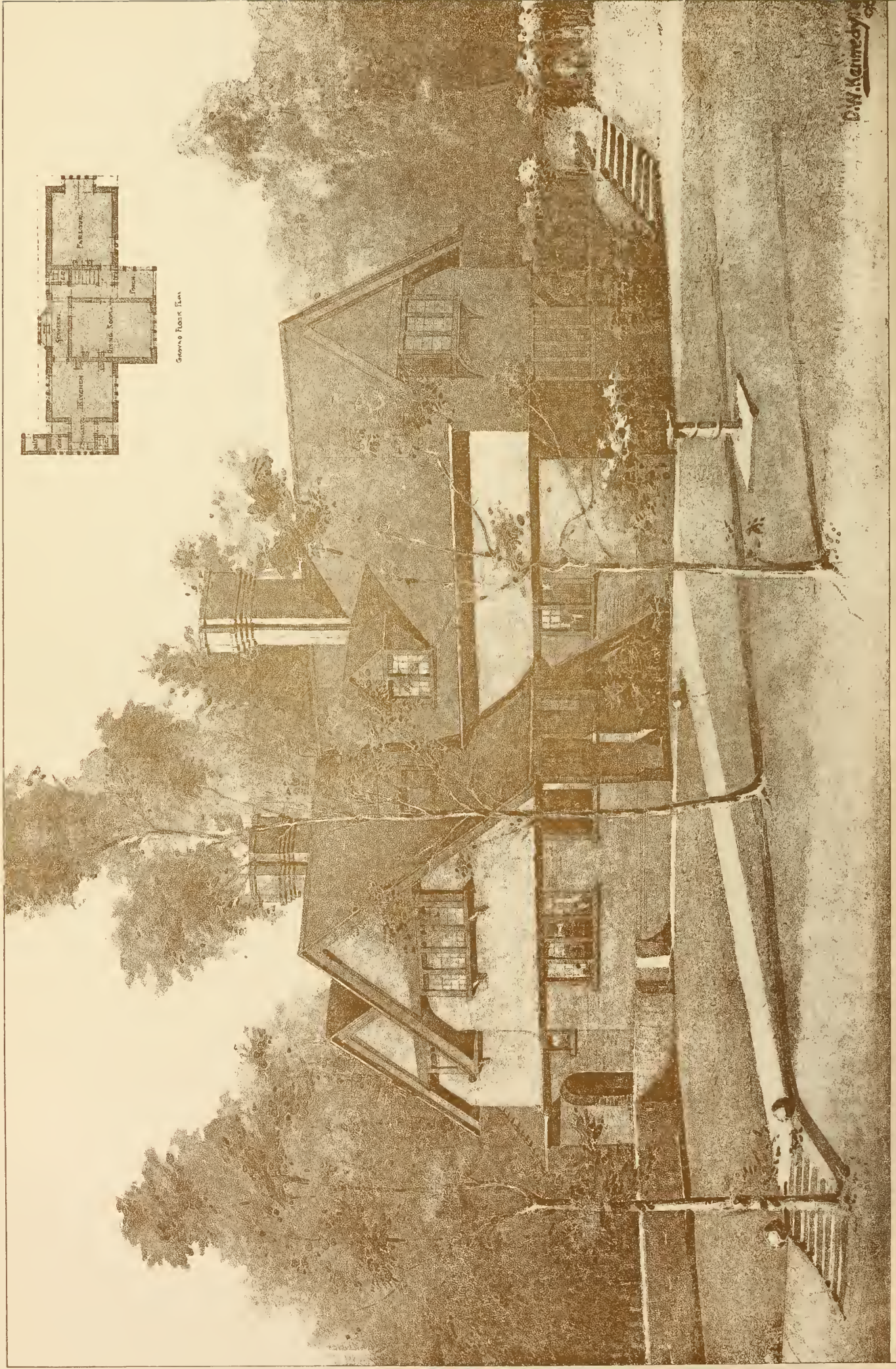
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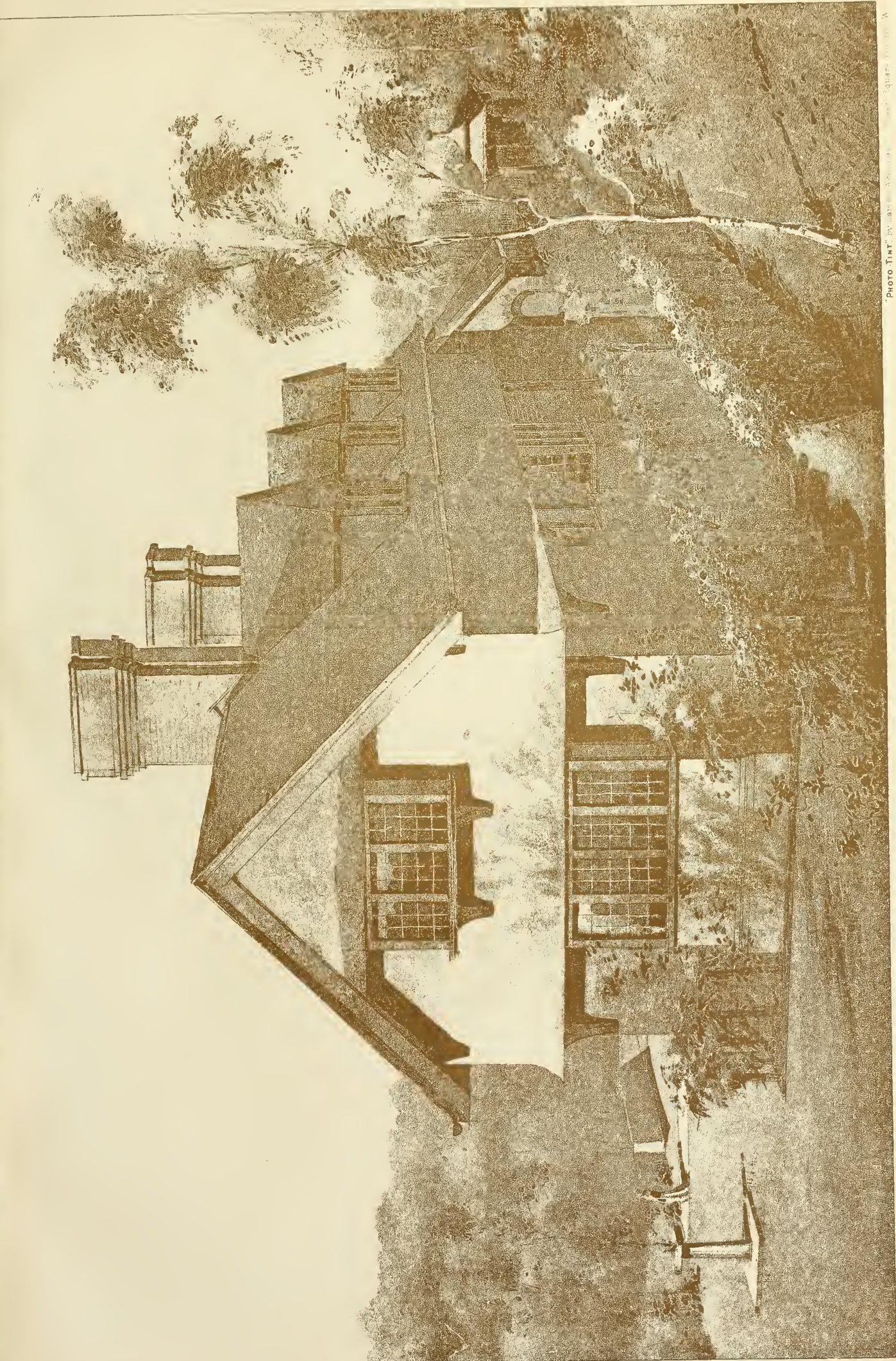
GUILD'S · No 29 ·
S. COX · THE GREAT HALL

"PHOTO-TINT" by James Akerman. 6, Queen Square, London, W.C.



COTTAGE NEAR HASLEMERE. W. L. LUCAS ARCHT.

D. W. Kennedy



"PHOTO TINT" BY JAMES A. WATSON, 1890. "AQUA" PHOTOGRAPHY.



JUNO.



JUPITER.



MINERVA.



MERCURY.



DIANA.



MARS.



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VULCAN.

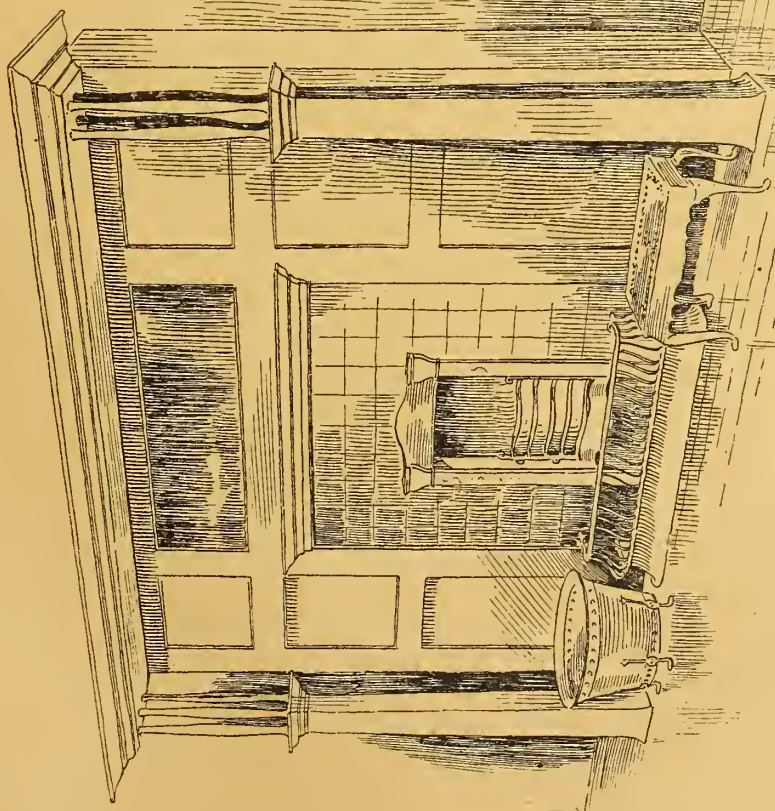


VENUS.

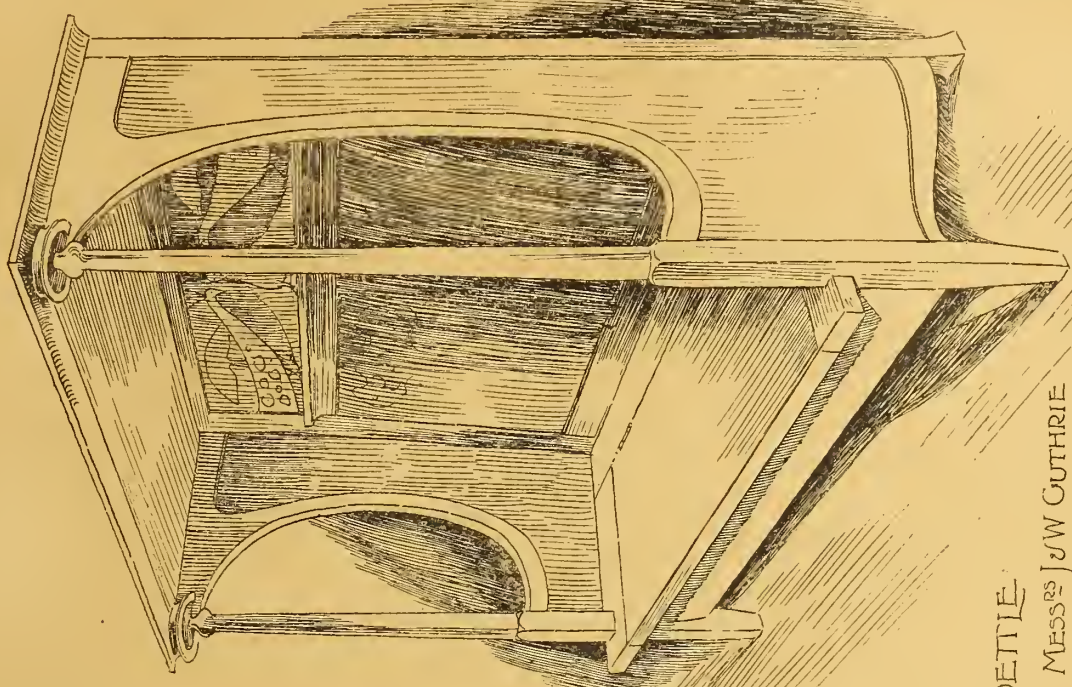


NEPTUNE.

TWO RECENT EXAMPLES
OF WHITE-WOOD FURNITURE.



MANTEL & FIREPLACE
DESIGNED BY CFAOYSEY ARCHT



HAIL SETTLE
MADE BY MESSRS J W GUTHRIE
DESIGNED BY CHAS R MACKINTOSH

A. Lincoln & Co. Ltd.

Building Intelligence.

BOX, WILTS.—Reopening of the parish church, after extensive restorations, from plans by Mr. Harold Brakspear, A.R.I.B.A., of Corsham, took place on All Saints' Day. The general contract has been carried out by Messrs. Downing and Rudman, of Chippenham. The work has included the removal of all the old galleries, which entirely blocked up the north aisle and a considerable portion of the nave. The old high pews have disappeared, and give place to more commodious ones in pitch-pine. The floors throughout have been lowered 12in., and the whole surface has been covered with a solid bed of concrete, which will keep the church dry, and with wood blocks in the nave and aisles. The lowering of the floor brought to light a very interesting feature—namely, the effigy of Anthony Long, of Ashley, which in Aubrey's time was on the south side of the church. "A faire freestone monument of Roman architecture borne up with Ionique pillars a figure incumbent on the altar in armour. Here lieth the body of Anthony Long, Esq., buried the 2nd of May, 1578." The old walls have been stripped of the modern plaster, revealing in the Haselbury aisle a recessed wall tomb, which was much mutilated, but has been reconstructed. Next to this, on the east wall, is another recess, doubtless for a reredos, consisting of a richly-moulded, pointed segmental arch resting on moulded caps, detached columns, and bases in each jamb. The latter were much mutilated, but have been repaired and new columns inserted in place of the old ones which were missing. The whole had been richly painted, and a good deal of colour still remains. The doorway on to the rood-loft has been uncovered. The three-decker of the beginning of this century has been replaced by a stone pulpit, and the clergy seats, lectern, and choir stalls, which are to be under the tower, are to be in English oak with open traceried fronts. The coved ceiling of the tower has been removed, the space being now open to the floor of the ringing-chamber. The chancel has been altered by the erection of a stone reredos considerably westward of the east wall, and the space so gained will be utilised as a vestry. A large monument on the north wall has been re-erected in the south aisle, so as to open a three-light 15th-century window, which it entirely blocked up. A number of fragments of encaustic tiles of 13th and 14th century date were discovered in this part of the church, also some pieces of a 16th century monument, presumably part of that to Anthony Long, mentioned above. The church has been provided with a system of heating with hot water, and is lighted with gas. The cost of the whole work will be £1,400.

EDINBURGH.—The corporation have received a report and plans from Mr. R. Morham, the city superintendent of works for the fever hospital proposed to be erected at Colinton Mains, south-west of the city. Within the principal entrance on the left is the porter's lodge, and further in on the right, the medical superintendent's house. Further within, and directly facing the principal entrance, are the general offices, and in the rear of these the stores, kitchen, and dining-room block, while beyond these are the nurses' and servants' homes. The ward pavilions will be arranged in double rows to east and west—those on the east being entirely for scarlet fever, and those for diphtheria, typhoid, and erysipelas in the north-western; and for measles, chicken-pox, whooping-cough, and typhus in the south-western ranges. Reception and observation wards are placed on either side near the principal entrance, and isolation wards towards the further extremities of the respective groups. At the north-east corner of the grounds is an ambulance station. Near this are lecture-rooms, pathological laboratory, museum, and mortuary buildings; further south are laundry, boiler, disinfector, electrical power, and incinerator buildings. Ample open space is left for separate recreation grounds in convenient proximity to the pavilions for the several classes of disease, besides airing courts in the spaces between the pavilions. The wards will be of two stories, and in separate pavilions.

LANGSIDE, GLASGOW.—The new Free Church at Langside was opened last week. The church provides accommodation for eleven hundred. In plan it is divided into nave and aisles, with gallery all round, and the pews are arranged on the amphitheatre principle, radiating from a centre, and the floor sloping. On each side, supporting

the clerestory and roof, there is a series of Corinthian columns, surmounted with arches richly moulded and relieved with panelled enrichments. Behind the pulpit platform, and in front of the organ recess, is a carved wood screen, the centre of which is upholstered to form a background. All the surfaces of the walls and roof are at present left plain, but it is intended to have them decorated. All the windows are filled with stained glass, specially designed. In connection with the church there is a suite of rooms. On the basement is the heating chamber, kitchen, and scullery. There is also provided a lift in communication with the floors above. The vestry, session house, class-room, and ladies' parlour are all on the level of church floor. The ladies' parlour and class-room are so arranged with a sliding partition that they can be combined. The hall has accommodation for 400. At one end is a platform, and there are also retiring-rooms and cloak-room. The style is Greco-Roman adapted to suit modern requirements. Placed on receding steps on the chief front is an Ionic portico, composed of six columns, supporting an entablature and pediment, the tympanum of which is intended for sculpture. The side walls of the church are comparatively plain, but relieved by the projecting wings. All the work has been executed from the plans and under the personal superintendence of Mr. Alexander Skirving, I.A., who was also the architect for the column commemorative of the battle, which faces the church.

WOLVERHAMPTON.—The board of guardians will consider to-day (Friday) the proposal that the Perry Hall Estate should be purchased, with a view to a new workhouse being erected. The General Purposes Committee will present a report recommending the purchase of the Perry Hall Estate, at a cost of £6,700. The property, which includes a farmhouse and buildings, covers an area of 181 acres. At the nearest point it is $3\frac{1}{4}$ miles from the union offices. The estimated cost to provide a new workhouse to accommodate 1,200 inmates reaches to £97,200, of which sum £6,700 will be required for the land, £80,000 for buildings, £5,000 as provision for extras, and £1,000 for extra furniture. Mr. W. H. Ward, of Birmingham, the architect who has been consulted by the guardians, reports that he has made an examination of the existing site and buildings, and gone carefully into the question of accommodating the various classes submitted by the clerk either by reallocation, alteration to existing buildings, or entirely new blocks, and he finds that it would be an utter impossibility.

The Court of Common Council considered last week amended plans for increased accommodation on the removal of the present fish section of the Central General Market to the site of the Fruit, Vegetable, and Flower Market. The committee recommended that £12,000 beyond £9,000 already voted should be provided for the works. The report was carried. The City Lands Committee brought up a report on the references relative to the proposed rebuilding of the Sessions-house, Old Bailey, and submitting sketch plans for the new courts there. It was decided to take the opinion of the judges as to the plans, and the committee were further instructed to confer with the Finance Committee as to the cost of the new building.

A new bank, situated at the corner of Cottenham-street and Westgate-road, Newcastle-on-Tyne, has just been completed. It is of local materials, the fronts being built in red bricks from South Shields, with stone dressings. The floors of the banking premises are fireproof, and the wood fittings of teak and mahogany. The work has been carried out by local contractors, viz.:—Messrs. Middlemiss Bros., builders; Mr. Hewitson, slater; Mr. R. Herron, plumber; Mr. W. Ferguson, plasterer; Mr. G. G. Laidler, painter; Messrs. Emley and Sons, Ltd., mosaic work; Messrs. McGee and Beckett, fitters. The work is from the designs of Mr. Frank W. Rich, architect, Eldon-square, Newcastle.

The Marquis of Ripon has commemorated his year of office as Mayor of Ripon by presenting to that city (with the assent of his son, Viscount de Grey) the town-hall site and buildings. The town-hall was built in 1799, and has always been loaned to the city by successive owners of Studley Royal.

The Kingston-on-Thames Town Council entered, on Monday, into an agreement with the Surrey County Council for the erection of new science and art and technical institute, towards which the county council covenant to contribute £3,250, the Kingston Corporation undertaking to repay this sum in the event of the borough of Kingston being constituted a separate authority for secondary or technical education within ten years.

COMPETITIONS.

PURSTON.—In a limited competition for a new Wesleyan church and Sunday-schools at Purston, near Pontefract, the plans and designs by Mr. George F. Pennington, M.S.A., architect, of Castleford, have been accepted. The plans provide accommodation for 450 in the chapel, which has circular galleries, a choir, and organ recess, also minister's vestry, with lavatories, &c. The school premises communicate with rear of chapel, and provide accommodation for 250 scholars, with four class-rooms, also kitchen, &c. The buildings are designed in the Italian Renaissance, and will be executed with local brick and stone.

SUNDERLAND.—The competition for the New College of Technical Education to be built for the Sunderland Corporation in Green-terrace, Bishop's Wearmouth, promises to be severely contested, over two hundred architects having already applied to the borough engineer for the instructions and plan of site. Premiums of £100, £50, and £25 are offered, and designs must be sent in to the town clerk of Sunderland by January 16th. The limit of cost is £18,000.

CHIPS.

As the result of a poll in Bristol, it has been decided to promote a Bill in Parliament for a scheme for the remodelling of the docks, estimated to cost £100,000.

A special meeting of the Leith Town Council was held on Tuesday, when plans prepared by Mr. George Simpson, the burgh architect, were adopted for public baths for the burgh on ground belonging to the corporation at 89, Great Junction-street, opposite the fire-engine station. The estimated cost is £8,000.

The Aberdeen University Court accepted, on Tuesday, tenders for the erection of the south wing at Marischal College, which will form part of the general extension scheme of the University. The total estimate amounts to £8,492.

A series of windows, consisting of a five-light one in the east, and two in the chancel on the north and south sides, has just been fixed in St. Paul's Church, Broughton, near Wrexham. They are memorials, and have been executed in the studios of Messrs. Jones and Willis, of Birmingham, London, and Liverpool.

The case of the Adamant Stone Paving Company, Limited, against the Corporation of Liverpool, to restrain the latter from infringing certain patents belonging to the plaintiffs, was resumed before Mr. Justice Romer in the Chancery Division of the High Court on Tuesday, and judgment was reserved.

The total length of existing Russian railways on September 13 last, according to an official report, was 36,861 versts, or about 24,000 English miles, open to traffic. Of these, 7,527 versts were double rails. The larger part of these lines, 33,274 versts, is subject to the Minister of Ways of Communication. The State works 21,158 versts, and private companies 12,116 versts. Under construction were 8,000 versts by the State and 3,600 by private enterprise.

The officers of the 1st Life Guards have just placed a monument in their memorial chapel at Holy Trinity Church, Windsor, in remembrance of Lieutenant-General J. Keith Fraser, C.M.G., who commanded the regiment from 1877 to 1882, and was subsequently Inspector-General of Cavalry until a short time before his death.

In the case of Louis William Brown, of Pembroke, builder, the order of discharge from bankruptcy has been suspended for two years, ending Oct. 14, 1898.

The Brassington Board Schools, Derby, are being warmed and ventilated by means of Shorland's patent Manchester grates, the same being supplied by Messrs. E. H. Shorland and Brother, of Manchester.

Plans for proposed extensions to Newport Schools were laid before the Newport (Yorks) School Board at their last meeting. Messrs. Gelder and Kitchen, of Hull, are the architects.

The City Commissioners of Sewers resolved, on Tuesday, to serve notices to acquire the freeholds of all the properties between Bride-lane and Salisbury-court, with a view to complete the improvement in Fleet-street, subject to the London County Council agreeing to contribute half the cost of setting back the premises. The first section of this important street widening, the rebuilding of the Punch Tavern, after being set back 15ft., was completed last week, and the additional space has for the present been thrown into the foot pavement. It was further agreed to acquire certain interests in Feuchurch-street for £27,000, with a view to improvements there. Further progress was made in regard to improvements in Upper Thames-street, Coleman-street, and Houndsditch.

ARCHITECTURAL & ARCHÆOLOGICAL SOCIETIES.

BIRMINGHAM ARCHITECTURAL ASSOCIATION.—The second meeting of the session took place on Friday evening last, November 6, in the Association rooms at the Exchange Buildings, the president, Mr. William Henman, in the chair. Mr. Harold Baker delivered a paper, entitled "Warwick Tower and Town," which was well illustrated by upwards of 60 lantern-slides. Mr. Baker had been fortunate in having a free run of the castle and permission to photograph everywhere, and produced results which were much appreciated by his audience. The lecturer gave an account of the history of the town, which is rich in architectural beauty and historical interest, tracing it back to the ancient days of Alfred the Great, whose daughter, Ethelfleda, built a castle there in 915, nothing of which remains but the mound in the courtyard of the present castle. The earliest portion of the latter dates from the 14th century, and the majority of the present building was completed in the same century. Attention was also drawn to the town gates; Leicester's Hospital, a fine old half-timber building, the garden of which still remains divided into strips, as the ancient custom went; St. Mary's Church, with its quaint semi-Classic treatment; and the beautiful Beauchamp Chapel, the contract for which is extant, giving the cost, a sum, reckoned at present value, amounting to £40,000. The general work and details of this chapel are very fine, and form, perhaps, the best example of 15th-century work in the country. The lecture was listened to throughout with great interest.

SHEFFIELD AND THE DOMESDAY SURVEY.—At a meeting of the Sheffield Society of Architects and Surveyors, held on Tuesday evening at the School of Art, Arundel-street, a paper entitled "A Study in Domesday," being a discussion of the known facts of the survey in the locality of Sheffield, was read by Mr. J. D. Leader, F.S.A., an honorary member of the society. After some introductory references to the circumstances under which the Domesday survey was undertaken, Mr. Leader said the object of the survey was fiscal and topographical. The lecturer went into other details of Domesday measurements, and suggested some points to which local investigation might be usefully directed; but the main purpose of his paper was to show that the Domesday Manor of Hallam included not only the districts now known as Upper and Nether Hallam, but the whole of Ecclesall Bierlow and that part of Sheffield Township lying west of the Sheaf and Don, and embraced within the modern wards of St. George, St. Peter, and St. Philip.

THE ARCHITECTURAL ASSOCIATION OF IRELAND.—As we mentioned in our last issue, p. 663, a meeting was held at the Grosvenor Hotel, Westland-row, Dublin, on Wednesday week, Mr. A. E. Murray in the chair, at which it was decided to form an Architectural Association for Ireland, somewhat on the lines of the London body of that name. About sixty gentlemen were present. All the resolutions put to the meeting were passed, and it was decided to call another meeting on Monday evening, the 9th inst., to make arrangements for balloting the committee, and election of officers. The last-mentioned meeting was duly held at the Grosvenor Hotel, when Mr. W. G. Doolin, M.A., took the chair, and about 45 were present. The meeting was very enthusiastic throughout, and the following officers were proposed, seconded, and unanimously appointed, the elections in each case being for one year. President: Mr. R. Caulfield Orpen, M.R.I.A.I.; vice-presidents: Mr. Howard Pentland, M.A., B.E., and Mr. Joseph Holloway, M.R.I.A.I.; hon. secretaries: Mr. William R. Gleave, A.R.I.B.A., and Mr. R. M. Butler; hon. treasurer and hon. librarian: Mr. Fredk. Hicks; hon. auditors: Mr. A. J. McGloughlin and Mr. W. F. Beckett. It was also resolved and carried that a committee of seven, with power to add two, be elected by ballot. Twenty-seven names having been chosen, the secretaries were instructed to prepare the ballot papers and arrange for a scrutiny. Mr. T. Tallon and Mr. W. J. McNerney were appointed scrutineers, and Mr. W. G. Doolin kindly consented to preside over the scrutiny. Mr. J. J. O'Callaghan was also present, and spoke ably in support of the Association. Mr. W. R. Gleave read a letter from Mr. Wm. R. Maguire, offering a donation of £2 2s., and a subscription of £1 1s. a year, and, under conditions, a Travelling Studentship of £10 10s. for the year 1897—pro-

posals which were received with great applause. There have also been promised other donations of £2 2s. and £1 1s. At the conclusion of the meeting 33 were enrolled, besides others who have written desiring to join. Mr. W. R. Gleave proposed that the subscription be 10s. per year. This was amended by Mr. Hicks that the subscription be 5s. per year, which was put to the meeting, and a vote taken in favour of the 10s. per year. The ballot papers have been printed, and were posted on Wednesday, and are to be returned by Monday next, at 12 o'clock noon, the scrutiny taking place on the same evening at 8 p.m., and a general meeting has been called for Tuesday evening at the Grosvenor Hotel, at 8 p.m., when the result of the ballot will be declared.

CHIPS.

Mr. Henry Harben, chairman of the Hampstead Vestry, laid on Tuesday the foundation-stone of a Free Central Public Library for Hampstead, to be erected at a cost of £5,000, the whole of which has been given by him, leaving only the cost of the site (£1,920) to be paid out of the parish rates, less a donation of £350 by Sir Spencer Mayon-Wilson, the owner of the land.

Alterations are being made to Cocking Church, Midhurst, embracing the ventilation, which will now be carried out on the Boyle system.

At the St. Alban's County-court held on Wednesday week, the adjourned case against E. Dunham, builder, was again heard by his honour, Sir A. T. Marten, Q.C. In this case Alfred Horne, a brick-layer, sued Mr. E. Dunham for £250 for injuries (a broken ankle) received through falling through some scaffolding whilst he was employed by the defendant. His honour gave judgment for plaintiff for £160 and costs.

Messrs. Leslie and Reid, civil engineers, Edinburgh, have been appointed engineers for a new water supply scheme for the town of Bo'ness. The works are estimated to cost £12,000.

A block of public offices, to cost about £40,000, and planned by Mr. W. T. Hollands, F.R.I.B.A., London, will be completed at Uitenhage, South Africa, in a year hence.

Both the London and South-Western and the Great Western Railway Companies have commenced works for the enlargement of their station accommodation at Salisbury. The Great Western platform has been lengthened and widened, and more sidings are being constructed. The South-Western have begun extensive works whereby a new up-platform will be provided opposite the down platform, and additional land for increased sets of rails has been purchased. It is estimated that these works will cost £50,000.

New headquarters and drill-hall are about to be built for the Medical Staff Corps, Leeds, from plans by Mr. William Bakewell, F.R.I.B.A., Park-square, Leeds.

A meeting of the creditors of Howell Powell, builder, Coedpenmaen-road, Pontypridd, was held on Tuesday week at Merthyr. The statement of affairs furnished the following particulars: Gross liabilities, £1,801 4s. 3d.; liabilities to rank for dividend, £609 4s. 3d.; net assets available for distribution, £68 10s.; deficiency, £540 14s. 3d.

A valuable possession came into the hands of the Brighton Corporation last week, when the trustees formally handed over the North Steine Enclosures, for the use of the inhabitants generally. The grounds will be used on the same restricted lines as the Old Steine Gardens have for some time past been utilised. The land was inclosed in 1817, in common with the Old Steine, which was transferred to the corporation in 1873.

The election of Mr. Thomas Graham Jackson to the Royal Academy has (says the *So-th-Eastern Gazette*) caused great satisfaction in Sevenoaks, where he is widely known and much respected. The new Academician is a large property-owner in the town, and married a daughter of Mr. Multon Lamharde, J.P., of Beechmont, whilst his sister is lady superintendent of the Sevenoaks Hospital for Children with Hip Disease. Mr. Jackson at one time represented the town on the school board, and was architect of the board school in Colden-road, the first erected by the authority. Mr. Jackson is just now staying in Naples.

Out of 185 candidates, Mr. Hodgkinson, of Ashton-in-Makerfield, has been appointed surveyor to the Birkdale Urban District Council, the salary commencing at £200.

At the annual election dinner of the Convener Court of the Seven Incorporated Trades of Aberdeen held on Saturday evening, Lord Provost Mearns mentioned that during the past three years the value of buildings erected in the city had been about £900,000, or an average of £300,000 a year.

TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. All communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondents.]

It is particularly requested that all drawings and all communications respecting illustrations or literary matter should be addressed to the EDITOR of the BUILDING NEWS, 332, Strand, W.C., and not to members of the staff by name. Delay is not unfrequently otherwise caused. All drawings and other communications are sent at contributors' risks, and the Editor will not undertake to pay for, or be liable for, unsought contributions.

Cheques and Post-office Orders to be made payable to THE STRAND NEWSPAPER COMPANY, LIMITED.

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ADVERTISEMENTS CHARGES.

The charge for Competition and Contract Advertisements, Public Companies, and all official advertisements is 1s. per line of Eight words, the first line counting as two, the minimum charge being 5s. for four lines.

The charge for Auctions, Land Sales, and Miscellaneous and Trade Advertisements (except Situation advertisements) is 6d. per line of Eight words (the first line counting as two), the minimum charge being 4s. 6d. for 40 words. Special terms for series of more than six insertions can be ascertained on application to the Publisher.

Front-page Advertisements 2s. per line, and Paragraph Advertisements 1s. per line. No Front-page or Paragraph Advertisement inserted for less than 5s.

Advertisements for the current week must reach the office not later than 3 p.m. on Thursday. Front-page Advertisements and alterations in serial advertisements must reach the office by Tuesday morning to secure insertion.

SITUATIONS.

The charge for advertisements for "Situations Vacant" or "Situations Wanted" is ONE SHILLING FOR TWENTY-FOUR WORDS, and Sixpence for every eight words after. All Situation Advertisements must be prepaid.

NOTICE.

Bound copies of Vol. LXIX. are now ready, and should be ordered early (price Twelve Shillings each), as only a limited number are done up. A few bound volumes of Vols. XXXIX., XL., XLI., XLVI., XLIX., LI., LIII., LIV., LVIII., LIX., LX., LXI., LXII., LXIII., LXIV., LXV., LXVI., LXVII., LXVIII. may still be had, price Twelve Shillings; all the other bound volumes are out of print. Most of the back numbers of former volumes are, however, to be had singly. Subscribers requiring any back numbers to complete volume just ended should order at once, as many of them soon run out of print.

RECEIVED.—F. H. Mountford.—G. H. J.—R. C. and Co.—Autolytus.—E. F. (Norbury).—W. D. and Co.

"BUILDING NEWS" DESIGNING CLUB.

SECOND LIST OF SUBJECTS.

B.—A Village Church, with a central tower, north and south aisles, and shallow transepts. The design to be adapted to a stone district, and the roofs are to be covered with tiles. The tower may be surmounted by a simple broached spire. Benches are to be shown to seat 250 people in the church, and choir-stalls in the chancel to seat ten men and twelve boys, besides two priests' stalls. The altar-space is to be seven steps, or 3ft. 6in. above the nave floor. A pulpit is to be shown, and a simple screen in oak in a dwarf stone wall dividing the chancel from the nave. An organ-chamber is to be provided on N. side of chancel, and a way for the return of communicants on the south side is to be provided. The font is to be located at the west end of the church, and a good porch on the south side is wanted. The vestry is to be divided into two—one room for the clergy, and one for the choir—and a separate entrance door opening into a lobby is to be provided from the south side of the building. The site stands above the road 6ft., so that a feature may be made of steps leading up to the entrance, but the surface of the ground round the church, forming a small churchyard, is practically level. Attention to church requirements in a village are to be considered and provided for, and the tower must be adapted for housing five bells, with a ringers' chamber. Simplicity of design is suggested, but the style and size of the building is left to competitors, who must let the accommodation asked for govern the space to be provided. The central aisle must be 6ft. wide. The building is to be set back about 25ft. from the road, where a frontage retaining wall stands on account of the elevated site. Scale, 5ft. for the two elevations and sections required, and plan may be drawn to 16ft. to the inch. A view is necessary.

DRAWINGS RECEIVED.—"Tyke," "Side Light," "E. G.," "Foreord," "Don Juan," "Whitefriar," "Rudgrave," "Pantile," "Moss," "Brix," "Minaret," "Eagle," "Valhalla," "Cameo," "Nut," "Gnat," "Jupiter," "Ashleigh," and "Aikane."

Intercommunication.

QUESTIONS.

[11555].—Salt in Sand.—What is the best means of detecting the presence of salt in sand? I should also be pleased to know what is considered the best book on chemistry with regard to building materials.—C. W.

[11556].—Testing Levels.—In your issue of the 9th ult. Mr. F. E. Yewdall gives Heather's method of

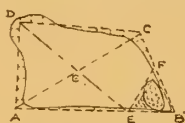
correcting the "error of collimation" or axis of the tube of the telescope, for which I thank Mr. Yewdall. But what I am most anxious to know is, Can an instrument be out of adjustment and yet appear all right, as regards cross wires, bubble, screws, &c., except to a person of long experience? If I set up my Y-level, and by tightening and easing the capstan-screws until I get the bubble in a central position, and it remains so while the level is turned completely round, is this level in adjustment? And if not, would there be a serious error in levels taken with it? I would like to get a reply from Mr. Yewdall or some of your engineering readers.—LEVEL ADJUSTMENT.

[11587].—**Surveyors' Charges.**—Will any correspondent give information as to his charges, or as to those usually made, for laying-out building estates, including the following:—Survey and sections of the land laid out, planning the new streets and depositing plans with corporation, setting-out and superintending the formation of streets, drainage, &c., partly by contract, the rest by daywork, paying wages and keeping the accounts, and effecting sales of sites, block plans and particulars of same being supplied to the solicitors, and in case of soil or sods being sold off, receiving the moneys and keeping account of same? I believe some surveyors have done all this work for a charge of 2½ per cent. on the sales effected, which appears very inadequate.—SURVEYOR.

[11588].—**Natural Bed.**—Would "H. L." kindly supplement his reply to my query by stating what are the indications which denote the natural bed of Portland stone when viewed under a powerful glass? Perhaps Mr. Harry Hems, who would seem to be an authority on everything, would also oblige by giving me a wrinkle?—PORTLAND.

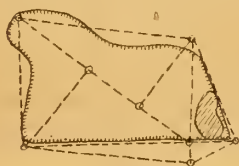
REPLIES.

[11583].—**Chaining-out Field.**—Start with base line A.B. Lay out triangles ABC and ADC, and ditto



E.F.B. to inclose refuse heap. Run a tie-line, E.G.D, to prove the work, and take distance A.G.—ALLEN T. HUSSELL, Ilfracombe.

[11583].—**Chaining-out Field.**—The accompanying rough sketch will give "A Student" an idea of the best



method to adopt in setting out his lines for measuring the field.—SURVEYOR.

[11584].—**Drains.**—1. The purchaser of Nos. 1 to 4 cannot legally refuse to allow the sewage from Nos. 5 to 9 its present outlet, through his property. 2. In the event of the purchaser retraining his four houses, he would be compelled to leave the existing drain in for the benefit of those above him, or to otherwise provide an outlet for the sewage of the houses above him to the satisfaction of their owners.—J. EZRA MILLER.

On Thursday night in last week a fire broke out in the timber-yard of Mr. John Jones, builder, Ettingshall. The damage done is estimated at £2,000.

In our notice on p. 650 of the restoration of St. Andrew's Church, Bemerton, we should have stated that the wood-block flooring at the above church was laid by Mr. Roger L. Lowe, of Farnworth. The Whitworth Art Gallery, Manchester, erected from funds left by the late Sir Joseph Whitworth, is now open to the public, and the floors have been laid in light oak wood blocks by Mr. Lowe. Mr. J. W. Beaumont, of Manchester, was the architect.

An interesting piece of rapid structural engineering work was accomplished on the Great Eastern Railway system during the early hours of Sunday. The railway bridge over the river Ouse on the London and Norwich main line near Ely was removed and a new wrought-iron bridge of one span, of 300 tons dead weight and 130ft. long, erected in its place between 1.30 and 7.30 a.m. The operations were carried out, under the direction of Mr. John Wilson, chief engineer of the line, by Messrs. Head, Wrightson, and Co.

A free public library for St. Philip's district, Bristol, was formally opened on Friday. It adjoins Holy Trinity Vicarage, and has been erected from plans by Mr. W. V. Gough, of Bristol; Mr. E. Walters, of the same city, being the contractor.

An official inspection was made on Friday of the Carmyllie branch line of railway, about five miles long, starting from Elliot Junction, two miles from Arbroath, and proceeding north through Kelly Den, Arbrilot, and Carmyllie, to the extensive pavement quarries. The line, which is single, has hitherto been used mainly for conveyance of the produce of the quarries, and it is now proposed to convert it into a passenger line under the provisions of the Light Railways Act.

LEGAL INTELLIGENCE.

DAMAGES FOR BREACH OF CONTRACT.—BROWN v. EZARD AND HODKINSON.—At the Salford Borough Court of Record recently, before Mr. H. G. Shee, Q.C., James Brown, of Ashton New-road, Beswick, sued Messrs. Ezard and Hodgkinson, builders, of Ashton New-road, Bradford, for damages for breach of contract, or for improperly constructing some houses at Clayton. Having seen four cottage houses built at Clayton by the defendants, plaintiff got them to build by contract five others. Under the specifications, and by the by-laws of the City Corporation, the chimneys required to be flush-pointed, and plastered with hair mortar, so that they would be impervious to smoke. After the houses had been finished, and were occupied, it was found that when the fires were lighted the smoke came through the chimneys into the rooms. Several of the tenants gave evidence in support of this statement. A builder who had been employed in repairing the chimneys stated that they had not been pargeted as required. For the defendants, it was alleged that the contract had been properly carried out. Mr. Ezard, one of the defendants, stated that complaints had been made, but these had all been attended to. The "leakage of the smoke" was caused by the sinking of the houses, which made the pargeting crack. Similar evidence was given by Mr. Hodgkinson. Mr. W. H. H. Aldred, formerly an inspecting surveyor under the corporation, said that he visited the houses about once a week on an average while they were building. Taking the by-laws as a whole, they were carried out. The witness had a large district to inspect, in which about one hundred houses were then building. The jury found a verdict for the plaintiff for the full amount claimed, £50.

PUBLIC HEALTH (LONDON) ACT APPEAL.—VESTRY ST. JOHN, HACKNEY v. HUTTON.—(Queen's Bench Division, Nov. 2, before Mr. Justice Grantham and Mr. Justice Wright).—This was a special case stated by a metropolitan magistrate on the hearing of a summons under the Public Health (London) Act, 1891, against the owner of 110, Southgate-road, for having an insufficient and improper water-closet on the premises, notwithstanding directions specified in a notice served on him by the vestry, the sanitary authority, to rectify the same. The summons was dismissed by the magistrate. The case was stated in pursuance of an order by the Court of Queen's Bench. The owner was summoned on May 16, 1895, by the vestry of the parish of St. John, at Hackney, for not having any water-closet accommodation on the premises. The magistrate visited the premises and found as a fact that there was water-closet accommodation. On August 2 the owner was again summoned under the Act of 1891 by the vestry for having insufficient water-closet accommodation. The magistrate thought the matter was not a question of public health, but really arose out of a dispute between the landlord and tenant. The magistrate adjourned the case for six months to give the tenant an opportunity of bringing an action in the County Court if he desired to do so. At the end of that period, no such action having been brought, the magistrate dismissed the summons. The question for the Court now was whether, under the circumstances, the magistrate was bound by the decision of the sanitary authority. Mr. Carrington, for the respondent, contended that the magistrate had power to dismiss such an information. There were two courses open to the sanitary authority. They might either ask for a fine, or do the work for themselves and recover the expenses. In section 36 of the Public Health Act, 1875, the authority could only call on the person to do the work, and, if he neglected, do it themselves. In such cases the magistrate acted ministerially. But he acted judicially in cases under the Act of 1891, by which the matter was made a criminal one. By section 251 of the Act of 1875, which was the same as section 117 in the Act of 1891, provision was made for recovery of expenses. Criminal proceedings were different: in them the sanitary authorities ought not to be judges. Mr. Justice Grantham said the magistrate was bound to convict. Whether it was wise for the Legislature to make the sanitary authority judges was perhaps open to question, but he thought it had done so. Mr. Justice Wright concurred, but he desired to add that, in his opinion, the magistrate might, instead of proceeding at once to conviction, adjourn the case to give an opportunity of an appeal to the County Council. The case must go back to the magistrate with this expression of opinion.

INJUNCTION AGAINST A SEWAGE FARM REFUSED.—ATTORNEY-GENERAL v. PRESTON CORPORATION.—Mr. Justice Stirling gave judgment last week in this case, heard during the last sittings. It was an action brought by the Attorney-General at the relation of the Rural District Council of Preston against the mayor, aldermen, and burgesses of Preston and a Mr. Allsup, the tenant of the borough sewage farm, seeking to restrain the defendants from receiving, treating, or distributing sewage on Freckleton Farm so as to cause a public nuisance. Freckleton Farm contains 557 acres, and is situated three or four miles from Preston on the north side

of the Ribble. The district of the relators was on the south side of the river opposite the farm. In 1889 an inquiry was held by the Local Government Board as the result of which the corporation were authorised to borrow a sum of £83,000 for the purposes of a scheme for conveying the sewage of the borough to Freckleton Farm to be there disposed of; and subsequently a further sum of £32,500 for the purpose of adapting the farm to be used as a sewage farm. Both these sums of money have been raised by the corporation, and applied by them for the purposes above mentioned. The sewage of Preston was first turned into the farm in August, 1893, and has continued ever since to be so dealt with. In 1894 complaints were made that this deposit of sewage was causing a nuisance, and this action was commenced in March, 1895. The plaintiffs did not complain of the violation of any specific statutory enactments, but they contended that the defendants were not entitled to dispose of the sewage of Preston in such a way as to cause a public nuisance. The defendants denied that they had so acted as to call for the interposition of the Court by way of injunction. Mr. Justice Stirling, in giving judgment, said that no case of injury to property was alleged, but it was said that the acts of the defendants caused injury or danger to the health of the inhabitants of the plaintiffs' district, or, at all events, seriously affected their comfort. He came to the conclusion that no case of injury to health was made out, and that there had not been any such interference with comfort as to entitle the plaintiffs to an injunction. In his opinion, however, it was established that down to the commencement of the action and for some time subsequently the defendants had adopted a mode of dealing with the sewage which was likely to cause nuisance. The law as to the granting of injunctions in cases of nuisance was concisely stated by Lord Justice Turner in "Swaine v. Great Northern Railway Company" in these terms:—"Occurrences of nuisance, if temporary and occasional only, are not grounds for the interference of the Court by injunction except in extreme cases." That was a case of private nuisance, but the same doctrine was applied to public nuisances in the case of "A. G. v. Sheffield Gas Company" and "A. G. v. Cambridge Gas Company." The present case was brought within that principle, and consequently the action must be dismissed; but, having regard to all the circumstances of the case, it would be dismissed without costs.

THE PORTMAN ARBITRATION CASE.—AWARD.—Mr. Ralph Clutton, the arbitrator in the proceedings in which Lord Portman claimed from the Manchester, Sheffield, and Lincolnshire Railway Company nearly £400,000 as compensation for the compulsory acquisition of some 14 acres of his Marylebone estate which the company required in connection with the extension of their line to London and the construction of a station, hotel, and coal sidings at the terminus, has delivered his award, the amount being £260,000.

CHIPS.

Of the 42 members of the first town council for Greater Plymouth elected last week, six are builders, and there are also a plumber, a cement manufacturer, and a quarryman.

Apologues of the ethics of advertising by professional men, a correspondent sends us a marked copy of last week's *Brighton Herald* containing a displayed advertisement by "Messrs. Loader and Loug, architects and surveyors, No. 54, Old Steine."

The old College and adjoining gatehouse and tower at Maidstone have been sold privately to Messrs. Day and Sons, acting on behalf of Lord Romney. The property has been acquired by a committee of gentlemen in the town who are taking steps for its preservation. Several schemes for the restoration of the buildings have been considered, but at present no definite course has been decided upon.

On Tuesday week Major-General H. D. Crozier, C.E., representing the Local Government Board, held an inquiry at Wellington, Salop, in respect to the application of the urban district council to the Local Government Board for their sanction of a loan of £9,717 for the purpose of carrying out a sewerage scheme. Mr. Littlewood, clerk to the council, represented that body, whose scheme was explained by their engineer, Mr. Stooke, of Shrewsbury.

The old Alexandra Theatre, Liverpool, is undergoing considerable alterations, and will shortly be reopened as a theatre of varieties under the name of the Empire. The architect is Mr. Frank Matcham. This theatre is to be relighted by an improved ventilating sun-burner of the "Stott" Thorp reflex type. These powerful sun-burners are also being fitted at the New Empire Theatre, Glasgow, and at the Queen's Theatre, Gateshead-on-Tyne. The several installations are being carried out by James Stott and Co., of Liverpool, Glasgow, and Newcastle-on-Tyne respectively.

Our Office Table.

At the meeting of the R.I.B.A., to be held on Monday, December 14, an account will be given of the further tests of brickwork piers made in June last, under the direction of the Science Study Committee, with illustrations showing the various modes of failure and tabulated statements of results. Professor W. Cawthorne Unwin, F.R.S., will read a paper on the relations between form and strength. Meantime, the sub-committee, consisting of Professor Unwin and Messrs. Wm. C. Street, Max. Clarke, H. W. Burrows, Matt. Garbutt, and Bernard Dicksee are engaged in preparing further examples of brickwork in the shape of short lengths of walls for experimentation in February next. The walls will be built of the same materials as the previous examples—viz., London stocks, gaults, Leicester reds, and Staffordshire blues. In addition to these, four pieces of wall will be built of Fletton bricks. In the first experiments the piers generally commenced to fail at the line of closers; in these pieces of wall, as in ordinary lengths of wall, there will not be any closers, and an increase of strength per square foot of sectional area, as compared with 18in. piers, is expected. In carrying out these experiments, Mr. Street writes in the *Institute Journal*, "the committee have devoted much time and money, but have received very little sympathy from the elder members of the Institute, who appear generally to be of opinion that the present sum of human knowledge on these and kindred subjects is quite enough for the present and succeeding generations." Nevertheless, the committee have persevered, although the funds at their disposal are inadequate.

The scaffolding which for the past two months had disfigured the central portion of the Strand front of Somerset House was removed at the end of last week, the extensive repairs to the masonry and carving on the attic story having been completed. A large heraldic group in Caen stone, representing the royal arms of George III. at the close of the last century, with figures of Fame and History used as supporters, which crowned this façade, had become disintegrated by the effects of rain and smoke, and fragments of stone had fallen down. Under the direction of H.M. Office of Works this sculpture has been taken down and replaced by a facsimile carved in a harder stone by Messrs. Farmer and Brindley, of Westminster Bridge-road, S.E. The same firm have renewed the western one of the four emblematical figures of heroic size which divide and support the attic story, that representing a Roman soldier, and have repaired the dentilled cornice below. A minor work just completed for the Board of Works in the same district has been the repair, repointing, and cleansing of the statue of Nelson and the capital of the Nelson Column. These works have been carried out by Mr. Harrison, a Sheffield steeplejack, who, with some astuteness, selected the moment of the passing of the Lord Mayor's Show on Monday afternoon for the removal of his ladders and plant.

DURING the past year extensive excavations have been carried out at St. Blaan's Church, Kingarth, Buteshire, at the direction of the Marquis of Bute, who had a preliminary exploration made of the site of this Celtic monastery in 1875, when the grounds were put in order. The precincts of the monastery church had been surrounded by a huge wall, the foundations of which, 6ft. broad, have been clearly traced and laid bare. On a mound within the wall, on the south side, extensive search was made for the site of the manse of the Reformed Church, supposed to have stood there. Instead, was disclosed a network of confused foundations inclosing the stances of twenty little cells. Two stone cists were also laid bare. Still further westward were found the foundations of the "Priests' House," or manse, the several apartments having been very rudely floored with the flat flagstones of the district. The extensive alterations and repairs are being executed under the inspection of Mr. Schultz, architect, London, and his resident assistant, Mr. Pechell.

THE London County Council discussed at great length on Tuesday the recommendations of the Parliamentary Committee in respect to the proposed introduction into Parliament next session of measures for the purchase of the undertakings of the eight companies supplying London with water. The report presented by the committee

was described as a compromise between the two political sections of the council. The recommendation of the committee was that the water authority should be the council acting in conjunction with the Corporation of the City. Lord Onslow moved, as an amendment, that the Government should be asked to form a separate authority for the purpose of dealing with the water supply. The amendment was negatived by 59 votes to 48, and ultimately the recommendations of the committee were carried by large majorities.

THE distribution of prizes to the successful competitors at the exhibition of works in wood and woodcarving, which has been held under the auspices of the Carpenters' and Joiners' Companies during the past fortnight at the Carpenters' Hall, London Wall, took place on Tuesday night. Mr. Jesse Jacob (master of the Carpenters' Company) and Mr. James (master of the Joiners' Company) received the guests, who numbered upwards of 300. After an inspection had been made of the exhibits, a meeting was held, at which Mr. Jacob occupied the chair. In their report, which was submitted by Professor Banister Fletcher, the committee of judges stated that there was a marked improvement in the works sent in for competition, and that they had awarded one gold medal, eight silver medals, 25 bronze medals, and £91 in money prizes. The awards were then distributed by Sir Arthur Arnold. The exhibition, which had been visited up till yesterday by about 7,500 persons, will remain open free until Saturday afternoon.

THE first meeting of the 143rd session of the Society of Arts will be held on Wednesday evening next, when the opening address will be delivered by Major-General Sir Owen Tudor Burne, K.C.S.I., C.I.E., chairman of the council, who will take as his topic, "India: its Arts, Manufactures, and Commerce." On the following Wednesday evening, Nov. 25th, Mr. W. Worby Beaumont, M.Inst.C.E., will read a paper on "Recent Developments in Mechanical Road Carriages." Among the after-Christmas meetings announced by the society are papers on "Light Railways," by Everard R. Calthrop; "A Half Century of Line Engraving, 1780-1830," by George Clulow; "Lithography as a Mode of Artistic Expression," by Leo McCulloch; "The Artistic Treatment of Heraldry," by W. H. St. John Hope, M.A.; "The Transmission of Power by Alternating Electric Currents," by W. B. Esson, M.Inst.C.E.; and "London Water Supply," by Percy F. Frankland, Ph.D., F.R.S. The following courses of Cantor lectures will be delivered on Monday evenings: Prof. Vivian B. Lewes, "The Use of Gas for Domestic Lighting," three lectures. William Burton, F.C.S., "Material and Design in Pottery," four lectures—January 18, 25, February 1, 8. C. F. Cross, F.C.S., "The Industrial Uses of Cellulose," three lectures—February 15, 22, March 1. Prof. W. Chandler Roberts-Austen, C.B., F.R.S., "Alloys," four lectures—March 15, 22, 29, April 5. Lewis Foreman Day, "The Decorative Use of Lettering," four lectures—May 3, 10, 17, 24.

THE following is the list of medals and premiums awarded by the council of the Institution of Civil Engineers for the current year: Telford medals and premiums to H. Riall Sankey, late captain R.E., Professor J. A. Ewing, F.R.S., M.M.Inst.C.E., J. O. Arnold, G. H. Hill, M.Inst.C.E., and F. E. Duckham, M.Inst.C.E.; Telford medal and Manby premium to the Hon. R. C. Parsons, M.Inst.C.E.; Watt medals and Telford premiums to Jeremiah Head, E. L. Corthell, M.M.Inst.C.E., and C. F. Jenkin, Assoc. M.Inst.C.E.; George Stephenson medals and Telford premiums to G. F. Deacon, W. Adams, and W. F. Pettigrew, M.M.Inst.C.E.; Telford premiums to John Dewrance, Assoc. M.Inst.C.E., and A. F. Bruce, M.Inst.C.E.; Manby premiums to B. Donkin, M.Inst.C.E., and Allan Brebner, Assoc. M.Inst.C.E.; Crampton prizes to Hammersley Heenan, M.Inst.C.E., W. Gilbert, Assoc. M.Inst.C.E., T. Wrightson, M.Inst.C.E., H. F. Parshall, Assoc. M.Inst.C.E., and D. T. Jarintzoff, Assoc. Inst.C.E.; Trevithick premiums to W. S. Szlumper and C. A. Rowlandson, M.M.Inst.C.E.; and Miller prizes to W. O. Leiten, jun., A. S. Butterworth, E. S. McDonald, S. Thow, J. Scott, J. Andrew, and M. de Ville, Studs. Inst.C.E.

THERE is considerable uneasiness and insecurity at Belize, British Honduras, just now, arising chiefly from the low price of logwood, combined

with the near approach of the Christmas hiring-season, when thousands of logwood-cutters are let loose in Belize from their eleven months' exile in the bush. Early in this year as much as 27dol. (gold) a ton was paid in Belize for logwood; now the price is 12dol., and may go lower before the labourers come in. The result is that either the labourers must accept about half their present wages, or logwood-cutting, practically the only paying industry in the colony, must cease. Serious rioting took place at Belize in the hiring-season of 1894-5, because Belize merchants were offering some 60 to 80 cents in gold as the equivalent of silver in the dollar, which had been demonetised by the Government during the previous October, just two years ago to-day, although the silver dollar was then, as now, worth scarcely 50 cents of the gold standard. What may happen in December, 1896, if merchants venture to offer a reduction of 50 per cent., or even 25 per cent., on present wages, it is impossible to say.

CHIPS.

Marseilles has just finished its drainage system on the model of that of Paris at a cost of £925,000 sterling.

The sudden death occurred at Paris, on Saturday, of the Russian marine painter, M. Bogoluboff. The deceased studied painting under Herr Achenbachs in Düsseldorf, and in 1861 was appointed Professor of the Academy at St. Petersburg.

A portrait of Mr. Alexander Ross, F.R.I.B.A., ex-Provost of Inverness, the architect of the cathedral and many other important buildings in that city, was presented to the corporation on Friday by subscribers, who desired that it should be hung in the town hall. The portrait is the work of Sir George Reid, P.R.S.A.

The town council of Ayr agreed on Monday to instruct Mr. R. Hammond to prepare plans and specifications for doubling the electric-light generating plant.

The Home Office and the Local Government Board have just issued an important body of regulations respecting the use of petroleum for the purposes of light railways, in connection with the Light Railways Act passed during last session. It is pointed out that petroleum vapour is easily ignited, and also forms a highly explosive mixture in contact with air. These two properties are insisted upon, as rendering necessary most stringent precautions.

The Sea-Wall Commissioners are about to make some improvements along the cliffs at Clacton-on-Sea. The urban district council have approved the plans and estimates for the making-up of Granville, Alexander, Harold, Castle, Magdalen, St. Mary's, and St. Ann's-roads, and are applying for a loan of £3,800 for the purpose of the works.

During last week a new pulpit was erected in Buckminster Church. Designed by Mr. Charles William Smith, of Grantham, it is of carved oak, with a stone base and steps, with polished brass fittings.

A new workmen's club at Clent was opened last week. The premises comprise a reading-room on the ground floor, 25ft. by 14in. 6in., a similar sized room above for recreation, and at the back a bowling green will be arranged. There is also a caretaker's house. The architect is Mr. Tom Grazebrook, of Stourbridge, and Mr. Walter Bayliss, of Belbroughton, was the contractor.

The Burns exhibition at the Royal Institute, Glasgow, will be succeeded by that of the Royal Scottish Society of Painters in Water-Colours. The water-colour art of Turner, Cox, De Wint, Müller, Roberts, Holland, Lewis, Fred Walker, Bough, and Millais will be seen on the walls; and the honorary members of the society, Gilbert, Tadema, Whistler, Linton, Israels, Morris, Burne-Jones, North, and Herkomer, will be represented. The receiving day is to-morrow (Saturday), and the exhibition will open to the public on Tuesday week, the 24th inst., the annual dinner taking place on the preceding day.

Part of the factory of Messrs. Shand, Mason, and Co., fire-engine manufacturers, situated in Upper Ground-street and on the bank of the Thames, close to the south end of Blackfriars Bridge, was totally destroyed by fire on Saturday night. A workshop of four floors, 70ft. by 40ft., the offices and stores, five stories in height, and 50ft. by 30ft., and a third building of four floors, also 50ft. by 30ft., were completely gutted, and a large stock of engines in course of construction and under repair was either burned or overwhelmed in the debris. Messrs. Shand and Mason state that, although the damage is considerable, much the greater portion of their premises remain, and they are completing arrangements for carrying on in another block the work formerly done in the burned out portion.

MEETINGS FOR THE ENSUING WEEK.

MONDAY.—Royal Institute of British Architects. "The Great Mosque of the Omeyyades at Damascus," by R. Phené Spiers, F.S.A. 8 p.m.

TUESDAY.—Institution of Civil Engineers. Discussion on "The Superstructure and Machinery of the Tower Bridge." 8 p.m.

WEDNESDAY.—Society of Arts. Opening Address by Major-Gen. Sir O. Tudor Burne, K.C.S.I., C.I.E., Chairman of Council. 8 p.m.
Carpenters' Hall, London Wall, E.C.

"Timber, Site, and Foundations," by Professor T. Roger Smith, F.R.I.B.A. 8 p.m.

THURSDAY.—Arts and Crafts Exhibition, New Gallery. "Decoration of Public Buildings," by Walter Crane. 8.30 p.m.

FRIDAY.—Architectural Association. "Garden Design," by F. Inigo Thomas. 7.30 p.m.

CHIPS.

At Tuesday's meeting of the Colwyn Bay District Council it was resolved to offer premiums of £30 and £20 for the best scheme for supplying electricity to the district.

The remains of Mr. William Slater, who died at his residence, Hayman's-green, West Derby, were interred at Anfield Cemetery, Liverpool, on Monday. The deceased, who had reached his 81st year, was many years engaged in the timber trade at Canada Dock, being well known and greatly respected. He retired from business about 30 years ago.

The latest addition to the world-famed collection of self-painted portraits of eminent artists, hung at the Uffizzi Gallery, at Florence, has been contributed by Mr. L. Alma Tadema. Both Lord Leighton and Sir John Millais responded in similar ways to requests from the custodians of the gallery.

An appeal is being made for £3,000 to improve the organ in St. Paul's.

The governors of King James's Grammar School, Knarborough, invite plans for schools, master's house, and premises, to accommodate 80 day scholars and 80 boarders. The cost must not exceed £4,000. A premium of £10 is offered, and the plans are to be sent in, under a motto, on or before Jan. 1, 1897.

Among the new mayors are Mr. Frederick Chancellor, F.R.I.B.A., who has been re-elected at Chelmsford; Mr. John Bowman, land agent, re-elected at South Shields; Mr. Charles Jesty, surveyor, has been appointed at Weymouth; Mr. George Marshall, builder and contractor, at Darlington; while the Lord Mayor of Liverpool is Alderman Thomas Hughes, a well-known timber merchant, who served before as mayor in 1839-90.

The first section of the new tower of Emmanuel Church, Compton Gifford, Plymouth, was dedicated on Saturday. The architects are Messrs. Rogers, Bone, and Cole. Mr. Jonathan Marshall, of Plymouth, was the contractor, and the first division of the work comprises the tower to the top of the cornice under the parapet. The cost has been £3,500. The height of the tower above ground is 71ft. It is built of local limestone. Mr. C. E. Perkins acted as clerk of works at the commencement, and was succeeded by Mr. G. Hoskin.

On All Saints' Day the dedication took place of a reredos in St. Stephen's, Ealing. The subject is "The Last Supper," represented in Caen stone, surmounted by a carved canopy in the Decorated style. The design was by Sir A. W. Blomfield, A.R.A.

At the last meeting of the City Court of Common Council, a letter from the City and South London Railway Company, submitting for the approval of the Court a block plan showing the proposed site of their Moorgate-street station and the positions of the lifts and staircases, was referred to a committee.

The Church of St. Gluvias, Penryn, has received this week a memorial litany desk and accessories—the desk and its platform being of English oak. It is of 15th-century Gothic type. The work has been carried out by Messrs. Harry Hems and Sons, of Exeter.

The new electric-lighting works erected by the Bury Corporation at Whitehead Bridge were opened on Thursday afternoon in last week. The contractors for the whole of the works, which cover an area of 10,000sq. ft., were Messrs. Siemens Brothers, of London. The borough engineer, Mr. J. Cartwright, prepared the plans, Mr. E. M. Lacey, of London, acting as consulting engineer.

In the parish church of Little Chart, Kent, a new stained-glass window was dedicated on All Saints' Day. The window is on the south side of the chancel. It was executed by Messrs. Heaton, Butler, and Bayne, the subject being an illustration of Proverbs xxxi. 27-8.

At Merthyr Tydfil, on Sunday week, there took place the dedication of a new peal of eight bells, the tenor of which weighs 25cwt., all cast by John Taylor and Co., of Loughborough.

Mr. J. Passmore Edwards has promised to build, at his own expense, a convalescent and holiday home at Southend for the indigent blind.

On Sunday the new west porch and font at Christ Church, Victoria-road, a chapel-of-ease to the parish church of St. Mary Abbots, Kensington, were dedicated. Besides the porch (with its lobbies), 19ft. by 10ft. 8in., paved with encaustic tiles, covered by a lead flat, having a stone parapet, cross passages have been made at the west end of the church, the disused west gallery and lobbies under it being removed. The font is of Caen stone, and has encaustic tile pavement around it. The architect was Mr. B. Edmund Ferrey, son of the late Mr. Benjamin Ferrey, who designed and carried out the church about 40 years since.

Colonel Luard, Local Government Board Inspector, held an inquiry at Clifton, Lancs, on the 5th inst., relative to the Barton Rural Council's application to borrow £2,300 for improving Rake-lane and Billy-lane, Clifton.

The official Board of Trade inspection of the Glasgow Subway was begun on Friday by Colonel Yorke, R.E., accompanied by the engineers of the company, Messrs. Simpson and Wilson. The Subway was commenced in 1890, and has cost close upon a million and a half sterling. The length is 6½ miles, comprising 11,527 lineal yards of double tunnel. Messrs. Simpson and Wilson were the engineers, and the work was let in eight contracts.

Mr. G. F. Watts, R.A., has announced to the Royal Academy his desire henceforth to figure in the list of honorary retired Academicians. Had he been a candidate for the Presidency there is no doubt he would have been elected, but Mr. Watts had previously decided to resign. The Academy limits retired members to a single picture, but allows them to take part at all elections, including that for president.

Mr. Joseph King Andrews, of the firm of Forster and Andrews, organ builders, Hull, died on the 5th inst. at his residence in Springbank, Hull, aged 76 years.

Mr. E. J. Physick, sculptor, has been commissioned to execute the memorial of the late Right Hon. Hugh Culling Eardley Childers, to be erected over the family grave in Cautley Church, near Doncaster.

Freehold ground rents and life policies and reversions formed the bulk of the supply at the Auction Mart, Tokenhouse-yard, last week, and, apart from these favoured investments, little else was sold. The aggregate realisation was only £49,335. There was a similar falling off in the corresponding week of last year, when, after a fortnight's brisk business, the returns only showed a total of £46,099.

Major-Gen. Crozier, R.E., Local Government Board Inspector, held an inquiry at Gloucester Workhouse, on Thursday in last week, into the application of the Gloucester Rural District Council for approval of the constitution of a special drainage district, to consist of parts of the contributory parishes of Barnwood, Hucclecote, Longford, and Wotton St. Mary Without; and for sanction to borrow £10,000 for the sewerage and sewage disposal for the special drainage district. It was explained that it was proposed to adopt the universal sewage purification system, and to discharge the purified effluent into the Severn just above Gloucester.

The tender of Messrs. Monk and Newell, of Liverpool, has been accepted for the construction of the Spen Valley section of the Heaton Lodge and Wortley Railway. The section extends from Northorpe to Cleckheaton. Actual work will not be commenced until the spring. At Gildersome, Birstall, Gomersal, and Mirfield great progress has been made in the construction of the line.

The memorial to the late Archbishop of Canterbury will, it has been decided, include, primarily, an effigy in the Cathedral at Canterbury, and the further efforts of those interested in the memorial will be directed towards the completion of some part of Truro Cathedral. An executive memorial committee has been appointed, and it has been further decided that a public meeting on the subject shall be held at Church House, at a date to be fixed.

At a special meeting of the General Purposes Committee of the Rochdale Corporation, it was agreed to recommend the latter body to increase the salary of the borough surveyor, Mr. S. S. Platt, from £400 to £500 per annum, and that he be allowed the sum of £100 as an honorarium in consideration of extra services rendered in connection with sewerage works. In course of the discussion, it transpired that Mr. Platt is one of the selected candidates for a borough surveyorship vacant elsewhere.

An extensive landslip has occurred during the past few days at the Undercliffe, to the north-east of Folkestone. Over fifty acres of chalk and clay have moved forward towards the sea, in some places a depth of 30ft. of material being affected. The slide is the most serious one for the last 20 years.

LATEST PRICES.

IRON, &c.

	Per ton.	Per ton.
Rolled-Iron Joists, Belgian	£5 5 0 to	—
Rolled-Steel Joists, English	6 0 0 ..	—
Wrought-Iron Girder Plates	6 15 0 ..	—
Bar Iron, good Staffs	7 0 0 ..	£7 5 0
Do., Lowmoor, Flat, Round, or Square	17 0 0 ..	17 10 0
Do., Welsh	5 15 0 ..	5 17 6

Boiler Plates, Iron—

South Staffs	7 10 0 ..	7 16 0
Best Suedsill	9 0 0 ..	—
Angles 10s., Tees 20s. per ton extra.		

Builders' Hoop Iron, for bonding, &c., £6 10s. 0d. per ton.
Builders' Hoop Iron, galvanised, £13 10s. 0d. per ton.
Galvanised Corrugated Sheet Iron—

	No. 18 to 20.	No. 22 to 24.
6ft. to 8ft. long, inclusive gauge	£10 5 0 ..	£11 0 0
Best ditto	11 5 0 ..	11 10 0

	Per ton.	Per ton.
Cast-Iron Columns	£5 10 0 to	£3 10 0
Cast-Iron Stanchions	5 10 0 ..	8 10 0
Cast-Iron Sash Weights	—	4 2 6
Cast-Iron Socket Pipes—		
3in. diameter	4 10 0 ..	4 15 0
4in. to 6in.	4 5 0 ..	4 10 6
7in. to 24in. (all sizes)	4 0 0 ..	4 2 6
[Coated with composition, 2s. 6d. per ton extra; turned and bored joints, 5s. per ton extra.]		

	Per ton.	Per ton.
Pig Iron—		
Cold Blast, Lilleshall	105s. to 110s.	—
Hot Blast, ditto	57s. 6d. to 62s. 6d.	—

	Per ton.	Per ton.
Wrought-Iron Tubes—Discount off Standard Lists f.o.b.		
Gas-Tubes	75p.c. Fittings 77½p.c.	—
Water-Tubes	70 ..	72½
Steam-Tubes	62½ ..	65
Galvanised Gas-Tubes	60 ..	62½
Galvanised Water-Tubes	55 ..	57½
Galvanised Steam-Tubes	45 ..	47½

	10cwt. casks.	5cwt. casks.
Sheet Zinc, for roofing and working up	£20 0 0 to	—
Sheet Lead, 3lb. per sq. ft. super.	12 2 6 ..	12 5 0
Pig Lead, in 1cwt. pigs	11 0 0 ..	—
Lead Shot, in 28lb. bags	15 0 0 ..	—
Copper Sheets, sheathing and rods	55 0 0 ..	—
Copper, British Cake and Ingot	49 0 0 ..	50 12 0
Tin, Straits	59 17 6 ..	60 0 0
Do., English Ingots	63 10 0 ..	65 0 0
Spelter, Silesian	16 12 6 ..	16 13 0

	Per ton.	Per ton.
Cut Clasp Nails, 3in. to 6in.	8 5 0 ..	—
Cut Floor Brads	8 0 0 ..	—

	Per ton.	Per ton.
Wire Nails (Points de Paris)—		
0 to 7 8 9 10 11 12 13 14 15 B.W.G.	8 6 9 0 9 6 10 3 11 0 12 0 13 0 14 3 15 3	per cwt.

TIMBER.

	per load	£11 0 0	to £16 0 0
Teak	—	—	—
Quebec pine, red	2 5 0 ..	—	4 5 0
„ yellow	—	—	—
„ pitch	—	—	6 10 0
„ Oak	3 5 0 ..	—	5 0 0
„ Birch	3 10 0 ..	—	4 15 0
„ Elm	2 15 0 ..	—	4 0 0
„ Ash	2 10 0 ..	—	3 10 0
Dantsic and Memel Oak	1 15 0 ..	—	3 15 0
Fir	2 0 0 ..	—	4 5 0
Wainscot, Riga p. log	4 10 0 ..	—	5 10 0
Lath, Dantsic, p.f.	5 0 0 ..	—	6 10 0
St. Petersburg	8 5 0 ..	—	8 15 0
Greenheart	—	—	—

Deals, per St. Petersburg Standard, 120—12ft. by 1½in. by 1½in. —

Quebec, Pine, 1st	£21 10 0 to	£24 0 0
„ 2nd	15 0 0 ..	17 0 0
„ 3rd	7 0 0 ..	10 10 0
Canada Spruce, 1st	8 10 0 ..	10 0 0
„ 2nd and 3rd	7 5 0 ..	8 10 0
New Brunswick	7 0 0 ..	8 10 0
Riga	6 10 6 ..	7 10 0
St. Petersburg	8 0 0 ..	13 0 0
Swedish	8 0 0 ..	16 0 0
Finland	8 0 0 ..	9 0 0
White Sea	9 10 0 ..	16 0 0
Battens, all sorts	5 0 0 ..	20 0 0

Flooring Boards, per square of lin. :—				
1st prepared	0	9	0	0 15 0
2nd ditto	0	8	0	0 12 6
Other qualities	0	4	6	0 7 6

Staves, per standard M:—									
Quebec pipe	—			—					
U.S. ditto	35	0	0	”	42	10	0	0	0
Memel, cr. pipe	225	0	0	”	240	0	0	0	0
Memel, brack	200	0	0	”	210	0	0	0	0

OILS.

	per ton	£16 15 0	to £17 10 0
Linseed	—	—	—
Rapeseed, English pale	26 10 0 ..	—	25 0 0
Do., brown	24 0 0 ..	—	24 10 0
Cottonseed ref.	15 10 0 ..	—	16 10 0
Olive, Spanish	29 0 0 ..	—	29 10 0
Seal, pale	23 0 0 ..	—	24 0 0
Cocanut, Cochin	27 0 0 ..	—	—
Do., Ceylon	24 0 0 ..	—	—
Palm, Lagos	23 10 0 ..	—	—
Oleine	19 0 0 ..	—	20 0 0
Lubricating U.S. per gal.	0 6 0 ..	—	0 7 3
Do., black	0 4 9 ..	—	0 6 6
Tar, Stockholm	0 19 6 ..	—	—
Archangel	0 12 6 ..	—	—
Turpentine, American .. per ton	18 15 0 ..	—	19 10 0

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FRIDAY, NOVEMBER 20, 1896.

ECCENTRICITIES.

WE have often heard of "rational" and "irrational costume,"—as similes they apply to our architecture. The lady who adopts what is called the "irrational" costume often grumbles about the inconvenience of modern dress—the tight corsets, the over-wide skirt, and the "torture" of hair-pins. At the same time, when she compares her own dress to what is known as "rational" costume—the shapeless figure and the heel-less shoes of one who has the courage of her convictions—she congratulates herself on her attire. The simple truth is the "irrational" habit appears even rational when it is brought into contrast with the honest and the true. And so it is that what is habitual and common in costume and in architecture becomes to be regarded as right. Any innovation, any deviation from recognised models, is looked upon with pity or contempt. The early pre-Raphaelite, like the advanced "Impressionist" of to-day, was ridiculed and criticised in no measured terms, and all because these exponents of painting dared to interpret life and nature in their own unsophisticated way. They were thought eccentric because they ventured out of the traditional path; in the minds of their critics there was no thought that perhaps, after all, they themselves were wrong, and that the new school were reverting to the true path. And this line of reasoning applies, to a great extent, to our architectural design. What is common is right; what looks original is wrong. The man who does a bold thing, who steps out of the beaten path and says he will have nothing to do with Vitruvius or Palladio, or any of the band of Italian Renaissance followers, is at once thought ignorant or an eccentric. If he dares to alter the proportion of his pilasters, or to supersede them by a bare wall, or to confine all his detail to a porch or a window, he is thought crotchety. What is to be thought of one who puts his windows just where he wants them to go, and deprives other parts of any windows at all? All these things are eccentricities, yet they may be perfectly honest and of right intention. The President of the Institute in his address spoke of the foolishness of substituting antiquarianism for architecture; but this is what we have been doing for the last two hundred years. No doubt it is quite true that "deceased architecture is the architect's lesson-book"; it is equally a fact that with "two deceased styles, Renaissance and Gothic, a large proportion of our architects are so familiar that they could build a paraphrase in either that might almost deceive a Gothic architect of any period, or an Italian of the Late Renaissance." The fact is architects have looked upon this kind of learning as culture, till at last it has been mistaken for architecture. Useful and valuable as such historical knowledge of the art is and must be, there has been a growing tendency to confuse it with the art itself. The accretions of Classic orders and Gothic details have at length obscured the real essential principles of architecture, and any attempt to ignore the accretional forms has been looked upon as eccentricity. Very few men have succeeded in adapting the features of preceding styles without ignoring the true principles. Of those who have been successful, like the late Mr. Thomson, of Glasgow, in arranging trabeated and columnar forms to modern buildings, the charge of eccentricity has been alleged against them. Even some of Mr. Street's works, and

those of the late Mr. Sedding, have been similarly described. They grasped the underlying principles of the Gothic system, while discarding the accidental accretions and features. In this sense what is called "eccentric" is honest and truthful work. A great many of the specimens of woodwork, furniture, and carving seen in the Arts and Crafts Exhibition have been pronounced chimerical and eccentric. Some of the designers certainly appear to have done their best to offend modern prejudices on matters of shape and convenience, and to have gone to the extreme of peculiarity. On the other hand, we see designs which have honestly adapted the material to the requirements of chairs, tables, and decorative adjuncts. In proportion as the "shop taint" has been discarded, and the individuality of the craftsman has been pronounced, the charge of eccentricity has been made against them. All honest endeavour has been so denounced. On these grounds a Madox-Brown, a Ruskin, a Burne-Jones, a Morris, or a Whistler can be equally condemned, and many of our finest paintings and noblest edifices be pronounced failures. The argument in this way leads to a veritable *reductio ad absurdum*, because, if what we have been used to is to be a standard, there can be no such thing as progress in art or anything else, for art in this sense would become stereotyped and unprogressive. Art must be applied to life as a whole, not a section of it—a principle admitted by all true artists, whether architects, painters, sculptors, or musicians. As Mr. T. J. Cobden-Sanderson, at one of the Art and Craft lectures, said, "Art had its origin in craft. It was not decoration, painting, sculpture, architecture, music, or verse, but it was all these things in turn." Such a principle repudiates the idea that what has been the fashion in architecture is true. It cannot be true always, for if so, there would be no change in our buildings, which are continually varying in their wants, and in the constructive methods employed. There must be constant modification going on—a departure from existing models, and it is in this sense that any deviation may be looked upon as eccentric by a number of people.

It is, therefore, not in a comparison with what is usual or fashionable that we can say any piece of architectural design or decoration is eccentric; rather, in fact, can we describe as eccentricity any departure from common sense—in other words, the use of certain styles which have completely outlived their origin and even their intention. By "eccentricities," we should rather describe certain aberrations of the architect's imagination. There are, for example, some qualities and ideas which make for eccentricity in design. There is, first, self-assertion—a very desirable thing in certain ways. We mean, of course, the personal assertion of the designer. He desires to be known, and he does something strange or churlish which is sure to draw attention. He may belong to that band of devoted eclectics who like to give us bits of unmitigated bareness or something quaint or freakish, not because it is a natural development from the design, but to make people stare and exclaim: "Well! how ridiculous or absurd!" "What will architects do next?" It may be a street building. We see a blank wall or story with a small frame of leaded lights in a corner, or a prodigious chimney-stack right in the front of a house—very freakish or positively whimsical. Whatever and whenever they build, this class of men adopt the same ideas or style, so that their work cannot be mistaken. Thus Mr. Solecism is talked about till he gets work from many who like to build their houses or premises different from those of ordinary people. Secondly, we have another motive—the desire to be peculiar. With these designers it is not so much individuality, but a kind of

crotchetyness, not to follow other people. A peculiar style is adopted; the customary styles are discarded—not because they are inappropriate, but because they are common. This sort of eccentricity is seen amongst people who adopt peculiar dress, who desire to don a costume of their own; they, in fact, like to be out of the common. These are some, at least, of the motives which have produced the eccentric in architectural design; but we should be wrong to place in the same category the work of men like Sedding, Norman Shaw, H. T. Hare, Leonard Stokes, whose works are dictated from motives very different to those which proceed from individual crotchetyness or caprice. Of this sort of eccentricity we see numerous instances. The object in some cases is to mix up two irreconcilable styles—to adopt, say, Classic and Late Renaissance features—we can hardly think unwittingly—in the same design. It is true there is a certain license and laxity in the works of the 16th and 17th centuries, when Classic details were grafted upon Gothic arrangements and plan; but in these examples of English Renaissance there is always a naturalness and charm in the combination, as if the architects were really endeavouring to produce harmonious results. But the modern mixture is hard and uncouth—it is for the sake of being peculiar, of arresting attention. If there is a fleche or roof turret it is sure to be placed anglewise to the front; a bay-window is thrust out at the corner obliquely, a hooded fireplace of Mediæval design is put in a modern dwelling-room which is of commonplace character. The conditions of modern interiors are perplexing in the extreme. Ordinary people cannot understand why such things as huge canopied fireplaces are put into modern drawing-rooms, the style and decoration of which rooms are very "modern." The desire to be original or peculiar is a very different thing from that kind of eccentricity which is really a divergence from conventional types. The former is generally freakish; it proceeds from a personal idea to arrest notice, to thrust something into a place where it is evidently not wanted. But who can fail to see that such a design as that by Mr. Wilson for the west end of St. Augustine's, Highgate, a drawing of which appeared in this year's Academy, is really an honest and dignified attempt to carry out a noble conception, eccentric as it may appear to ordinary eyes. Those who esteem conventions and "correctness," whatever it may mean, would possibly think some recent efforts in ecclesiastical design eccentric, as in some features of Mr. Leonard Stokes's work; but they must acknowledge them, nevertheless, to possess the qualities of honesty and sincerity of purpose. Departures they may be from the average Gothic designers' work, but not from sensible construction and honest artistic expression. Who has not been charmed by some of Mr. Norman Shaw's and Messrs. George and Peto's domestic work, despite their freedom from stereotyped forms? and we can multiply instances to show that so-called "eccentricity" may be mistaken for honesty and artistic life. Of course eccentricity in design is not to be aimed at except as the result of careful study. The endeavour after "originality" is by no means the principal aim of the architect, as it often leads him to abandon restraint and refinement, and this is just the manner in which many of the buildings which affect originality appear to us. Their details are extremely crude and ill-considered, as if the architect, having hit upon something original, left all the work to his clerk of works or the workman. The modern workman is no longer the intelligent co-operator with the designer, so that when the latter attempts anything original in the way of design, he cannot expect any sympathy from the craftsman. Hence it is that so much of our modern work is commonplace: the architect with an idea has a difficult task to

get his design carried out with any consistency or harmony.

"Eccentricity," or whatever we like to call a divergence from the normal type, is a sign of growth, if not of progress, in proportion as it is an honest attempt to throw off the trammels of an old style. Of course, there are freakish and impatient attempts, by men who will not try to master the principles and materials that are before them. On the whole, we are thankful to the few who, with conscientious purpose, show there is another line of thought possible, who have at last discovered a new mode of attacking a problem that is not so hampered by tradition. Or we have arrived at a point at which further progress or development in the old paths is impossible. Every style at its beginning was more or less a striking out upon a new path: there was an initial departure when the Romanesque was succeeded by the Gothic system, also at each point in the successive development of the Pointed styles, as in the growth of the different phases of the Renaissance, gradual it may be, but, still, a departure in which the construction or mode of vaulting was the immediate impulse. So long as our modern designs follow this principle of development, we need not fear that what looks new and strange to us is really whimsical and to be condemned, especially when it is the work of one who has himself mastered the principles of his art.

ROOFS: THEIR DESIGN AND COVERING.

ONE of the practical developments of plan is roofing, though it is not often that the ordinary architect pays much attention to it. He allows it to work itself out, and leaves the rest to the carpenter, the slater, and the plumber—especially so, if it happens that his design is not much affected by this feature. And yet it is all-important. One architect has said, "Show me the roof plan, and I will then say what I think of the plan." Within the last forty years the roof has been more carefully regarded. The Gothic revivalists did much to bring the roof into prominence, and to them we owe the modern development of this important feature as a constructive and decorative art. Perhaps one of the most recent modern oak roofs of any pretension is that which Sir Arthur Blomfield has put over the great hall of the Church House at Westminster—a good example of modern workmanship, though less massive than many of the great hall and church roofs. When the roof, as in this case, plays a prominent part in the design, we may expect to find the architect devoting much of his attention to it; but in many secular works the main object is to cover the building in as expeditious and as cheaply a manner as possible. It is not seen internally; and externally, the designer is apt too often to adapt his roofing to the gables and other external features of the building, rather than to make it paramount, and adapt these features to it. Of course, there should be a correspondence between the main breaks and external projections of the plan and the roofing, which can only properly be observed by a simultaneous study of those objects. We are yet far from emulating the noble and picturesque roofs of the civic buildings of France of the 14th and 15th centuries, or even the smaller examples in the towns, as at Chartres and Chateaudun, well known to all students. The gable-ends of these houses which face the street are framed like principals with collars and curved braces, and they project beyond the half-timbered front and supported on brackets, something after our 15th-century barge-boards. We have done little to develop this sort of decorative timber-work in our streets, and for obvious reasons, though in many of our suburban residences the framed gable fronts and barges are common enough. The disuse of decorative timber work in our secular buildings

has no doubt been one cause of the small interest taken in roofs of this kind. When the roof is only regarded as a constructive covering to the building, its architectural importance is neglected; it is thought to be more of a builder's work, and if the carpenter and slater make their work watertight, the architect is satisfied. The papers read the other day at the Architectural Association on roof-covering show a revived interest in the question of coverings. As Mr. Thos. Stirling said in his paper on slating, when a roof is specified to be covered with good slates, and a reduction is called for, the slates "are the first thing to be cut down in cost." As to quality and colour of this material, the architect has been mainly guided in his choice by price-books and samples. Speaking of slates for London use, Mr. Stirling says: "Where appearance is a secondary object, I cannot suggest better slates than the best 'tons' and best mottled." The former are "well adapted for church roofs, and are laid in diminishing courses, and show about 15in. at the eaves, and reduce to about 9in. at the ridge. They are of a bluish-grey colour with a tinge of green. Speaking of the size of slates, 16in. by 10in. is recommended, or for high-pitched roofs 16in. by 8in., as they are lighter. Indeed, the pitch of roof ought to determine the size and weight or thinness of slate. For a flat-pitched roof a wide slate does better than a narrow one, and for ordinary pitches 16in. or 18in. by 12in. is recommended. Several points of value are worth attention: one is, that the rougher the slate, the less chance there is of leakage through rain blowing over the lap. The smooth surfaces, on the other hand, having less air between them, allow the moisture to work in between them by capillary action. Thus, to insist in the specification that the slates shall fit closely on each other is, on this account, to invite the entrance of moisture, as may be found in Devonshire, where the smooth slate roofs suck up a quantity of moisture which finds its way over the lap. Another point is that lime and hair bedding acts like a sponge, and absorbs the water, keeping the roof damp. Again, the lime is said to destroy the slates. On the whole, the reader of the paper recommends the slates from the Westmoreland and Cumberland districts, as making the most picturesque roof-covering; they are also durable. They are obtained in random sizes, and vary in colour, and the character of these kinds of slates is best maintained by the use of the ordinary green slate of random widths. On the mode of fixing, the author refers to the value of an air-current between the slates and battening, as the battens, if laid as usual, prevent the moisture dispersing; for this purpose he suggests vertical battens.

On tiling much may be said. There are a mechanical regularity and evenness about some modern tiled roofs which detract much from their artistic effect: their uniformity of make and colour is distasteful when we compare them to the old tile roofs with their inequality and "bloom." Mr. Walker, in his remarks on this kind of roof-covering, made some sensible observations on the selection of tiles. Those of bright or clayey red colour are often absorbent, and do not weather well, and, he might have added, they are not pleasing. A good tile should be dense and partially vitrified, and this partial vitrification adds much to the surface appearance, as we see in the Broseley tiles, which resemble somewhat the old tile with its surface coating and non-absorbent character. As to bedding in mortar, the tops only should be so treated, or about 3in. of their depth. When the lower part of the tiles is bedded in lime and hair, capillary attraction, as in the case of slate, is invited, and a slight gauging with Portland cement is recommended to keep out moisture, especially when the roof is not boarded. The remarks on secret gutters are worth notice.

The tiler is very apt to beat down the lead to secure an even surface for his work, instead of making the tiles tilt over the lead welt.

Copper, lead, and zinc are materials which have their advantages on roofs of flat pitch or nearly level. They are lighter, and do not crack. While slates on a square of roofing will weigh about 6cwt., copper will weigh only 1cwt. and zinc 1½cwt. Lead and copper, of course, are the most durable, and resist the action of acids, while zinc is particularly exposed to their action, and cannot be depended on. On the contrary, zinc and copper are firmer and lighter than lead. Comparing lead with copper, the former may be laid to a thickness of 6lb. or 7lb. per foot as easily as copper weighing only 16oz. or 18oz. to the foot, and be equally durable. Copper is a covering which has not yet been fully recognised by the architect. As it is firmer and tougher than lead, it makes a better covering for flat roofs, and for covering domes, spires, and cupolas it has the merit of lightness and durability in its favour, as well as its colour. It also expands and contracts less than zinc or lead, and with wood rolls and welts, which can be readily made in it, there are unquestionable advantages in its use. It is moreover, a better fire-resisting material than the other two materials. It is firmer and stiffer in laying, and therefore fewer drips are necessary, and it can be wrought more easily than lead or zinc into ornamental work. These are some of the advantages of copper as a covering for roofs and ornamental features. Being durable, light, fairly workable, and less exposed to atmospheric influences, it might be advantageously used more frequently than it is on our buildings. Mr. George Ewart's remarks on the comparative merits of these metals deserve the attention of the profession. Good slates and tiles appear to be the coverings which have been most favourably accepted by architects for ordinary buildings; but for large roofs of flatter pitch copper offers many advantages.

THE SOCIETY OF ARCHITECTS.

THE meetings of the Society during next session will be held at St. James's Hall, Piccadilly, on Thursday evenings instead of on Tuesdays, as heretofore, and will take place on the fourth Thursday in every month, with the exception of December. This is an awkward evening, inasmuch, as owing to the early hour at which we have to go to press on that day, it will probably be out of our power to report the meeting till the week following. The opening meeting is arranged for Thursday in next week, at 8 p.m., when Mr. Robert Walker, J.P., of Cork, will deliver the Presidential Address.

The report of the council of the Society of Architects for the year ending October 31, 1896, which will then be submitted, announces the continued and growing prosperity of the Society. Founded, as it was, not only to assist the business of the profession, but to promote the highest interests of architecture, it is hoped that this success is, and will be, an indication that rising architects realise the importance of association for the purpose of attaining high ends and the encouragement of all that tends to that object. During the past year there have been 60 candidates for election as members, of whom 43 were successful in their application; but one died within a few weeks of his election. Seven members have been removed by death, and ten have retired, the result being that there is now a total of 544 on the roll of the Society, an increase of 25 since October 31, 1895, when the number was 519. Three students have also been added to the register, and it is hoped that a considerable accession will be made when the examination comes into operation.

The past session was opened by the President's address, by Mr. E. J. Hamilton, and a discussion was held in January on "The Action of Fire on Fire-resisting Materials" and "Architects, Local Boards, and their Rules." The following papers (all illustrated by drawings and lantern slides) were read: "A Year's Work under the London Building Act of 1894," by Mr. Ellis

Marsland (Hon. Sec.) "Architectural Training," by Mr. G. A. T. Middleton, A.R.I.B.A.; "Bricks and Brickmaking," by Mr. H. Greville Montgomery; "Road and other Screens in Devonshire: Past and Present," by Mr. Harry Hems, of Exeter; and "Peterborough Cathedral and its Present Condition," by the Rev. Canon Owen W. Davys. During the past year the "new departure" of 1895 was repeated, and the ordinary meetings were held on June 20 at Peterborough, and on July 25 at Shoreham, when visits were paid to those places. On the former occasion members were enabled to make a careful inspection of the cathedral through the courtesy of the Dean and Mr. Thompson, the contractor for the works in progress. On the latter date the churches of Old and New Shoreham were visited, Mr. H. G. Quartermain (hon. treasurer) acting as guide to the party and reading instructive papers on the subject. In accordance with a resolution of the council to hold, as might be convenient, meetings in the provinces for the purpose of ascertaining the views of provincial architects on the question of Registration, invitations were sent to all the best-known architects within a reasonable distance of Cardiff and Bristol to attend meetings, to be held at those towns on March 23 and 24 respectively. The president and hon. secretary attended, and were supported by the hon. local secretaries. A paper was read on the statutory registration of the profession, followed by a discussion, and a resolution adopted in the following terms:—"That this meeting cordially approves the principle of the statutory examination and registration of architects, and is of opinion that it is desirable, in the interests of the public and the architectural profession, to promote a Bill in Parliament for the attainment of this object." It is proposed to continue the meetings as opportunity offers. With reference to the proposed examination for membership, the council, in addition to the scheme already formulated and published, together with a list of qualifying examinations, which will be accepted in lieu of part of the society's examination, have issued a provisional conspectus of subjects, and the hours on three different days during which the examination will be held. Further information will be issued as soon as possible, and announced in the *Journal* and architectural publications. A special committee has been appointed to deal with this important question. During the past year the council has met on ten occasions, the finance committee on nine, the literary committee once, and the practice committee once. There have also been two special meetings: one to consider the examination scheme, and the other to prepare the house list. The large reading-room, which is daily open to members, for letter-writing and appointments, has not been so frequently used as might have been expected, and the council once more points out the great advantages which it offers, especially to those who are only occasionally in London. In concluding their report, the council request members to bear in mind that, by replying promptly to communications with the secretary, they will save the time of the staff and promote the efficient working of the business of the society, and this is the more necessary as membership extends over so wide an area.

GRAPHIC STATICS.—V.

WE now pass on to apply the foregoing principles to the problem of finding the direct stresses in the members of various trusses, under given conditions of loading and support, the whole work for each truss being done, in general, by means of one *frame diagram* and one *force diagram*. For the present we shall restrict ourselves to the simpler cases, and shall reserve those of a more difficult nature for future discussion.

A few explanatory words are necessary before entering on this part of our subject. Since we are now to deal only with the *direct stresses*, and not with either *shearing* or *bending stresses* in the members, we must treat the joints of any truss as if they were frictionless hinges, the axis of the pin of each hinge passing through the intersection of the axes of the bars which are connected by that hinge; and the loading must be supposed to be concentrated at the various joints, any load which is otherwise placed, being divided in the proper ratio among the two joints at the ends of

the bar which supports that load. The *internal forces* with which we have to take account, are thus only such as act along the axes of the various bars which form the truss.

A *perfect truss* is one which has no superfluous members, and which cannot alter its *shape* without the *length* of at least one of its members being altered. The triangular frame is a perfect form of truss, and is also the simplest. The discussion of trusses in general will be deferred till some little familiarity with a few typical forms has been acquired, since it can then be entered upon by the beginner with less difficulty than at present; besides which, having seen some practical applications of the principles already discussed, he will be encouraged to proceed to acquire the knowledge necessary to the convenient

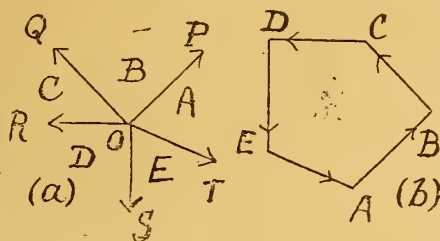


Fig. 16.

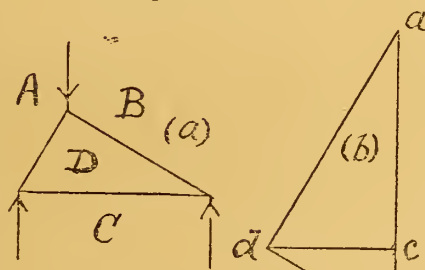


Fig. 17.

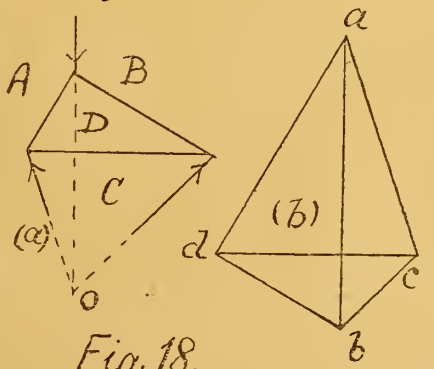


Fig. 18.

treatment of more difficult and more interesting problems.

A different system of notation from that which we have hitherto used to denote forces will be made use of, and will now be explained. Instead of naming a force by putting a letter at each end of the line which represents it, the force is, in the new system, named by putting a letter at each side of the line; and in the case of a number of forces acting at a point, a letter is placed in each angle formed by the lines of action of the forces. Thus the forces OP, OQ, OR, OS, OT, represented in Fig. 16 (a), would be spoken of as the forces AB, BC, CD, DE, EA. The polygon of these forces (which we will suppose to be in equilibrium) is shown in Fig. 16 (b), and it is seen that the same letters are used in both figures to name the same force, the letters in one case appearing at the sides, and in the other case; just as in the old system, at the ends of the line which represents the force. This system of notation is peculiarly fitted for our present purpose. In the *frame diagrams* the letters will be at the *sides* of the lines of action of the forces; and in the *force diagrams*, where the *magnitudes* of the forces need to be well defined, the letters will be at the *ends* of the lines representing the forces. Capitals will be used in the frame diagrams, and

the same small letters in the force diagrams. The invention of the system is sometimes ascribed to Mr. Bow and sometimes to Professor Henrici. It seems likely that both of these gentlemen may have independently invented the system.

In the case of every structure with which we shall deal, the whole structure and every part of it are supposed to be at rest. Hence the following conditions must be in all cases fulfilled:—1. All the external forces form a system in equilibrium, and, therefore, the lines representing them in the force diagram will form a closed polygon. 2. All the forces which act at each joint of the frame form a system in equilibrium. That is, the external forces acting at any joint, together with the pulls and thrusts of the various bars which meet at that joint, form a system in equilibrium. Hence, in the force diagram, the lines which represent the external and internal forces which act at any joint, will form a closed polygon, the word *polygon* being used here and above in its most extended sense. 3. The forces which act on each member of the frame form a system in equilibrium.

To begin with, let us take again a problem already dealt with (Ch. III. p. 480, Fig. 10). Fig. 17 (a) is the frame diagram representing a triangular frame acted upon by three external forces, the force AB being a load of 150lb., and the forces BC and CA the two supporting forces, which are supposed to be vertical, and whose magnitudes are not yet known. If the letter D be placed in the space within the frame, we shall have all the space within and without the frame diagram named, and any joint of the frame may be named by naming the spaces which meet around that angle; for instance, the vertex may be called the angle ABD, or A B D A.

To draw the force diagram, draw Fig. 17 (b), *a b* to represent the given force AB (150lb.); draw *bd* parallel to the bar BD, and *da* parallel to the bar DA. Then *abda* is the polygon of forces for the joint A B D A, and we see that *bd* represents in direction and magnitude the force (75lb.) which the bar BD exerts at that joint, and that *da* represents in direction and magnitude the force (75lb.) which the bar DA exerts at the same joint. For the joint D B C D we have now the known force *db* (equal and opposite to *bd*), the force which the bar DB exerts at its other end; draw, then, *bc* parallel to the force BC, and *cd* parallel to the bar CD, so getting the triangle *dbcd* as the polygon of the forces which act at that joint, and thus finding *bc* as representing the external force BC (37lb.), and *cd* as representing the force (65lb.) exerted by the bar CD. Coming now to the joint A D C A, we must have *ad* and *dc* to represent the forces (130lb. and 65lb.) in the bars AD, DC, and, therefore, *ca* to represent the force CA (113lb.), the force polygon for the joint being *adca*.

In this example the external forces AB, BC, CA, are all parallel, and the *closed polygon* *abca* which represents them in the force diagram is, consequently, reduced to a straight line.

In Fig. 18 (a) the same frame, with the same load, is again dealt with; but here the direction of the supporting force BC is supposed to be inclined at 45° to the horizon. The explanation of Fig. 17 (b) applies perfectly to Fig. 18 (b), except as to the magnitudes of the supporting forces and the force in the bar CD. These may be measured from the diagram to the same scale used for the given force.

Note that because the whole frame is in equilibrium under the action of the *three* external forces AB, BC, CA, which are not all parallel, the lines of action of these must meet at a point. This gives a means of testing the accuracy of our work, or of finding independently the *direction* of the force CA, as indicated in Fig. 18 (a), and, thence, of finding the *magnitudes* of the two supporting forces BC and CA, by drawing the triangle *abca* of the external forces Fig. 18 (b), without regard to the internal forces.

We have taken an unsymmetrical form of this truss. This and most other trusses are generally used in a symmetrical form. J. C. PALMER.

At the last meeting of the city council of Wells, Somerset, a letter was read from the Local Government Board sanctioning the loan of £3,500 for carrying out a system of sewage disposal, of which Mr. Naylor is engineer. A deputation has been appointed to visit Exeter, Yeovil, and Horfield sewage works.

ADAPTABLE SPECIFICATIONS.—XVIII.*

SPECIFICATION PART X. (continued): PLUMBERS',
BRASSFOUNDERS', AND SUNDRY WORKS.

X. 4. **CLOSE-NAILING EDGES OF LEAD.**—The loose edge of the lead at the following points—namely..... is to be bedded in white lead, and closely copper-nailed.

X. 5. **CHEEKS OF DORMERS.**—The cheeks of the following dormers—namely..... [and the following vertical faces—namely.....] are to be of 6lb. milled lead on 1½in. grooved and tongued deal boarding, the boards being in 5½in. widths. The dormers to have aprons of 5lb. lead, 15in. wide, close copper-nailed at top, and flashings of 5lb. lead, and soakers of 4lb. lead as specified in clause X. 3. Each cheek of a dormer is to have No. solder dots and screws.

X. 6. **SKYLIGHTS.**—All skylights in sloping roofs are to have gutters, valleys, and aprons of 5lb. milled lead on inch boarding, and flashings of 4lb. lead.

X. 7. **LEAD HIPS AND RIDGES.**—These are to be of 6lb. milled lead, 2in. wide, with 3in. laps. The lead is to be in lengths of not more than [six] feet, and is to be neatly dressed over [1½in. by lin.] wooden rolls.

X. 8. **LEAD SILLS.**—The following sills—namely..... are to be covered with 6lb. milled lead, bedded at top in white-lead, and close copper-nailed, and carefully dressed over and round the sill below.

X. 9. **ZINC FLATS, &c.**—The following flats—namely..... are to be covered with No. 16 gauge Vieille Montagne zinc, on inch grooved and tongued deal boarding, the zinc being laid in the most careful and perfect manner on [Braby's] system, including all necessary holding-down clips, solid stopped ends, and ridge-plates. No solder nor external fastenings are to be used. Drips are to be 2½in. deep, and are not to be further apart than 7ft. 6in. Where not distinctly shown on drawings or directed otherwise, the flat between the drips is to have a fall at the rate of 3in. in 10ft. The wall flashings are to be of No. 15 gauge zinc; they are to go 1½in. into the walls, to be finished with a bead, and to be pointed in neat Portland cement.

X. 10. **ZINC GUTTERS.** are in all cases to be of No. 16 Vieille Montagne zinc, to have a fall of at least 3in. in 10ft. between the drips, and to have drips 1½in. deep. Their flashings to be of No. 15 gauge zinc, 6in. wide, finished at bottom with a neat bead. They are to go into the walls 1½in., and are to be pointed in neat Portland cement. The zinc of the gutters is to turn up at least 6in. against the walls or other vertical faces, and to go 10in. under the slates.

X. 11. **CORRUGATED ZINC ROOFS.**—Cover the following roofs—namely,..... with Italian pattern corrugated zinc roofing of No. 15 gauge thickness of Vieille Montagne zinc, with the "flutes" or corrugations 15in. from centre to centre, laid on rounded longitudinal deal bearers 3in. by 2in., which are to be placed one under each "flute" or corrugation. The zinc to be laid without solder with strong holding-down clips, allowing free expansion and contraction of the sheets; with solid unsoldered ridge-plates, and solid unsoldered stopped ends to the "flutes."

X. 12. **LEAD SADDLE-PIECES.**—Wherever a tile ridge runs into a sloping roof below the ridge of the latter, provide and fix a saddle-piece of 4lb. lead, containing 5 superficial feet dressed to fit the slope of the higher roof, and to go under its slating, and at the same time to be covered and concealed by the lower ridge tiles, to the underside of which it is to be fitted.

X. 13. **INTERNAL PLUMBING: GENERAL DIRECTIONS.**—Everything connected with the water supply and service is to be done in strict compliance with the rules of the..... water company. The contractor is to inform himself of these rules before executing the work, and no charge will be allowed for any alterations in the work which he may have executed, if these alterations have been required in order to set right departures—whether accidental or intentional—from the company's rules. Give the requisite notice to the company that they may lay on the water, and pay their fees, if any; and provide for, or pay fees for, watching, lighting, and making good roads, pavements, paths, boundary walls and fences, and anything else disturbed or injured by laying on water from the main, and by any other part of the plumber's work.

X. 14. **LEAD PIPES AND JOINTS.**—All lead

pipes and joints as to which the water company may have made rules, are to be of the sizes and weights and quality, as regards the pipes, and of the nature, as regards the joints, which the company's rules may require; and all fittings as to which the company may have made rules are to be of the kind specified by those rules. The clauses in this specification are to be followed in all cases in which the company's rules do not contravene them; and if in any case the directions of this specification should conflict with the company's rules, or with the rules of any local board or other public authority, the contractor is to call the architect's attention to the fact a reasonable time before the work has to be done. Subject to this proviso, the weights corresponding to the internal diameters of the lead pipes are to be as follows; that is, ½in. pipes are to weigh 7lb. per yard run, ¾in. pipes 11lb., 1in. pipes 15lb., and 1½in. pipes 18lb. All underground pipes, outside the building, are to be at least 2ft. 6in. below the finished surface of the ground [and are to be laid on and surrounded for the whole of their underground length, by powdered wood charcoal, in a train averaging 6in. square in section]. All joints in pipes, including those to taps and brasswork, if not specially described otherwise, are to be carefully executed and perfect "wiped" soldered joints. The plumber's work throughout is to include all materials, such as solder, wall-hooks, nails, tacks, screws, and everything else necessary for its execution in a thoroughly sound and workmanlike way.

X. 15. **COURSE OF THE SUPPLY-PIPES.**—The water is to be laid on from the main with ¾in. pipe to the cistern "A." [Put at the point marked..... on this pipe, between the main and the first cistern, a ¾in. branch with a ¾in. high-pressure brass bibcock of Lord Kelvin's patent form.] The water is to be laid on to cistern A with a ¾in. high-pressure ball-valve of the "Croydon" pattern with copper ball, with screw ferrule. Put to this cistern a 1½in. overflow, carried through the wall, and discharging [on the..... roof]. From cistern "A" lay on the water with [lin.] pipe to cistern "B" with [Tyler and Co.'s 1in. patent ball-valve and best copper ball], and put to cistern B a 1½in. overflow pipe, discharging..... [over the head of a rain-water pipe.]

X. 16. **COURSE OF THE SERVICE PIPES.**—Lay on the water from cistern "A" with ¾in. pipe to the apparatus and boiler supplying the bath. Provide the sum of [fourteen pounds] for pipes, cylinder, and other materials and labour to be used in warming the bath, and supplying hot water to the lavatory and housemaid's closet. In addition to this, provide and fix where directed, in connection with, and as near as possible to, the range boiler a [Turnbull's] ½in. gunmetal dead-weight safety-valve adapted for a [30ft.] [50ft.] head of water, and costing p.c. [22 shillings] [25 shillings], also lay on the water from cistern A to [the scullery sink] with ¾in. pipe, and a strong ¾in. brass bibcock of Lord Kelvin's pattern.

From cistern B lay on the water with ¾in. pipe, and ¾in. branch to the waste-preventing cisterns of the [two w.c.'s], and with a ½in. pipe to the [ground-floor lavatory]. Lay on the water with ¾in. pipe from the same cistern to the housemaid's closet, with strong ¾in. brass bibcock as before specified, and with ¾in. pipe to the bath.

X. 17. **STOPCOCKS.**—Form as near as possible to the point where the supply-pipe from the main enters the ground belonging to the premises, a shaft of 4½in. brickwork in cement, with footings resting on a bed of cement concrete 2ft. 6in. by 2ft. 6in. by 9in. and with a 3in. sawn York cover. This shaft is to be 14in. by 14in. inside, and is to be carried deep enough to let the ¾in. supply pipe from the main pass through the lower part of it resting on the concrete. Provide and fix on the ¾in. pipe, inside the brick shaft, a ¾in. high-pressure, loose valve gun-metal stop-cock of "waterworks" pattern, with crutch key. Immediately below each cistern, in an easily accessible position, fix on each service-pipe which leaves that cistern a strong screw-down stop-cock of the same diameter of the pipe, and with turned ends. Fill the brick shaft above described with hay.

X. 18. **HOT-WATER SUPPLY (ALTERNATIVE).**—All pipes for the hot-water supply are to be the best wrought-iron, galvanised, welded steam-tubing, with all necessary tees, bends, connections, and angles jointed in red-lead cement. Provide and fix where directed a [Bolding's] galvanised wrought-iron circulating cylinder, fitted with wrought-iron flanges, of the size holding

[40] gallons, and of 14 gauge iron [½in. plate]. Properly connect this cylinder to the boiler by inch flow and return pipes. Carry up from the cylinder, to discharge [on the roof] at a point approved by the architect, and above the level of the cold-water cistern which supplies the boiler, a ½in. expansion pipe, and put a short T-piece to the outer end of the expansion pipe. From the return pipe between the cylinder and the boiler lay on the water with ¾in. pipe to the bath, and with ¾in. branches from it, and ¾in. best screwdown brass bibcocks to the scullery sink and the housemaid's sink; also with ¾in. pipe and [Tyler's] ¾in. electro-plated, non-concussive, self-closing tap to the lavatory.

X. 19. **LAVATORY.**—Provide and fix in the lavatory a white glazed cabinet table, 26in. by 20in., with basin 16in. in diameter; fit it with plug and disappearing chain, and with 1½in. overflow to discharge..... and fix to the lavatory a 2in. S-trap with screw-cap for inspection, fixed immediately under the plug-hole, and a 2in. lead waste-pipe continued from this trap to discharge over a short piece of channel-pipe leading to a gutter at.....

X. 20. **LAVATORY (ALTERNATIVE).**—Provide and fix in the lavatory where shown, a complete lavatory apparatus, to be selected by the architect, value [60s.] p.c.—and properly connect with four lead supply, overflow, and waste-pipes of the sizes suitable to it, taking the overflow and waste-pipes down to discharge over.....

X. 21. **HOUSEMAID'S SINK.**—Provide and fix where shown in the housemaid's closet, a [Bolding's] square stoneware slop sink, with plain slate skirtings, flushing and draw-off valves, earthenware basin and trap, p.c. [50s.], and properly connect the trap, so as to be quite airtight, with a stout [glass-lined] cast-iron soil-pipe continued down to the ground-floor level, and discharging below the grating of the trapped gully marked on [ground plan] [plan of drains.]

X. 22. **SCULLERY SINKS.**—Provide and fix where shown in the scullery, on strong galvanised wrought-iron bearers, an [Adam's] highly-glazed white Belfast sink, 33in. by 18in. by 7in., outside measurement, with 1½in. overflow and union with elbows, and ¾in. brass grating to waste, with 2in. trap with cone inlet and screw cleaning eye immediately beneath, properly connected to a 2in. lead waste-pipe, and discharging over the grease-trap indicated on the drains plan.

X. 22. **SOIL-PIPES.**—Where not otherwise described, these are to be strong, socketed cast-iron ones, 4in. in internal diameter [glass enamelled inside] [protected inside and out by the Bower-Barff process]. All their joints are to be run with melted lead, and well caulked, so as to be perfectly airtight. Soil-pipes are in all cases, unless specifically directed otherwise, to be carried down outside the building, and fixed by strong clips. The bottoms of them are to be connected with the drains by 4in. stoneware lens, firmly bedded in concrete, the junction of the iron and the stoneware being formed with neat Portland cement. The soil-pipes are to have all necessary cast bends, junctions, and branches, and when of 4in. internal diameter are not to weigh less than 54lb. to the 6ft. length. The head of every soil-pipe is to be carried up above the walls of the building [as directed on the drains plan], and finished with a conical galvanised iron cap on galvanised iron brackets. All soil-pipes must be left free from cracks and flaws.

X. 23. **VERTICAL WASTE-PIPES.**—Waste-pipes for baths and lavatories situated above the ground story are to be stout 3in. cast-iron socketed pipes with airtight joints run with lead and caulked. A neat cast-iron hopper-head, approved by the architect, is to be attached to the top of each, and a similar head, with 3in. curved branch to the vertical pipe, is to be fixed where any waste-pipes below the highest one discharge into the vertical waste-pipe. The vertical wastes are to discharge over open-trapped gullies [as shown on the drains plan].

X. 24. **FLAP-VALVES TO OVERFLOW PIPES.**—Every overflow pipe from a lavatory, bath, or safe is to have a copper-hinged flap-valve at its outer end.

X. 25. **VALVE W.C. APPARATUS.**—Provide and fix in the w.c. at..... a [Hellyer's patent pedestal Optimus] valve closet, with flushing-rim basin and table top in one piece of white ware, white-ware valve-box and vent-arm, ebony knob, and brass guide pull, and white-ware inclosure; including 1½in. supply valve and patent cast anti-D trap, with mahogany French-polished rim-seat, back rail and skirting; the seat

clamped and hung to back rail with brass hinges, including rubber buffers for fixing under seat. Provide and fix to this w.c. a galvanised cast-iron double-valve water waste-preventing cistern for giving flush and after-flush, with two cranks and copper wire. Properly connect the trap of the w.c. to the soil-pipe.

X. 26. WASH-DOWN W.C. APPARATUS.—Provide and fix in the w.c. at a pedestal hygienic wash-down w.c. apparatus, with closet-basin and trap in one piece of white ware, with socket vent-arm and vertical spigot outlet; and provide and fix to this w.c. a patent cast-iron painted angle-siphon cistern with ball valve, overflow and chain-pull—three-gallon flush. Put to the w.c. a mahogany French-polished rim-seat, back-rail, skirting, the seat stayed with iron rods and hung with brass hinges, and two rubber buffers for fixing under the seat. Properly connect the trap of the w.c. to the soil-pipe, and connect the bent arm, so as to be perfectly airtight, with a lead anti-siphonage pipe of the same diameter, passing through the wall, and returned into the soil-pipe at a point above the level of the highest w.c. apparatus which is connected to that soil-pipe.

X. 27. JUNCTIONS OF LEAD TRAPS WITH IRON SOIL-PIPES are to be made by securing a strong brass ferrule to the lead trap near its outlet by means of a wiped solder-joint, the lead being dressed back over the lower edge of the ferrule, placed in the socket of the iron soil-pipe, and then run with lead and caulked. Junctions of stoneware traps with iron soil-pipes are to be made by inserting the end of the trap into a proper socket, cast on the soil-pipe, and making the joint good with neat Portland cement. The lead anti-siphonage pipes are to be joined to iron soil-pipes by means of a brass ferrule and melted lead, as above described for lead traps.

X. 28. URINALS FOR DOMESTIC USE.—Provide and fix [in the lavatory] an [Adams's patent insulator corner urinal] in highly-glazed earthenware, white, with pillar, brass outlet grating and trap, and brass flushing nozzle, with two-gallon automatic urinal flush-tank, the trap of the apparatus connected with a 3in. glazed stoneware drain passing through the wall, and discharging below the grating of the trapped gully shown on drains plan.

FACTORY CONSTRUCTION AND FACTORY ACTS.—XI.

By GEORGE H. BIBBY, F.R.I.B.A.

FACTORY DINING-ROOMS.

IN connection with many factories and workshops, it has been found convenient, in the interests of both employers and employed, that suitable apartments should be provided for the purpose of enabling the workpeople to take their meals without the necessity of leaving the premises. Frequently attendants are provided, who either prepare the meals entirely or who take charge of the food brought by the workpeople from their homes. In these cases, and where large numbers of workpeople are engaged, a kitchen and offices, in addition to a dining-room, are sometimes provided.

The Factory and Workshop Act, 1878, Section 39, provides that no child, young person, or woman shall be allowed to take a meal or to remain during the times allowed for meals in certain parts of factories or workshops—that is to say, in the case of glass-works in any part in which the materials are mixed; in the case of glass-works where flint glass is made; in any part wherein the work of grinding, cutting, or polishing is carried on.

In the case of lucifer-match works, meals may not be taken in any part in which any manufacturing process or handicraft is usually carried on, except where wood is cut.

Meals may not be taken in earthenware works in any part known or used as dipper's house, dipper's drying-room, or china-scouring room.

But in addition to the special restrictions above mentioned, other factories or workshops may become subject to like prohibition, for where it appears to a Secretary of State that by reason of the nature of the process in any class of factories or workshops, or parts thereof (not named in the special restrictions), the taking of meals therein is specially injurious to health, he may, if he thinks fit, by order made under the provisions of the Factory and Workshop Act, 1878, extend the prohibition accordingly, to include such further factories and workshops.

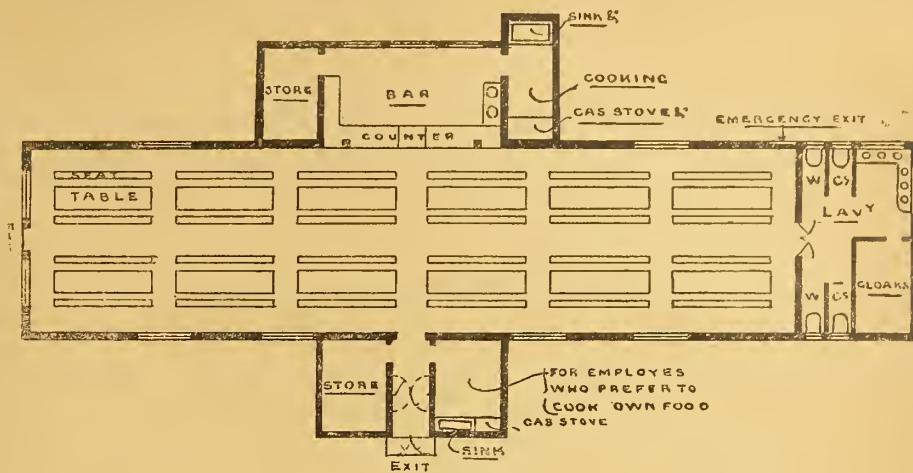


FIG. 22.

In a very large number of factories no provision whatever is made for the heating or cooking of the food brought in by the workpeople, and they are either turned out of the factory at meal-times, or contrive to warm their food at gas-jets, in the boiler-room, or in any other makeshift manner that may occur to them.

In other factories a gas cooking-stove is often provided in the basement, or in some store-room or passage, and the workers may, or may not, have an attendant to watch the heating of their

may be convenient. But for the benefit of those who find it more economical or convenient to bring their own food and cook it themselves, a special room is here provided. The advantages of the plan shown in Fig. 22 include a central arrangement of the bar by which the food would be distributed much more conveniently than in the plan shown on Fig. 23, where the bar is at one end of the room.

In Fig. 24 a not uncommon arrangement is shown, but it is a manifestly undesirable one upon

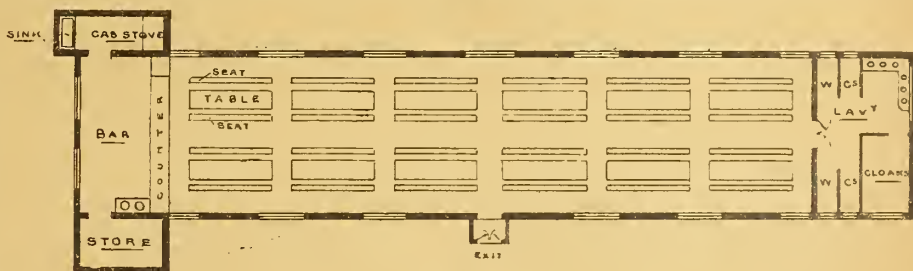


FIG. 23.

food, which is consumed in any waiting-room, store-room, or other place permitted by the employers, no dining apartment being provided.

A very common arrangement, however, is the provision, by the employers, of a room (with narrow boards for tables and benches on each side) where the workpeople are very closely crowded, and which has to serve as kitchen, scullery, and dining-room, all in one, to the great discomfort of those concerned, especially in hot summer weather. Apartments planned by an architect in this manner are, however, regrettable on other

account of the manner in which the cooking range is intruded directly upon the seats occupied by the workpeople, and which arrangement would be objectionable, especially in the summer months. In Fig. 25 is shown a further arrangement for a dining-hall, also for 144 persons. Here the arrangements show the range space for cooking as forming a portion of the apartment occupied by the diners; but the scheme is obviously inferior to that shown in Fig. 22.

In these four arrangements apartments would

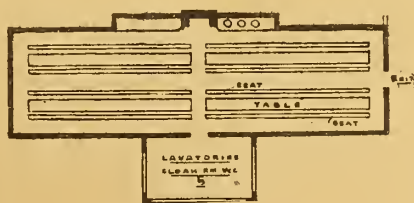


FIG. 24.

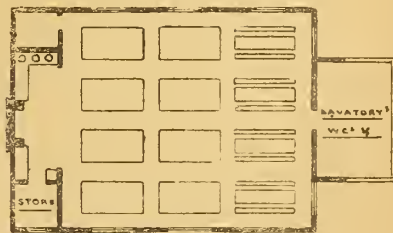


FIG. 25.

grounds, for the workpeople under such circumstances become listless and inactive and less profitable to their employers. There can be no doubt that workpeople are, to a great extent, neglected in this matter (especially in the larger towns), and that in some factories the bare floor boards afford the seat for the meal and the couch for the mid-day rest, and this I have observed to be the case both for males and females.

In Fig. 22 is shown a plan for a dining-room for 144 workpeople, in which ample space is provided for the passage of the attendants to and from the bar, from whence the food is brought. Under this scheme it is supposed that the workpeople either pay daily for which they require, or otherwise join in with an arrangement under which their employers provide the meals and charge their workpeople at each week end, or as

be provided: stores, lavatories, cloakrooms, water-closets, &c. Usually (for reasons of economy) long benches are provided; but these are unsuitable for females, for whom chairs should be obtained.

In Fig. 22 the exits are intended to open outdoors, as for other factory buildings, so as to secure proper means of escape in the event of fire or panic; indeed, many of the factory dining-rooms are so situated and so frequently overcrowded that every precaution in respect of the exits is most necessary.

(To be continued.)

A choir vestry is to be added to Bushey parish church at a cost of £450, from plans by Mr. C. H. Rew, of Great Berkhamstead.

THE GREAT MOSQUE OF THE OMEYYADES, DAMASCUS.

At the ordinary meeting of the Royal Institute of British Architects, held on Monday evening last, the President, Professor George Aitchison, A.R.A., in the chair, a paper on this grand mosque, now destroyed, was read by Mr. R. Phené Spiers, F.S.A. A large number of ladies and other visitors were present. In his introductory remarks, Mr. Spiers mentioned that, when travelling in 1866, as the holder of the Grand Prix de Rome, he was accorded a special permission to draw inside the mosque, and had, therefore, in his possession, illustrations of the great dome and other features hitherto unpublished. The destruction of the mosque by fire on the 14th October, 1893, led him, in February in the following year to take up the subject in order to solve, if possible, the problem which has exercised the minds of many archaeologists—viz., the determination as to what part, if any, of the mosque belonged to the church of St. John, commenced by Theodosius in the middle of the fourth century (who utilised the remains of a Roman temple), and enlarged by Arcadius, his son, at the beginning of the fifth century. Mr. Spiers first described the mosque itself, the main building of which runs east and west, and is built in between two ancient towers at the south-east and south-west corners respectively. The mosque measures internally 446ft. by 123ft. Exactly in the centre is an immense transept running north and south, with a dome over the crossing and on each side—viz., to the east and west; a nave and aisles, or, more strictly speaking, three aisles (for the divisions are of equal dimensions), 180ft. long. The north and south transepts have horizontal ceilings in wood carried on beams supported on corbels, all richly carved, painted in brilliant colours, and gilded. The dome on the crossing, which is of stone covered with lead, is carried on squinch pendentives; the nave and aisles to the east and to the west of the transept are divided each by an arcade of eleven bays, with columns taken from some more ancient edifice raised on octagonal pedestals, and surmounted by Roman capitals and Byzantine dosserets. Above the arcades the walls are pierced with semicircular arched openings. Similar openings of the same size run the whole length of the mosque in the north and south walls, being there fitted with pierced Arabesque designs in stucco filled with stained glass. On the north side of the mosque is the great court, of the same length as the mosque, and 160ft. in depth, surrounded with an arcade with openings above, similar in size and design to those already mentioned in the nave and aisles. Externally, the mosque is of the simplest design. The walls are all built in ashlar masonry in courses varying from 2ft. 9in. to 3ft. in height. The windows are all circular-headed, and of equal size. The transept rises 30ft. above the walls of the two wings, and has a low-pitched gable on the north and south fronts, with a single bold ogee moulded cornice. There are three minarets, two of them built on the ancient towers between which the mosque was erected. The principal entrances are the triple gateways with bronze doors on the east and west sides, which lead into the great court. In front of the east and west gates there existed a double colonnade, the remains of which are built in the shops at the sides, and at the west end of the western colonnade is a magnificent archway, the greater portion of which still exists. Forming part of the south wall of the mosque are, first, the two towers before referred to, one of Syrio-Greek work, the other Roman or Byzantine; and, secondly, the great doorway of the Roman temple which served as the entrance to the church of St. John, and was used afterwards by both Christians and Moslems when the church was divided into two portions. After a detailed description of the chief historical events connected with Damascus, Mr. Spiers, relying on Mr. Guy le Strange's admirable translation of the works by the Mediæval Arab geographers, proceeded to trace the history of the mosque from the time when it was entirely rebuilt, in 705, by the Khalif Al Walid, down to the present day. The conclusion arrived at by Mr. Spiers is that Al Walid first pulled down the ancient church of St. John and then built the existing mosque, which is virtually the same now, subject to restorations of the north minaret, and the addition of two others, to the cementing over of portions of the exterior stonework damaged by the fires of 1069 and 1405, and to the encasing of some of the columns of the great court. In conclusion, Mr.

Spiers described the remains of Roman work existing round the mosque, drawing especial attention to the great gateway on the west side, which he considered to be the portal of a Roman palace no longer existing, and as much older than the well-known arch leading to the Palace of Diocletian at Spalatro. The paper was illustrated by plans, sections, and elevations of the mosque, mainly derived from his own drawings and from photographs, and based on the plan measured by Sir Charles Wilson, and published in Fergusson's "History of Architecture"; by drawings made in 1866; and by numerous large photographs taken before and after the fire in October, 1893.

In proposing a vote of thanks to Mr. Spiers, Mr. HOLMAN HUNT remarked that when he was in Damascus in 1854 it was quite impossible to make observations within the great Mosque, although he looked with longing eyes on that remarkable building. He had never been able to satisfy his desire to see the interior until that moment, and cordially thanked Mr. Spiers for his paper and illustrations. Col. WATSON, who seconded the motion, agreed with the lecturer that the Caliph Al Walid destroyed, and indeed gutted, the ancient Christian church, the only remains left of that structure being the foundation of the south wall and the beautiful gateway in its centre, although the old pillars and other materials were doubtless utilised in the reconstruction. The former building was probably Orientated east and west. He could not agree with Mr. Spiers's conjectural location of the temenos walls of the former temple.

Mr. HENRY C. KAY referred to an interesting description of the mosque by a 14th-century Moorish traveller, agreeing generally with the existing work, which was obviously Arabic in style, and was certainly not derived from Egyptian sources.

Lieut.-Col. LENOX PRENDERGAST also supported the vote of thanks, which was carried by acclamation, and was acknowledged by Mr. Spiers.

SUSPENSION BRIDGES—A STUDY.

By GEO. S. MORISON, Past-President Am. Soc. C.E.

(Continued from page 700.)

DURING erection a much greater motion may be required, especially if no temporary supports are put in for the backstays. A greater motion can be obtained, without overstraining the metal, in two ways: By omitting the permanent diagonal bracing and putting in timber bracing, which can be so wedged as to bend the tower; and by inserting hydraulic presses in the castings

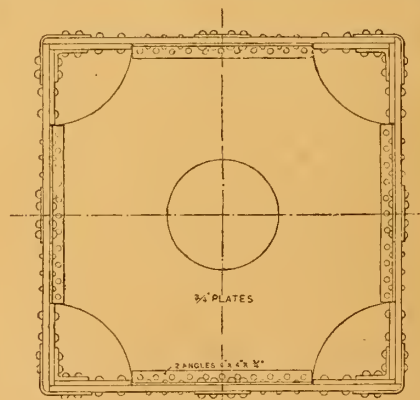


FIG. 14.

under the posts next to the river, so that the whole tower can be thrown out of plumb. The section of each post varies from 1,051sq.in. at the top to 1,145sq.in. at the bottom. Each post is 8ft. square, and the details of construction are shown in Fig. 14. This post is divided into quarters and made in sections, each 24ft. long, breaking joint with these sections, so that there would be one horizontal quarter joint every 6ft. Each quarter-section 24ft. long would weigh less than 12 tons, a weight which can easily be handled. All the heavy riveting around the corners would be shop driven, and it is proposed to use 1½in. rivets for this portion of the work. The splices at the joints, both vertical and horizontal, would be field-driven, ¾in. rivets being used in these places, and could, if necessary, be hand-driven. At

intervals of 24ft. diaphragms would be built in each post, these coming opposite one of the joint (as shown in the intermediate section in Fig. 14),

BILL FOR ONE-QUARTER POST SECTION.

1	Plate, 48in. x 1½in., 24ft. long.
1	" 46½in. x 1½in., 24ft. long.
1	" 22in. x 1½in. to 1½in., 24ft. long.
1	" 21in. x 1½in. to 1½in., 24ft. long.
1	Angle, 9in. x 9in. x 1in., 24ft. long.
1	Corner Plate, 25in x ¾in., 24ft. long.
2	Splice Plates, 15in. x ¾in., 24ft. long.

the function of these diaphragms being the same as that of the diaphragms in a bamboo rod. At the top two extra cross-webs would be built into the post to support the steel casting. At the bottom the post would rest on a large casting. For convenience of inspection, a hole is made through the middle of each diaphragm, and a series of ladders would reach from diaphragm to diaphragm, by which inspectors could pass through the whole interior of the post, a manhole being placed near the base, through which they could enter. At the bottom each post would be held down by an anchor-bolt at each corner, though this is hardly a necessary provision. These posts have been carefully estimated in detail, the weight of one post being 2,182,000lb., or 8,728,000lb. for the four, including diaphragms, ladders, and everything else. At the top the four posts are connected by girders 31ft. deep, there being two girders on each longitudinal side and one on each transverse side. The depth of these girders is fixed by the riveted connection between the double girders and the posts, this connection being necessarily long enough to transfer the whole strain from the vertical bars to the post. These six girders are estimated to weigh 264,000lb. The tower is braced on each side between the four posts, this bracing being divided into six panels, the second panel from the bottom corresponding in height to the depth of the stiffening truss, this arrangement being adopted so that the wind strains can be thrown from the stiffening truss into the tower at the panel points of the bracing. The arrangement of this bracing is given in Fig. 15. Above the stiffening truss the bracing has comparatively little to do, and is made in the form of a single web with broad angles on the edges. From the top of the stiffening truss downward, where the wind strain is to be resisted, the bracing is double webbed and materially heavier. At the bottom of the floor posts are tied together by heavy riveted ties, which pass outside the posts, but form the bottom member of the bracing. The weight of the bracing for one tower complete has been estimated at 2,389,000lb. The towers are connected at the top by a light lattice truss bridge, which has comparatively little work to do, but which will add to the lateral stability, and be a convenience, both during erection and afterwards. This truss bridge complete is estimated to weigh 98,000lb. or 49,000lb. for each single tower. Each post rests on a large bottom casting, which should be made of steel. This casting would be made in four principal parts bolted together, and should be machined to a true plane on the bottom, as the pressure on the bottom will be 1,000lb. per square inch. This casting, together with the anchor bolts, is estimated to weigh 130,000lb., or 520,000lb. for each tower. The total weight of the structural portions of the tower will then be as follows:—

Posts.....	8,728,000lb.
Girders.....	264,000 "
Bracing.....	2,389,000 "
Truss.....	49,000 "
Castings and anchor bolts.....	520,000 "
Total.....	11,950,100 "

As there will be four of these towers, two at each end, the total weight of metal in the towers will 47,800,000lb. This entire work should be open-hearth steel of the quality ordinarily used for structural purposes. The sections are so heavy that the edges would all have to be planed, and it would all be solid drilled work; special machinery would be required for its manufacture, but the order is so large that the cost of this special machinery when averaged over the whole work would be no greater than the wear of ordinary tools. In open competition this work ought to be let for a very low price per pound; if estimated at 4 cents per pound, three results for the cost of the towers 1,912,000dol. Fig. 15, showing the general elevation and tower, shows the tower as finished with a room about 50ft. square on top, surmounted by ornamental work terminating in a flagstaff. This covered

room is necessary to house the cable connections, but as the floor of this room will be 560ft. above the water, or nearly twice as high as any structure now existing in New York City, and higher than any structure in the world except the Eiffel Tower, a considerable revenue could probably be derived by providing elevators and taking visitors to the top of the towers. As the elevators and housings on top of the towers do not form a portion of the structural work, they are not included in the estimate.

Foundations.—The average depth from mean high water to rock at the site of each tower is assumed to be 140ft. In order to prevent any possible disturbance from expansion and contraction of transverse members at the feet of the metallic towers, it is thought best to rest each post on an entirely independent foundation. There would, therefore, be four independent foundations under each tower, or eight on each side of the river, making sixteen in all. Of these the two centre ones next the river, on each side, would have to support the reaction of the stiffening truss as well as the weight of the tower post, and they are therefore made larger than the others.

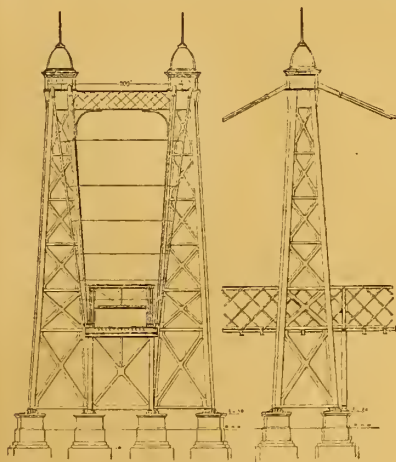


FIG. 15.

The plan of half of the tower foundations is shown in Fig. 16. Each separate foundation consists of a masonry pier of granite 58ft. high, 28ft. above mean high water, and terminating at the base at an elevation 30ft. below mean high water. It is proposed to make these piers of an exceptionally good class of masonry, and to allow a maximum pressure of 20 tons per square foot on the granite, and of 1,000lb. per square inch on the under side of the casting which supports the tower. While these pressures may seem excessive, it must be remembered that good granite has a crushing strength of over 20,000lb. per square inch, and that the pressure in the central section of the East River Bridge towers, at the level of the roadway, is 28 tons per square foot. The masonry pier for each of the smaller foundations contains 2,700c.yds., and that for the larger foundations 3,900c.yds. Estimating this work at 30dol. per cubic yard, the masonry for the smaller foundations becomes worth 81,000dol., and for the larger foundations, 117,000dol. Each of the smaller foundations would rest on a cylinder 60ft. in diameter, and 110ft. high, thus containing 311,000c.ft., or, say, 11,500c.yds. Each of the larger foundations would rest on a cylinder 70ft. in diameter, thus containing 423,330c.ft., or, say, 15,700c.yds. If the cost of this portion of the work is estimated at 20dol. per cubic yard, the cost of each of the smaller foundations becomes 230,000dol., and that of each larger foundation 314,000dol. The cost of each of the smaller piers complete, including both masonry and foundations, becomes 311,000dol., and of each of the larger piers, including both masonry and foundations, 431,000dol. As there are at each end of the bridge six of the smaller piers and two of the larger, the cost of the substructures of each of the double towers will be 2,728,000dol. The total cost of the foundation for the towers on both sides of the river will then be 5,456,000dol. This estimate is believed to be at least 1,000,000dol. more than the actual probable cost of such work, but this paper is dealing with the general subject of a suspension bridge, and precise estimates of the subaqueous portion really pertain to more specific subjects. The pressure on the bottom of the

foundations, after deducting the weight of the material displaced, and estimating the weight of a cubic foot of masonry or foundation at 150lb. in air, 87lb. in water, or 50lb. in mud, is 9,304 tons per square foot for the smaller, and 9,306 tons for the larger.

Anchorage.—The anchorages at each end of the bridge would be divided into two parts, each of which anchors two cables, the position of these anchorages being shown in Fig. 1. The anchorage has no duty to perform except to provide weight, and may be built of a very cheap class of masonry or of concrete. Any class of work which is entirely free from voids and weighs at least 140lb. per cubic foot, or 3,780lb. per cubic yard, will answer this purpose. The exposed sides of the anchorages should be faced with a good class of masonry; brick would answer, but granite would be more in keeping with the massiveness of the work. The top will not require a coping, but should be covered with Portland cement concrete or some form of pavement which will keep out water; there is no reason why buildings should not be erected on top of the anchorages. There will be two tunnels running through each anchorage, each of which should be lined with brick, and be large enough for convenient inspection of cables, and perhaps also for running a carrier during erection. At the lower end of each cable there will be a room in which the detail connection is placed, and it will probably be expedient to have some kind of a staircase placed in a small shaft by which these two rooms can be reached. The bearing of the castings must be taken on granite masonry of very high quality, the pressure on the bottom of the castings being 1,000lb. per square inch, and enough of this masonry has been provided to reduce the pressure on the cheap masonry to 250lb. per square inch. Each anchorage would consist of a single block of masonry, a longitudinal section of which is given in Fig. 8. It is 180ft. long, 130ft. wide, and the top finishes at elevation 155, this being the elevation of the rails. The horizontal distance from the theoretical intersection on the top of the tower to the theoretical intersection at the bottom of the anchorage is taken as 1,200ft. The lower intersection is assumed to be at elevation 60, so that the vertical difference in height between the two intersections is 500ft. The volume of material above the theoretical intersection point is 2,223,000c.ft., which, at 140lb. per cubic foot, weighs 311,220,000lb. The angle at which the cables take hold of the anchorage is one vertical to 2.524 horizontal. The vertical lift will, therefore, be 31,695,721lb. Taking this from the weight of the anchorage, the weight left to resist the horizontal pull is 279,524,279lb. Assuming a coefficient of friction of 60 per cent., the frictional resistance of this weight is 167,714,567lb. Dividing this last quantity by 80,000,000lb., the assumed horizontal strain in cables gives a factor of stability of 2.09. This is without taking into consideration the strength of the additional anchorage in the rock below, nor including the weight of any buildings or other structures which may be erected on top of the anchorages. The quantity of masonry in each anchorage above the points of intersection is 2,223,000c.ft., or 82,333 cubic yards. As, however, the foundation may be below the assumed level of the intersection, this masonry is estimated as 100,000 cubic yards. The greater part of this would be concrete or a cheap

class of masonry, but 1,375 cubic yards will be high-class granite work. Estimating the whole mass of masonry at 6dol. per cubic yard, and adding 44dol. per cubic yard (making a total cost of 50dol.) for the high-class granite work, there results as the cost of one anchorage 660,500dol. There will be two anchorages at each end of the bridge costing 1,321,000; the total cost of the anchorages at both ends of the bridge will, therefore, be 2,642,000dol.

(To be continued.)

THE TRADES TECHNICAL SCHOOLS.

THE work done at these schools of the Worshipful Companies of Carpenters, Joiners, Bricklayers, Plasterers, and in connection with the British Institute of Wood Carvers, was open to inspection last Tuesday evening, at the Great Titchfield-street Schools. Professor Aitchison, A.R.A., president of the R.I.B.A., presided, and made a tour of the workshops with Professor Banister Fletcher, F.R.I.B.A., chairman of the judging committee, and several of the promoters. Since our last notice of the work some great progress has been made, and there are 285 students with an average attendance at the classes of 405 per week. A new class for pattern-making has been established, and several scholarships introduced to enable students to pursue their studies. Professor Aitchison, in his introductory remarks, dwelt on the necessity of promoting a desire for beauty as well as maintaining their reputation for excellence of workmanship. The tendency of the day to do things cheaply, and to imitate rather than aim at excellence, was partly the cause of so much inferior work. Proceeding to inspect the various workshops in which all the students were at work, Professor Aitchison gave a word of encouragement and advice to each of the classes.

The bricklayers' workshop was one of the first inspected. The first prize has been awarded to G. Fry, and the second to G. Reed, while a certificate is given to J. Carr. The first prize was given for a model of pedestal and base of column in gauged work, admirably executed, and the certificate is awarded for a gauged segmental and flat arch. A special prize is awarded to A. Charton, who won the first prize last year. The second prize subject—corbelling in moulded and rubbed work to an oriel—elicited attention for its excellence and neatness of finish. The president drew attention to the value of the fillet to divide two curves, which were here juxtaposed. We may remark the "rubbers" used are from Bracknell, and are made by T. Lawrence, and these, when gauged and set in putty, make excellent work. The processes of rubbing were shown; a Gothic arch with splayed inner opening was another work. The carpenters' work is improving, and the exhibits are more numerous. C. Phillips is given the silver medal and scholarship at King's College, and A. Harrington a bronze medal and scholarship. Among the work we notice trusses for roofs, partitions, &c. A student was engaged in setting out a hip with angle-tie, and fitting the rafters to the hip by finding the bevels. Another was engaged in setting out a hammer-beam roof. Several other prizes and certificates are awarded. The joiners' shop was very interesting, and many students were at work. We may notice the improved

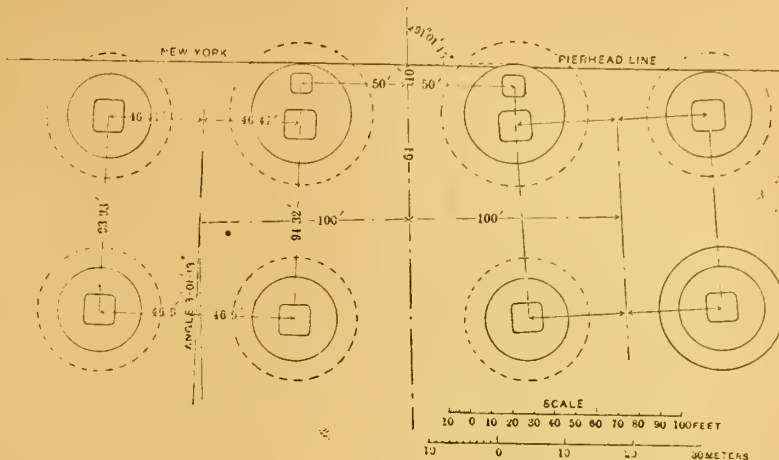


FIG. 16.

bench used, in which there are double drawers for tools, one-half being used for those working on one side, and the other half for those on the other side of bench. The silver medal and scholarship is awarded to W. Thompson, and the bronze medal and scholarship to W. Watkins. We notice several specimens of joinery: a casement frame with pivoted sash which can be easily removed, a large model of a stair with winders, executed with much care, and the well; specimens of the handrailing, a Venetian window-frame, and other examples of joinery. The masons' shop was a busy scene, many of the students being engaged in complex and intricate work. A special prize is given for a very neatly-executed model of a curved stone staircase, in which the curved surfaces, the steps, and the jointing of capping or rail, are skilfully shown. The first prize is awarded to W. Berkley and H. Haigh for a Yorkshire stone drain junction, a clever piece of work, and the second between F. Ockenden and J. Williams for a wing retaining wall of bridge, the stones all worked to the batter. One of the several certificates is given to G. Mathews for a very nicely-worked model of a groined vestibule or vault. Students were at work in various intricate operations of masonry, on stone models of curved staircases, cutting the winders, setting out and working the same, tailing of the steps into wall, also on circular work, ramps and twists, Gothic tracery cornices, straight and circular work. The smiths' shop has only been lately established, and is doing good work. We saw several good specimens of hammered work. The plumbers' work has much improved, and the judges have awarded the first prize to A. King and the second to E. G. Baddiley, for beaten lead from solid sheet—very creditable examples. The plasterers' and painters' shops were also interesting, and the work done generally is encouraging to the companies and the students themselves.

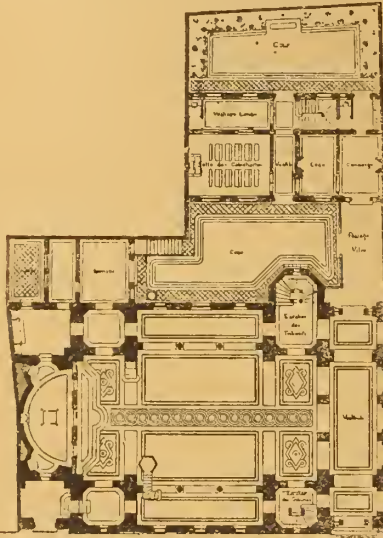
THE IRREGULAR WORKINGS OF THE WORKS COMMITTEE.

THE recent disclosure of irregularities in the accounts of the Works Department afforded subject for a heated discussion at Tuesday's meeting of the London County Council. The report stated that some grave irregularities had taken place in the book-keeping of the department. The sub-committee which had investigated the circumstances considered that there was no reason whatever to think that any actual diversion for personal profit of the money or property of the Council had taken place; but there had been, since April, 1895, frequent instances of falsely signed and bogus transfers of material from one job to another, incorrect appropriation of invoices to a job when the goods were not used, materials sent from stock and not debited to the job, and the deliberate alteration up and down of the ascertained cost of a job for purposes of so-called departmental advantage. Seven subordinate officials of the department were mentioned as having been in connivance in these reprehensible proceedings. One of them was no longer in the service of the department; the works committee recommended that five of them should be dismissed and the sixth severely reprimanded. In regard to the manager of the department, the sub-committee reported that they no longer had any confidence in him, and consider his retention of his present office highly undesirable. A report from the Comptroller, appended, stated that the necessary corrections in the accounts increased the net profit on the works concerned by £889 8s. 9d. A recommendation that the services of the manager, Mr. Thomas Holloway, be dispensed with, and that a sub-committee should be appointed to consider whether any changes should be made in the working of the department, was met by an amendment from Lord Dunraven to omit the latter, on the ground that the matter was of so serious a nature that it was desirable it should be inquired into by a Royal Commission, or the strongest select committee the Council could create. Lord Denbigh seconded this proposal, and a protracted and animated debate ensued, during which it was suggested that the officials implicated in cooking the accounts had been instigated by others. It was eventually decided to dismiss Mr. Holloway, the manager of the department. The Council then proceeded to deal with the cases of other officers implicated in the irregularities—viz., Mr. Ruddle (second assistant in the building branch), the principal clerk in the

works department, two clerks in the works department, and the travelling time inspector. The Council negatived an amendment to allow Mr. Ruddle to resign, and his dismissal was agreed to. The remaining cases were being dealt with when it was decided to adjourn the discussion.

NEW GREEK CHURCH, RUE BIZET, PARIS.

WE give herewith an illustration showing the interior of this fine building, by M. Vaudremer, architect, which he has handled with great skill. The design is grand in its proportions and rich in decorative effect, and the details



have received minute care and attention. It has been built at the cost of M. Schillizi, a private gentleman.

The church consists of nave and side aisles, with gallery above, another being placed over vestibule opposite altar. A dome is arranged over the centre of the building. The staircases to galleries are built in the piers which support the dome, and are arranged in openwork cages. The arched screen between nave and altar is of white marble richly carved, with gilded bronze grille to centre and bronze doors to side openings, all of fine workmanship. The surfaces throughout are decorated with paintings, some of these consisting of bands following the constructive lines and some symbolic, representing sacred characters on a large scale, and on a gold ground. This work is by M. Lamerre, the artist. Our reproduction is taken from a view published by the *American Architect*.

BOOKS RECEIVED.

The Gentleman's Magazine Library, edited by GEORGE LAURENCE GOMME, F.S.A. "Norfolk, Nottinghamshire, Northumberland," edited by F. A. Milne, M.A. (London: Elliot Stock). Part VIII. of this interesting collection of the contents of the *Gentleman's Magazine* from 1731 to 1868 is before us. The topographical details and family history given of these three counties are of particular interest. Archaeologically the accounts of the fine churches of Norfolk and their mural paintings, decoration, and monuments make this volume welcome. The mural paintings discovered in Norwich Cathedral in 1863, and the frescoes of South Burlingham Church, depicting costume and armour, the Norman remains, oak rood screen, and benches and pulpit of the 15th century, on which the colour and gilding remain, painted grass &c., found in the same edifice; the churches of Great Yarmouth, Griston, Kettlestone, Merton, Thetford, Tottington, Cley-next-the-Sea (one of the finest Decorated naves), the priory of Waybourne, near Cromer, all described by the late Edward A. Freeman, are of much interest. On Northamptonshire, another great county for churches and medieval remains, the notes are also of interest. We pick out notes on "Medieval Houses at Thorpe, near Peterborough," "Coats of Arms in the Churches

of Stamford," as those of Harringworth, Ufford, Barnack. The description of the latter, and notes of Brampton, Brigstock, Brixworth, Cotterstock, Higham Ferrers, Northampton, Peterborough, Thorpe Mandeville appear, many of these describing monuments, architectural details, inscriptions, historical incidents, family records, village customs, folk lore. The volume, like others we have noticed, is well printed and bound, and only lacks the illustrations to make it perfect.

—*American Sanitary Plumbing*, by JAMES J. LAWLER, plumbing expert (London: Kegan Paul, Trench, Trübner, and Co., Ltd.). This American treatise on modern plumbing is a useful manual on the "Best Methods of Plumbing," illustrated by original sketches and diagrams, and many of the recent appliances. New York practice is mainly kept in view, but the principles and practice of plumbing treated will be found to be quite up to date, and the book may be usefully studied by students and plumbers in the craft. The "Lawler System of Hot Water Circulation for Kitchen Boilers" is described, and its advantages enumerated. Although there is much that every plumber knows, Mr. Lawler's work will be useful to those who wish to acquaint themselves with modern methods. —*Farm Buildings*, by W. J. MALDEN (London: Kegan Paul, Trench, Trübner, and Co., Ltd.). is a practical little treatise on farm buildings and agricultural appliances. The author very justly exposes the folly of building very large homesteads in these days, when so many large blocks of buildings are standing idle on unlet farms. No doubt there is an attractiveness in a large homestead and imposing range of buildings, and more architectural effect can be obtained. Mr. Malden is an advocate for dividing the homestead, and for erecting such buildings as may be necessary to suit the circumstances, or altering existing buildings to make them suitable to modern wants and changes in cropping and stocking. There are buildings not absolutely required, as the threshing barn, owing to the disuse of the flail, and the value of open-air stacked corn; the root houses, liquid manure tanks, &c. Feeding passages at the heads of animals are not recommended, and the author thinks space behind them for tram-lines for conveying food is more desirable. The author gives a capital mode of head-feeding from the outside, the food being conveyed through shutes opening on the outside, allowing the food to fall into the manger, an economical plan. Large yards are condemned. One cannot here discuss the author's plans, but may state that he gives outline plans for homesteads on farms of 400, 200, and 50 acres, arrangements which have much to commend them, though exceptions will be taken to some of the details. The yards with cow-byres or open hovels are small. Good positions are assigned to the dairy on the north side, which is isolated as a range, and not in connection with the other sheds, and the stables on the south-east corner are in a good place. Covered yards and temporary buildings are next considered. Wooden roofs, we are glad to find, are recommended as cheaper, and the author shows some simple modes of converting existing buildings to the recent changes in farming. The small holding has to be considered, and if the old homesteads can be divided into small ones, so much the better. Mr. Malden's plan is to build homesteads that will admit of this division into several holdings, and his suggestions will be found useful. Another chapter deals with machinery on farm buildings and power, implements for tillage, cottages, and other appliances. —*A Practical Manual of Building Societies*, by ARTHUR FAWCETT, accountant and auditor (London: W. B. Whittingham and Co., Ltd., Gracechurch-street). The author has published a useful work on the internal working of building societies from an arithmetical point of view. Everybody connected with building societies must have desired to know something of their working. The author endorses the Chief Registrar's report that the majority of terminating societies are on the ballot system, and he shows the weak points and inequity of the plan—he calls it, in short, a system of quasi-legalised gambling. The remarks on the Bowkett and Star-Bowkett Societies are of interest, and the plan proposed for working such a society so that it terminates in 30 years instead of 60 is worth attention. The plan is illustrated by means of a repayment table. Permanent societies are next discussed, and the author shows by a table the lower rate of interest charged by these societies. The method of allotting appropriations in

terminating societies, worked on the ballot and sale system, is regarded with suspicion, and to avoid the gambling incentive Mr. Fawcett suggests a scheme for the conversion of such societies based upon sound principles which is worth consideration. The Acts of Parliament and regulations governing these societies, the code of rules and forms, &c., are useful additions to this practical guide.—*European Architecture: A Historical Study*, by RUSSELL STURGIS, A.M., Ph.D., &c., &c. (London: Macmillan and Co., Ltd.), is a work we have just received, and can hardly do justice to in this column. From a general glance at its contents and method of treatment, the author's main object is to present a general summary of architecture on a chronological basis, and to show that the history of architecture is a study of absorbing interest, to be mastered by those who study the buildings themselves. Mr. Sturgis draws attention to inherent principles of each style, rather than to superficial features, and he tries by analysis and comparison to point out differences. The illustrations are above the average; many of them are taken from Viollet le Duc, Fergusson, Choisy, and various French and other authorities, and are selected with the object of illustrating constructive methods and principles, rather than peculiarities of external architecture. On the whole, the author appears to have grasped the right method of study; which is not so much archaeological, as constructive and essential, having reference to development of vaulting, plan, and modes of construction. Thus, as he points out, the architecture of the Renaissance is mainly Mediæval in plan. There are ten plates illustrating typical examples, and the illustrations in the text are very numerous, and made by photo processes. It is one of the best of the recent introductions to the study of architecture; its aims at least are good.

—*The Engineering Magazine* (London: George Tucker, Salisbury-court). Among the interesting papers contributed to this magazine is one on "The Cantilever as Applied to Building Construction," by John Beverley Robinson. The author forecasts the probabilities of architectural design, and endeavours to show that the cantilever is an element destined to develop a new style. He observes: "The cantilever principle fulfils the requirements; it is capable of satisfactorily covering areas, and also of bridging openings, while as distinct essentially from both the lintel and the arch, it is, I believe, sufficient to eventually give birth to a new and coherent use of harmonious ornament. The principle of the cantilever, to put it paradoxically, is that you can double the strength of a beam by cutting it in two." This is shown by a diagram cut in two places, and the middle piece being only half the length of the whole beam or span, will sustain twice the load. The author shows, by extending the ends over the supports, and holding them down by another load, a roof covering is possible of great strength and span. Several applications of this principle are shown by illustrations of roof-trusses: one of the conditions is that there must be a lean to addition or extension of the truss outside the principal span, so as to form the cantilevers. Several artistic suggestions are illustrated in the course of Mr. Robinson's remarks, showing the application of this construction to large halls, exhibition roofs, the Bourse at Antwerp, door-heads, halls, &c. In stone and brick construction the cantilever principle is shown in all bracketed and corbel openings, in which two side corbels of stone support a centre piece or lintel. The Hindu development of the bracket is another important illustration which the author has not mentioned; but all readers of Mr. Fergusson's handbook know the examples he has given of this principle of roofing and covering areas. Other readable articles are to be found in this well-illustrated magazine.

—*Fuel and Refractory Materials*, by A. HUMBERT SEXTON, F.I.C. (London: Blackie and Son, Ltd.), is a useful manual for the metallurgist and engineer, dealing in a summarised and practical way with such subjects as combustion, heating power of fuels, wood, peat coal, liquid, and gaseous fuels, by-products, furnaces, &c. The larger treatises like that of Dr. Piercy are beyond the requirements of the practical man. We see the author adopts the British system of units as more useful for practical purposes. The book is full of illustrations, with well-drawn sections of the various kinds of oven for coke and other appliances and apparatus. The chapters are subdivided into paragraphs, with headings in thick type, thus facilitating reference.

OBITUARY.

WE announce with regret the death, from bronchitis, of Mr. W. A. PURDUE, A.R.I.B.A., of John-street, Adelphi. His father held a post of importance in Somerset House. His third son, William, who was born at Ringwood, Hants, was articled to Mr. S. Beazley, the well-known architect of several theatres. The office of M. J. Johnson, of the Adelphi, a designer of note and a brilliant draughtsman, next gave Purdue an impetus towards drawing, and also a desire to study on the Continent. Between the years 1854 and 1858 he spent four years abroad, in Italy mostly, bringing home a goodly collection of drawings, and a facility with the pencil which lasted through life. Numerous contributions to the pages of the *Illustrated News*, *Building News*, and other publications attest combined accuracy and taste. A labour of love to him was the painstaking copying by hand of the illuminations of the almost unique MS., Queen Mary's Psalter, better known as No. 2 B. vii., in the British Museum. He carried on a practice of a miscellaneous character for several years, and with much esteem from all, his more intimate friends especially, as one amiable and unselfish in disposition. His death took place on the 14th inst., at the age of seventy-one.

Mr. FRANCIS ALFRED SKIDMORE, one of the most active promoters of the modern Renaissance in art metalwork, has just died in humble circumstances at Coventry, at the age of 80. He was the son of Mr. F. Skidmore, of Coventry, and beginning about the year 1850, at some premises in West Orchard, he carried on the manufacture of art metal-work for a few years on a very limited scale. His connexion grew to such an extent, however, that a company was afterwards formed, and extensive workshops and a foundry were erected. At the International Exhibition of 1862 a medal was awarded to "Skidmore's Art Manufactures Company." From Skidmore's works came the wrought-iron entrance-gates to Eaton Hall, and the metal canopy which forms a part of Sir Gilbert Scott's Albert Memorial in Hyde Park; the choir-screens in Hereford, Ely, Lichfield, and Norwich cathedrals, all designed by the elder Scott; and works in iron in nearly all our other cathedrals, in over three hundred parish churches, and in eight colleges at Oxford and six at Cambridge. Ultimately the business was taken over by a Birmingham firm.

Mr. JAMES ROGERS, a well-known Welsh builder and contractor, died at Tenby, in Pembrokeshire, on the 30th ult., in the 86th year of his age. Early in the "forties" he built, under the direction of the late Messrs. Walker and Burgess, the then Trinity House engineers, the lightkeepers' residences on Caldy Island, and also the Flat Holmes Lighthouse in the Bristol Channel. On the completion of the last named he settled down in Tenby, where he built up a successful business. Some years ago he restored nearly the whole of the quaint old churches in the Hundred of Castlemartin, most of the funds for which were found by the Earl of Cawdor. He also restored the fine old church in Tenby, with those of Hodgeston and Carew, all of them being from the designs and under the superintendence of Mr. David Brandon, architect, and he executed several other works of importance. He was returned to the Tenby Town Council in 1871, and from that date up to the time of his death, for the last 14 years as an Alderman, he was an uninterrupted member of that body. He was a man of unblemished character, and his opinions carried great weight with his colleagues on the council. He commanded the respect of all who knew him, and he has passed away deeply regretted by a large number of friends.

John Anderson, a Swansea steeplejack, while engaged on Friday in repairing one of the huge chimney-stacks at Morfa Copper Works, Llandor, fell from the scaffold, a distance of 100ft., death being instantaneous.

Mrs. Palmer Douglas, of Cavers, and her cousin, Captain J. H. Anderson, have recently been investigating a tumulus at Belvidere, on the Cavers estate, a few miles from Hawick. Under a huge block of stone they found a large slab which covered a very ancient cist. In the presence of Dr. Christison the cist was opened on Friday, and found to contain a human skeleton in a state of perfect preservation. Some calcined bones and two horn pins were also found, and the whole will be forwarded to Edinburgh for examination.

COMPETITIONS.

SOUTHAMPTON.—A limited competition has just taken place for the appointment of architect to the proposed Congregational church in the Avenue. A design by Mr. James Cubitt (Cubit and Collinson, 2, Broad-street Buildings, E.C.) has been recommended by the assessor, Mr. J. M. Brydon, and adopted by the committee. It consists of a wide nave, three bays long, with narrow aisles and shallow transepts, a large west porch with lobbies and cloakrooms, an apsidal chancel adapted for a choir of 50, and a lofty organ-place. The church will be seated at present for about 600, but provision is made for future extension. It is in a Late Gothic style, with a low tower over the nave, some distance behind the western front.

CHIPS.

The Wolverhampton Board of Guardians were engaged, on Friday, for several hours in discussing the advisability of purchasing land at Perry Hall for £6,700, for the purpose of erecting a new workhouse, in accordance with the report of Mr. W. H. Ward, architect, of Birmingham. It was decided to refer the matter to a committee.

By command of her Majesty, a memorial to the late Prince Henry of Battenberg has just been erected in the Royal Forest of Ballochbuie, at Balmoral. The memorial is a mouldish of massive proportions, and constructed of red granite.

At the half-yearly meeting of the North Pembrokeshire and Fishguard Railway Company, the engineer reported that the extension line from Letterston to Fishguard, in connection with a steamboat pier at the latter place, was approaching completion, and would be ready for opening next summer.

According to the monthly report of the Labour Department the building trades continue busy, and have still further improved. The percentage of unemployed in Unions making returns is 0.9, compared with 1.3 per cent. in September, and 1.9 in October of last year. The furnishing trades are still active. The percentage of unemployed Union members at the end of October was 1.7, compared with 1.2 in September, and 1.9 per cent. in October, 1895.

At a public meeting held in the Town-hall, Belfast, on Friday evening, it was decided to erect a statue of the Queen, in commemoration of her Majesty's reign. The cost of the statue will be £5,000.

A portrait of the Master Cutler of Sheffield, subscribed for by the staff and workmen of Messrs. Charles Cammell and Co., will be presented on Saturday, the 28th inst., and will be placed in the Cutlers' Hall. A replica of the portrait will be given to Mrs. Wilson.

The Dean of Worcester unveiled and dedicated on Friday the east window erected in St. Mary's Church, Atherstone, from designs by Mr. C. E. Kempe, at a cost of £450. The lower central lights of the window represent the Nativity, and on either side are portrayed the Annunciation and the Presentation in the Temple. The three upper central lights represent the Crucifixion of our Lord, and on one side is the figure of the prophet Isaiah as representing "Prophecy," and on the other side St. Paul as "Testimony." The upper part is filled with figures of saints and angels.

The Ipswich Dock Commissioners resolved on Friday to increase the salary of their engineer, Mr. Miller, to £250, with £25 additional for office expenses.

The Strand District Board of Works received at their last meeting a letter from the estate agents of the Duke of Bedford, inclosing plans of a proposed new street leading from Catherine-street to Drury-lane. The letter stated that terms had been arranged with the rector of the parish of St. Mary-le-Strand to make the road across the playground (formerly the burial-ground), subject to a faculty being obtained for the purpose in the consistory court. The agents now applied to the Strand Board for the confirmation of the scheme for the new street, and the closing of the old courts which would have to be demolished. The application was unanimously acceded to.

The death of Mr. C. H. Stevens, divisional surveyor of the East Central Division of Shropshire, took place at his residence, Mill-bank, Wellington, at the age of 23, after a short illness, on Sunday week. Mr. Stevens was the son of the late Captain Stevens, was educated at Oswestry Grammar School, and served his articles with Mr. A. T. Davis, C.E., county surveyor of Salop, being appointed East divisional surveyor under the County Council in April, 1895, as a successor to Mr. Lofthouse. The funeral took place on Tuesday in last week, in the presence of many officials of the County Council, including Mr. A. T. Davis, county surveyor.

Building Intelligence.

BIRMINGHAM.—The High School for Girls, which has been erected on a portion of the site of the Hen and Chickens Hotel, New-street, has been opened for school purposes. The site was acquired at a cost of £18,500, and adjacent property in Worcester-street was also purchased at a cost of £13,900, in order to avoid the risk of litigation in respect of lights; but this property has not been used for the new school. Plans were prepared by Mr. J. A. Chatwin, of Birmingham, and a school affording accommodation for 300 scholars has been erected. The only portion of the building which fronts New-street is a decorative porch and a porter's room one story high, from which a corridor runs rearward for the whole length of the building, a distance of about 184ft. This corridor, which has a width of 10ft., is repeated on each story. Two staircases run from floor to roof. The building is an adaptation of the Renaissance style, in red brick, with terracotta dressings. The basement is occupied by a lavatory, a cloak-room, 31ft., and the caretaker's apartments. There is a sub-basement for the heating boilers and the stores. On the ground floor is the assembly hall, 68ft. by 31ft., and rising to the height of two ordinary floors. There is a platform at one end, and a gallery, carried upon brackets, at the other end. Five classrooms are also arranged on this floor, each about 23ft. by 20ft. On the mezzanine floor there is a library and museum, 33ft. by 26ft., private rooms, office, cloakroom, and lavatory. The next floor has eight classrooms, varying in size from 31ft. by 24ft. to 23ft. by 20ft. On the fourth floor, over the assembly-hall, there are rooms for art and science. The former measures 47ft. by 31ft., and the latter has an area of 858ft., with a smaller room adjoining. There are also four classrooms. On the uppermost floor, the chief features are a playroom, laboratory, science lecture-room, cookery, classroom, and a dining-room. Hot and cold water are laid on to every floor, and the building, which is fireproof, is lighted by electricity and heated by a system of pipes. The windows have been constructed with patent sashes invented by Mr. J. Jones, of Aston, and can be quickly detached from the frame, and cleaned or repaired from the inside of the building. Each window is also furnished with a contrivance whereby it can only be opened a few inches by pupils.

LEITH.—At the Dean of Guild Court, on Monday, the North British Railway Company renewed an application for warrant to erect twenty tenements of shops and dwelling-houses at Halmere-street and Lorn-street. Mr. Beaton, master of works, explained that in the three blocks with two-roomed houses there were sixteen tenants entering from one common stair, and the statute only allowed twelve. Mr. W. F. Beattie, of Edinburgh, the architect to the company, stated that they had thirty-two rooms in the blocks containing the two-roomed houses. What they proposed doing was done in other towns. It was pointed out that the company were providing houses in place of those to be demolished. Mr. Beaton said that that Court had steadily set their face against having more than twelve houses entering from one common stair. The Provost intimated that the court, by a majority, approved of those houses. Warrant was then granted for the tenements.

STRANRAER, N.B.—The foundation-stone of a new church for Ivy-place United Presbyterian congregation, Stranraer, was laid on Saturday. The building occupies the site of the old church in London-road, and is in style Late Decorated, the walls being built of dark blue dressed whinstone, with hewn work of a cream-white stone. The roofs will be covered with sea-green slates, finished with red ridge tiles, and the roof of stair turret will be dark red tiles. The main gable faces the street, the principal entrance being in the centre by a wide double doorway. On the western side of the main gable the gallery staircase is carried up in an octagonal tower, the lower stages of which are kept plain. The belfry stage has an arched of deeply moulded openings, with cusped tracery heads, and the tower is roofed with a steep conical roof. The side elevations have two-light windows in lower portion, and four-light windows with traceried heads in the upper. The hall and other rooms form an annexe to the south and west of the church. In the interior the church will be divided into nave and side aisles

by stone piers and arches, and the upper part has a traceried three-light window to be filled with stained glass. Sittings are provided for 530 persons. The hall is intended to seat about 300, while the large session-house can also be opened into it when required. There are also provided ladies' room, vestry, kitchen, and heating-room, with cloakroom and lavatory accommodation. The total cost will be about £4,000. The architect is Mr. John B. Wilson, A.R.I.B.A., of Glasgow.

WORTLEY.—The foundation-stone of a new Parish Church at Wortley, Leeds, was laid on Saturday. The Building Committee have decided only to erect the chancel and four bays of the nave at present. Plans have been prepared by Mr. W. Swinfen Barber, architect, of Halifax, and his successor, Mr. T. H. Farrar. The old church has accommodation for 400 worshippers, while the new structure is designed to seat 750. More than £3,500 has been subscribed.

CHIPS.

Mr. George Simonds has just completed a life-size bust in bronze of the late Mr. Charles Mitchell, of Jesmond Towers, Newcastle. The bust is intended for the University of Aberdeen, of which Mr. Mitchell was a generous benefactor.

The Directors of the London and Yorkshire Bank, Morley, propose to erect new premises at Morley, in Town-street, opposite to the Town-hall. The plans are being prepared by Mr. William Bakewell, F.R.I.B.A., architect, Leeds.

The King's Norton new workhouse infirmary, Selly Oak, Birmingham, is now being erected from the plans, and under the superintendence of, Mr. D. Arkell, architect, of Birmingham; Mr. B. Rowbotham, of Birmingham, being the builder. The whole of the wards are being warmed and ventilated by Messrs. E. H. Shorland and Brother, of Manchester, by means of their patent open fireplace Manchester stoves with descending smoke-flues, two stoves being used in each ward.

In the case of Richard Barlow, of Longsight, late Manchester and Ardwick, builders' merchant, the order for discharge from bankruptcy has been suspended for three years, ending Oct. 21, 1899.

Heer Obreen, the chief director of the Ryks Museum, at Amsterdam, died last week after a long illness. He was director at the time of the building of the new gallery, from the designs of Heer P. J. H. Cuypers, of Amsterdam, and was responsible for the arrangement of the pictures and for compiling the first catalogue.

An appeal is made for the sum of £10,000 for the repair of the fabric and an endowment fund for Tewkesbury Abbey. The abbey is without an endowment, and the benefice is under £200 a year. The sum of £3,000 is needed immediately for the roofs and walls. Mr. J. Oldrid Scott, F.S.A., is the architect to the restoration committee. The subscriptions promised up to the present time amount to £1,171.

The long-standing question of providing a statue to Darwin in his native town, Shrewsbury, was settled on Tuesday by the Shropshire Horticultural Society undertaking to defray the entire cost, estimated at from £1,000 to £1,200.

The memorial-stone of a new building for the southern section of the Glasgow United Young Men's Christian Association was laid on Saturday. Situated at Eglinton Toll, the new premises, when completed, will consist of a reading-room, a gymnasium, a large hall to accommodate 800 persons, a smaller hall to seat 300, and several classrooms. The ground flat will be let as shops. Erected in the Elizabethan style of architecture, the building is of red sandstone. The cost will amount to £9,000, and Mr. Robert Miller is the architect.

The Midland Railway Company are considering a scheme for extending to the Metropolis the branch line from Bedford to Hitchin. Many years ago the company's only route from Bedford and the Midlands was by way of this short line to Hitchin, whence they ran over the Great Northern system to London. The construction of the line to St. Pancras, however, put an end to that arrangement. Leaving the Great Northern Railway to the west, they will reach a contemplated City terminus *via* Enfield and Islington.

In a case heard on Tuesday before Mr. Justice Cave and a jury, a house-demolisher named James Brind, living at Tagg-street, Old Ford, recovered £75 as damages for false imprisonment and malicious prosecution from Henry Adams, contractor, of Parkfield-street, Heme Hill-road. During a knock-out meeting held at The Ship and Blue Bell, Shoreditch, last December, defendant was robbed of his purse containing £40, and alleged that it had been stolen by plaintiff, who was committed for trial, but acquitted.

ARCHITECTURAL & ARCHÆOLOGICAL SOCIETIES.

PLYMOUTH, DEVONPORT, AND STONEHOUSE BRANCH, DEVON AND EXETER ARCHITECTURAL SOCIETY.—The inaugural meeting of the winter session of the Three Towns Branch of the Devon and Exeter Architectural Society took place at the Plymouth School of Art, Princess-square, on Friday evening. The chairman of the district, Mr. Charles King, presided. Mr. B. Priestley Shires, A.R.I.B.A., delivered the first of a series of lectures that have been promised by members of the architectural profession, including Mr. Edmund Sedding, Plymouth, and Mr. G. H. Fellowes Prynne, F.R.I.B.A., of London. The subject of Mr. Shires' lecture was "The Domestic Life of the Edwardian Period, as shown by its Architectural Manners and Customs," and it was profusely illustrated with measured drawings, monographs, and sketches, for which Mr. Shires had received several of the honours at the disposal of the Royal Institute of British Architects, the Architectural Association, South Kensington, &c., and these included Markenfield Hall, Belsay, and Alnwick Castles, Archbishop's Palace, Southwell, several sketches of York cartoons from ancient MSS., Lutterell Psalter, &c. Mr. Shires said the Edwardian Period for art and architecture was perhaps one of the most brilliant and flourishing epochs in English history. The people not only enjoyed peace and prosperity, but made rapid progress in civilisation. It was exactly for this period and no longer that the Decorated style prevailed. Many of the houses were of large extent and great magnificence, and testified to the wealth and prosperity of their owners. The general arrangement of a house of this period chiefly consisted of a hall, and that that feature was being greatly developed in the many fine mansions that have been erected in recent years. Originally it sometimes occupied the whole height of the house, and not infrequently had a low ground story under it; the wings were commonly of two stories only, the cellar below and the solar over it. In other instances they formed towers of three or four stories in height. The other buildings for offices and stables, &c., were so arranged as to form a quadrangle with the hall in one angle of the principal and the gatehouse in the centre of the open side opposite to it, and generally the whole was surrounded by a moat. The plate and furniture of the hall table was also a great feature. The chapel was also an important apartment. The size and situation varied considerably, but was generally near to the hall. The window was large, and the altar was placed immediately under it. The sacarium for the use of the chaplain generally extended the whole height of the building, and included a piscina and locker, and sometimes a sedilla. Another interesting feature was the solar, the use of which corresponded with the drawing-room of modern times, and was the private apartment of the lord, his family, and principal guests. One of the most striking features was the window, the recesses of which were of a fair size, and usually built as in the preceding century with the masonry left so as to form benches on each side. These were the favourite nooks and corners of domestic life. A vote of thanks was accorded to Mr. Shires on the proposition of Mr. Parker, A.R.I.B.A., seconded by Mr. Princhard. Notice was also given by a member, "That at the next meeting he would propose that some action be taken *in re* public officials competing for private work."

A Congregational church which has been built in Hollingreave, near Burnley, was formally opened on Monday. The church is 74ft. by 45ft., with transepts at the north end, and minister's and choir vestries and organ-chamber. Accommodation is provided for 670 worshippers. The style is Renaissance. There is a tower and spire rising to a height of 90ft. The total cost has been about £4,500. Messrs. Hitchen and Pritchard, Burnley, were the architects.

On Saturday, Professor Baldwin Brown, Edinburgh University, delivered the first of a series of lectures on "Art" in the Academy, Moffat. He explained that the course will embrace architecture, sculpture, and painting. Taking the first head, he stated that architecture must be considered with relation to site and surrounding. An architectural monument must be imposing in mass, and give an idea of sublimity. It should be employed in due relation to the service it is to fulfil, and express the spirit of the age. Proportion must be regarded as the essence of architecture. The lecture was illustrated by numerous views of buildings, ancient and modern.

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ILLUSTRATIONS.

PORTRAIT OF AN OLD MAN, BY VELAZQUEZ.—AN OLD LOCK.
—THE PARK HOSPITAL, HITHER GREEN.—HAMPTON COURT
PALACE.—INTERIOR, GREEK CHURCH, PARIS.—RENAISSANCE
FURNITURE.

Our Illustrations.

PORTRAIT OF A MAN, BY VELAZQUEZ.

This fine portrait, by Don Diego Rodriguez de Silva y Velazquez, is a thoroughly typical example, broadly handled and entirely devoid of any trace of mere mannerism, as, indeed, were all his works, whether he painted portraits of men or animals or landscapes. A true student of nature, Velazquez owed his skill to no other teacher, though nominally he was a pupil of Francisco Pacheco, his father-in-law, who was himself a highly cultivated man, but never rose above the second rank as a painter. In giving a previous specimen of Velazquez's work we printed an account of his life and work written for our pages by Mr. Charles Eastlake, the Keeper of the National Gallery.* The portrait of the old man reproduced to-day is in the Royal Gallery at Dresden. Velazquez was born in 1599 and died in 1660. Many paintings by him were shown at the Spanish Exhibition held in the New Gallery last winter from private English collections, but his greatest works can only be seen at Madrid.

WORKS OF ART IN SOUTH KENSINGTON MUSEUM:
A STEEL RIM LOCK IN BRASS CASE, BY RICHARD
BICKFORD.

A YEAR or two since we commenced a series of illustrated articles specially written for our pages by the late Professor J. H. Middleton, Lit.D., the esteemed Art Director of South Kensington Museum, in description of some of the more notable and beautiful examples of historic art in that great national collection. Unfortunately, the long illness and untimely death of this learned writer brought our authoritative descriptions embodied in these articles to an end. We had, with the co-operation of Dr. Middleton, before his fatal illness, taken a series of photographs of objects selected by him as typical or specially meritorious specimens with which to illustrate his intended articles for the BUILDING NEWS, and Messrs. Dixon and Son, the well-known photographers, executed the photographs, under the Professor's direction, for us. We had reproductions made ready and waiting for the long-promised letterpress, which sickness alone prevented the Doctor from finishing, and which death left undone. These photolithographs we now intend to publish, and the merit of the choice which was made of subjects is, of course, undoubted. To-day we give illustrations of a most beautiful rim-lock of exquisite finish and design, from the great Spitzer Collection, and bearing on the rim-plate the name of Richard Bickford, London. Who he was we cannot tell, and his name does not appear in the Guild of Armourers, which craft the character of his work suggests he might have been associated with, nor was he connected with Ironmongers' Hall. There is a slightly German character about some of the

ornament, though we know that the locksmith's art and the armourer's greatest successes were perfected in France after the metalsmith's true treatment of his material had met with its death-blow in England early in the 15th century, about which time the demands of fashion seem to have imposed forms more properly belonging to joinery and woodwork. Smithing reached its perfection under the influence of the Matsys family of Lovain, in the Low Countries, and in most of the finest examples of the craft found in England a foreign influence seems manifest, from the magnificent grille of Queen Eleanor's tomb in Westminster Abbey, executed probably after a Paris model in 1294 by Thomas de Leghton, down to the Late Renaissance screens in St. Paul's Cathedral, designed by a Frenchman named Tijou. Huntingdon Shaw's work at Hampton Court Palace is of a similar type, and his is one of the very few names handed down in connection with the metal artificer's craft. It is quite possible, moreover, that Richard Bickford was a clock-maker by trade, or rather that his work was intimately associated with dial enrichments of the kind familiar in grandfather clocks, some of which are of remarkable excellence in the better specimens. Whether this lock was actually intended to be fixed to a door or not seems uncertain, considering the highly elaborated treatment of the back of the lock, which would necessarily be entirely hidden when the lock was in its place; the projecting and ornamented screw-heads, too, as well as the graceful little shell below the key-hole on this side, would be in the way when attaching the lock to a wooden stile of a door. If a gate of open ironwork is suggested, there is no evidence of such a use either, seeing that the ornament is not adapted to partial exposure, and no reference to such a use is implied by the screw-holes or by the pattern of the lock, which, moreover, is really not suitable for a gate lock. We are disposed to think that Richard Bickford made it as a show-piece, and as such it is worthy of the warmest praise, exhibiting great beauty of design without any undue effort. The ornament gracefully occupies its spacings, which are contrived in recognition of the practical requirements of the lock, as well as its fastenings. The arms of the Medici family of Florence are introduced on both sides of the lock. The glazed dials, not uncommon in old locks, were no doubt used to secure the lock on the inside from being opened, and indeed till the hands of these checks were properly set it would in all likelihood be impossible to open the lock, even with the key belonging to it. The handles are shown in side elevation together with the spindle, which in itself is prettily shaped, another evidence of the artist's thoroughness, and inferentially supporting the theory that the lock was made as a sample. It was bought for £183 14s. in 1893. Another lock bearing the same inscription, together with the date 1675, is in the Goltz collection at Moscow. We are indebted to Mr. A. B. Skinner, Assistant Art Director at South Kensington Museum, for this piece of information. The key, by John Wilkes, of Birmingham, is in steel, and belongs to a similar lock. The conventionally treated swans are most admirably introduced, one foot grasping the quatrefoil below, the other leg extended rampant fashion to complete the ornamental spacing in the centre of the handle, which is surmounted by a crown. John Wilkes was formerly, it seems, in business in Bull-street, Birmingham, in a house which had just about then been erected (probably 1690), even if he did not build it, and he subsequently went to live in the then more fashionable spot known as Old Square, where, it would appear, he was living in 1727. In 1732 John Wilkes died. Mr. Joseph Hill, of Birmingham, has been good enough to give us this information, and he adds the following lines, inscribed on one of John Wilkes's locks, dated 1700, with the maker's name attached:—

If I had ye gift of tongue,
I would declare and do no wrong,
Who they are that come by stealth
To impair my lady's wealth.

Cooper the poet's room at Throckmorton's House, Northamptonshire, the same authority says, had a curious lock inscribed "Johannes Wilkes Birmingham fecit," and the mechanism of the legs of certain figures moving and revealing the keyhole deserves mention. There is no record of the name of John Wilkes in the books of the Ironmongers' Hall; but William Wilkes, of Derry, was appointed a freeholder of the company about this time. The

illustration, photographed from the object direct, shows the work nearly full size, and the scale attached gives the exact size.

THE PARK HOSPITAL, HITHER GREEN.

This hospital is the largest of three infectious diseases hospitals erected, or in course of erection, by the Metropolitan Asylums Board, containing, as it does, beds for 548 patients. There are eight two-storied pavilions for scarlet fever, four for diphtheria, and six isolation pavilions for other cases. The central administration buildings consist of the kitchen block, steward's stores, and residences for the servants; while on either side are the steward's house and that of the assistant medical officers. From these radiate all the various buildings for patients, as well as the nurses' home, which is on the highest point to the south-west. Open but covered corridors connect all portions of the hospital, and beneath these are subways for all pipes, wires, &c. Other detached buildings comprise the medical superintendent's house, the lodge, the offices, and the waiting and discharge-rooms, mortuary, &c. The buildings cover a site of nearly 20 acres, and some idea of their extent may be gathered from the fact that there are upwards of five miles of drainage within the curtilage. The works are making rapid progress, nearly all scaffolding being removed, while many buildings are approaching completion. The general contractors are Messrs. Leslie and Co., of Kensington-square. The architect is Mr. Edwin T. Hall, F.R.I.B.A., of 57, Moorgate-street, London. The bird's-eye view reproduced here was exhibited at the Royal Academy last summer.

HAMPTON COURT PALACE: DETAIL OF RIVER FRONT.

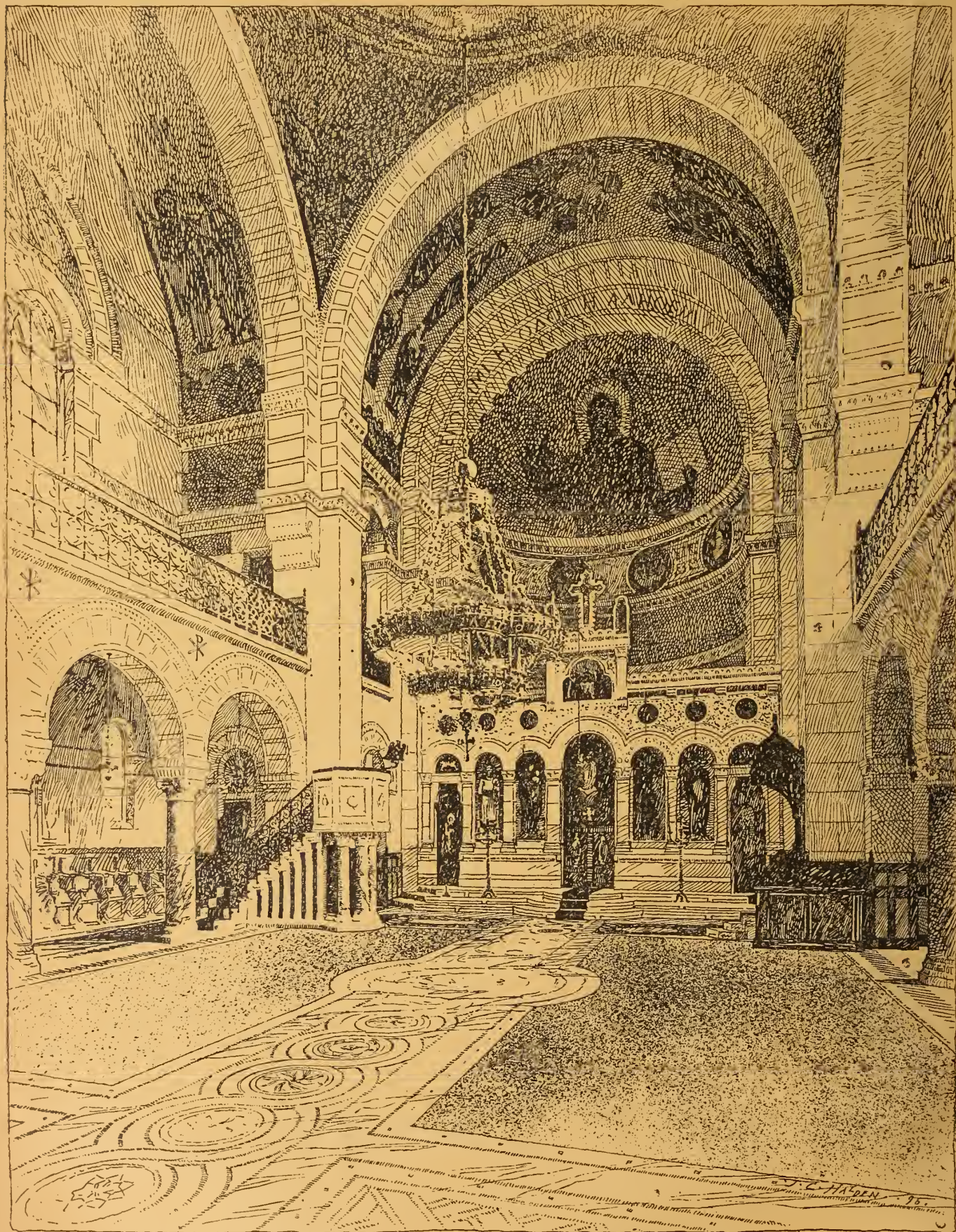
The Silver Medal of the Royal Institute of British Architects' drawings, by Mr. Hugh P. G. Maule, of which we to-day complete our series of reproductions, have already been described by their author when we gave the smaller scale elevations of Sir Christopher Wren's façades* with the plan of the palace. The detail of the garden front and section of the Fountain Court have also already appeared. The drawing accompanying these few lines exhibits in a most useful manner the famous river front, giving a detail of the central portion, which is entirely executed in stone. Plans of each part and a complete section fully figured leave nothing to be desired, making a valuable record of a most charming specimen of the English Renaissance.

REPRESENTATIVE SPECIMENS OF RENAISSANCE
FURNITURE.

The two Chairs and Table depicted on accompanying sheet of sketches are from three different countries, and capital specimens of the respective periods in which they were produced. The late 18th-century Arm-chair of English workmanship doubtless owes some of its character to French influence. It is made in dark walnut, and displays great freedom and skill in the handling of its curved lines. The two outside scrolls of the back at top are very slightly concave on front face and rounded on the reverse side, while the wide-shaped "splad" in centre is delicately carved and inlaid with coloured woods. The shell ornament at top, the foliage to knees of front legs and to volute-shaped feet, as well as the ornamental piece in centre of rail below seat, are characteristic of the period to which the Chair belongs. The seat is upholstered in red-figured silk. It was purchased for the National Collection at South Kensington Museum for the very small sum of £5. In the same place there is a settee to match. The French Table of late 16th century is of light walnut, and though it has suffered from the ravages of time, still presents a very respectable appearance, it having survived probably by reason of its substantial and careful workmanship. The top is modern, evidently having replaced a "draw-out" one, as holes for bearers still exist. The eight brackets under arched work at ends are missing, and the feet upon which the table probably once stood are likewise gone. Some sketch outlines of mouldings further elucidate the character of this table. Its length is about 5ft., and total height to under side of modern top is 2ft. 5½in., the width at base being 2ft. 7½in. It forms part of the fine "Payre" collection at South Kensington. The Italian Arm-chair is also of walnut wood, with leather seat and back, and studded with brass nails, the back being covered with Renaissance ornamentation, embossed and gilt. There are several fine specimens of similar character at the South Kensington Museum (for which

* "Christ at the Column," December 1, 1893.

* BUILDING NEWS, October 9 and November 6, 1896.



NEW GREEK CHURCH, RUE BIZET, PARIS.

collection this one was purchased for £33 15s.), but a rather unusual feature in these stately and formal seats is to be found in the ribbon-bow or double-knot form used in the rail under seat, of which there is a plain-cut one corresponding at back. The fringe is of "old gold" colour. There are two cross-rails at back behind the leather shoulder-piece. The dimensions of this typical Italian chair are, 4ft. 1in. height of two back-posts,

1ft. 10in. to top of seat, 2ft. wide, and 1ft. 5in. projection.

NEW GREEK CHURCH, RUE BIZET, PARIS.

(SEE description and plan on p. 732.)

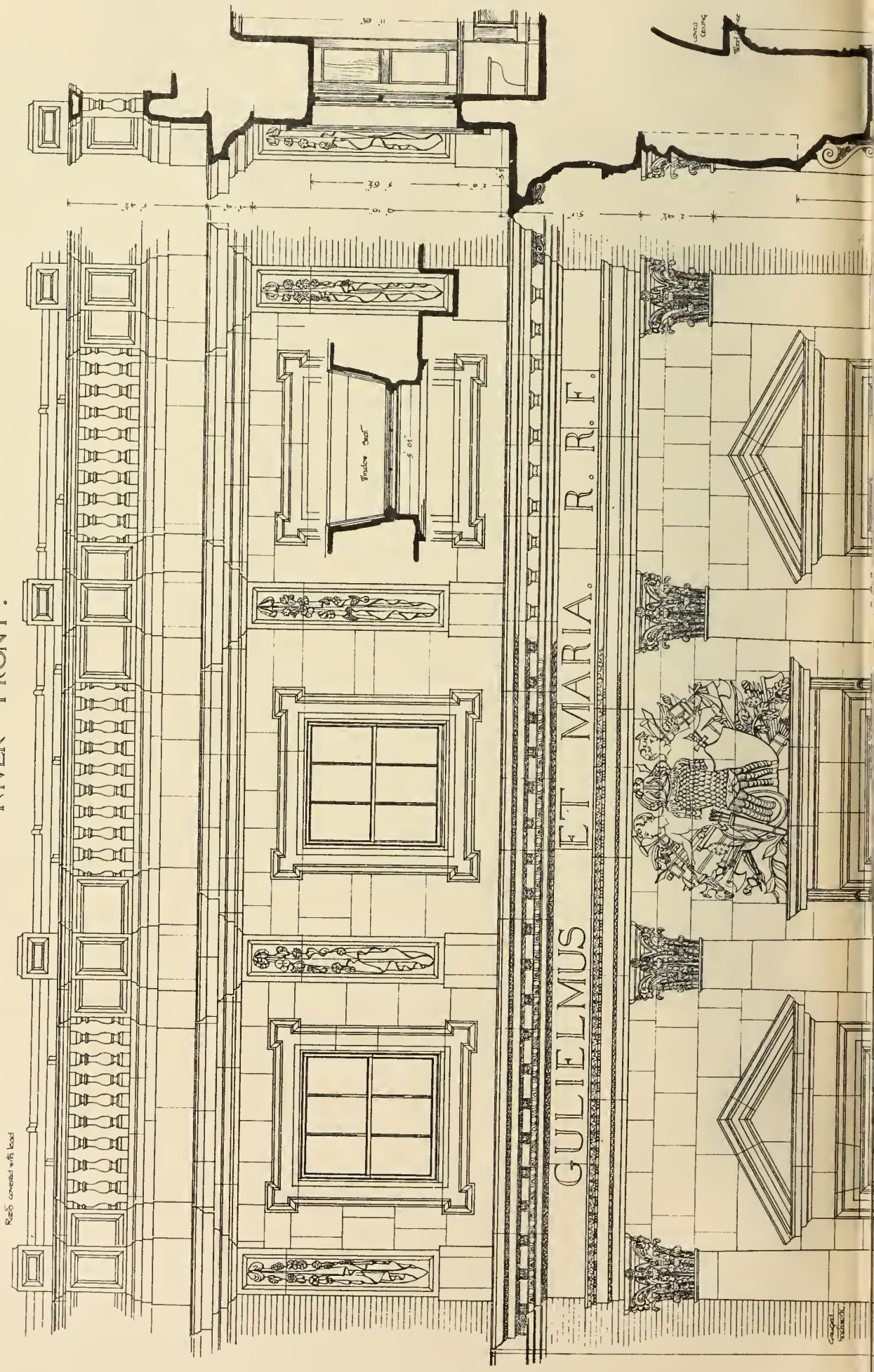
The adjudication in bankruptcy is announced of John Peury Davis Rowlands, of Oystermouth, Glam, and Swansea, architect and surveyor.

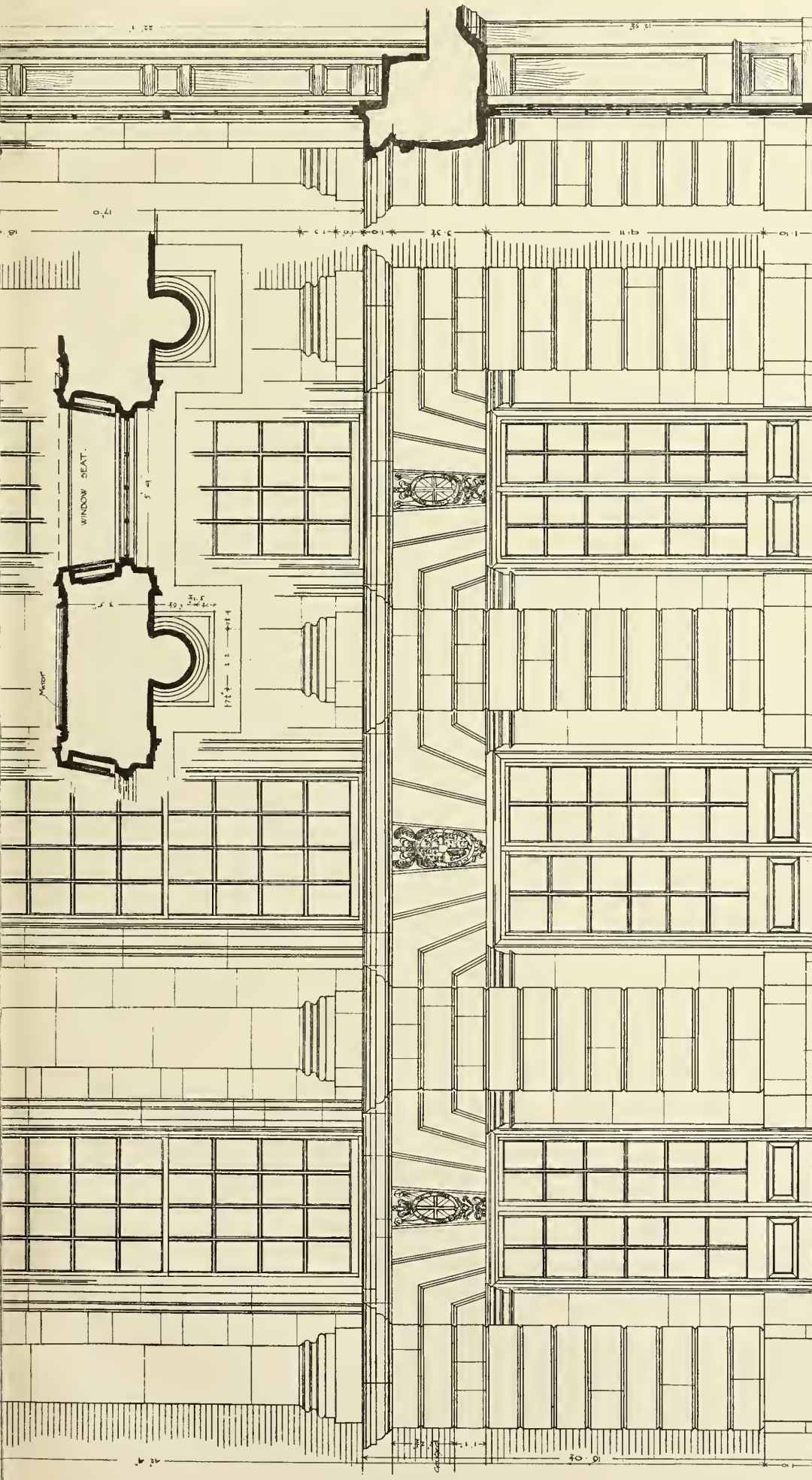
The first of the Coroners' Courts being erected by the London County Council, in pursuance of the Public Health Act, will be opened to-morrow (Saturday). It is situate in St. George's Church-yard, Camberwell.

The Glasgow and South-Western Railway Company have given notice of a Bill to enable them to construct a branch from Dumfries to Moniaive, leaving their main line about two miles north of Dumfries Station.

HAMPTON COURT PALACE : (WREN.)

RIVER FRONT :



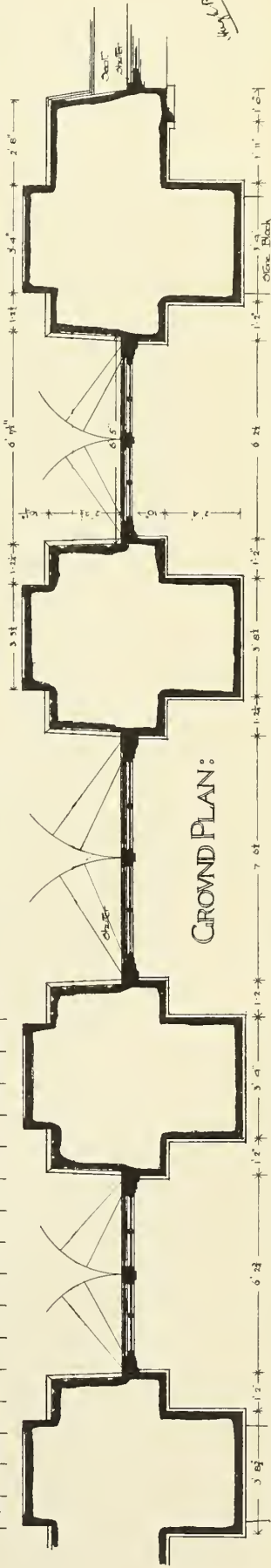


SECTION:

CENTRAL PORTION:

ELEVATION:

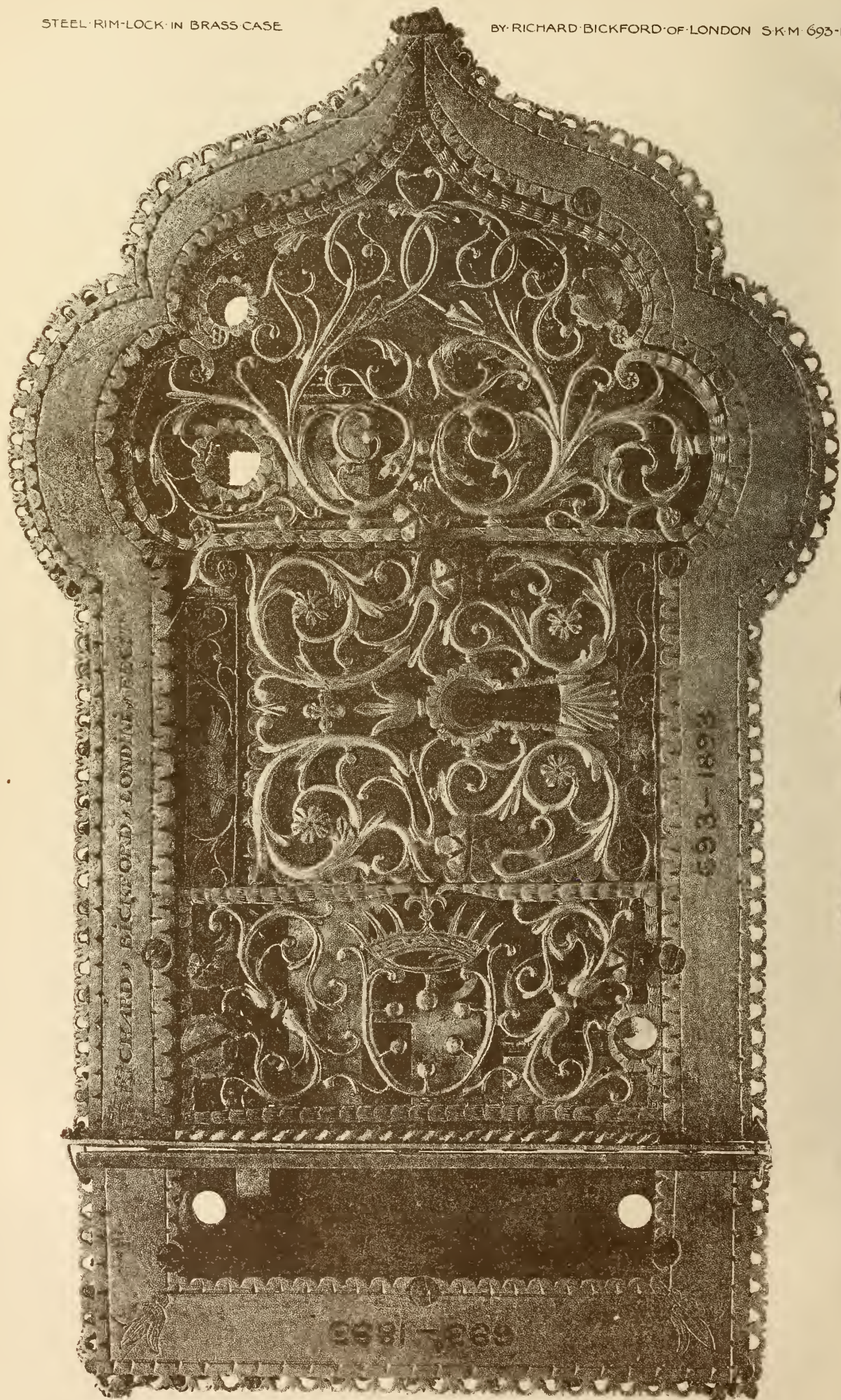
SCALE OF FEET: 1" = 1' 0"



GROUND PLAN:

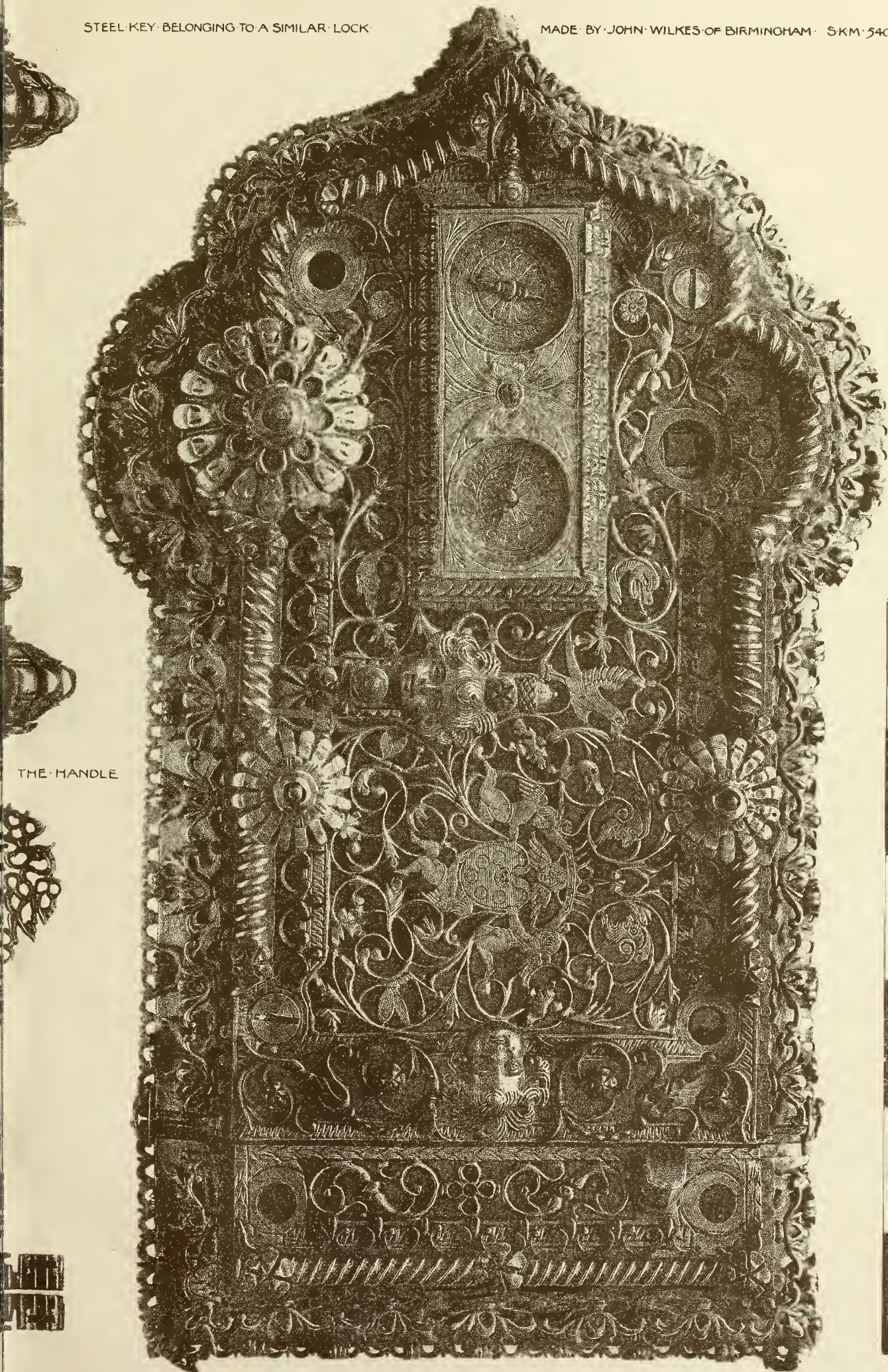
STEEL RIM-LOCK IN BRASS CASE

BY RICHARD BICKFORD OF LONDON S.K.M. 693-1893.



STEEL KEY BELONGING TO A SIMILAR LOCK

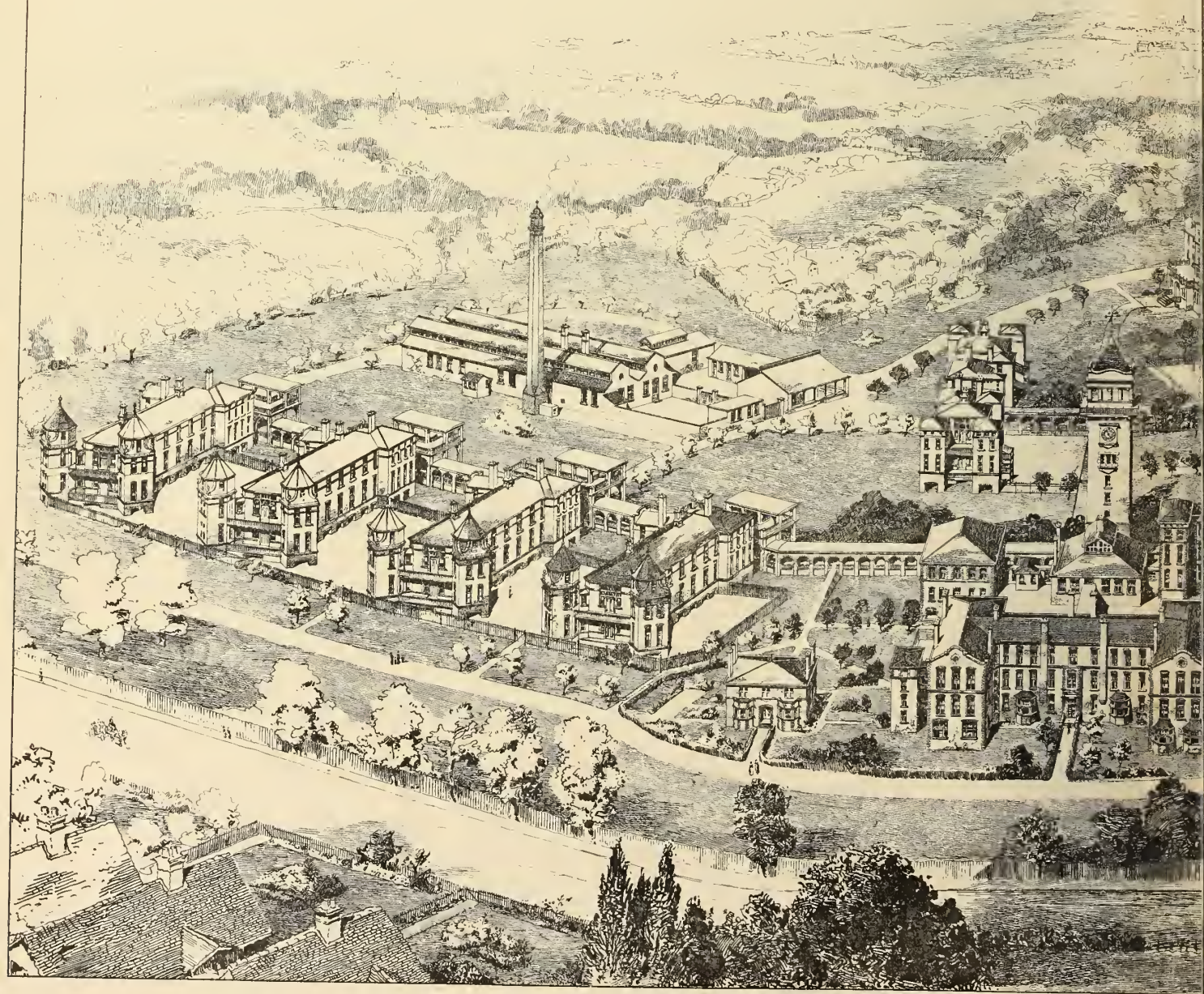
MADE BY JOHN WILKES OF BIRMINGHAM SKM 5406-1859



THE HANDLE

1
2
3
4
5
6
INCH

*The Park Hospital
Hither Green, London S.E.
Edwin L. Hall F.R.I.B.A. Archt.*



3, Nov^r 20, 1896.



Photo-Lithographed & Printed by James Akerman, 6, Queen Square, W.C.



THE BUILDING NEWS, NOV^R 20, 1896.



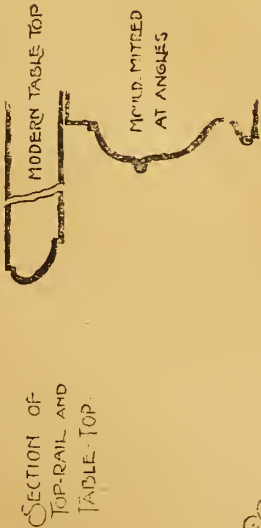


FROM A PHOTO BY FRANZ HANFSTAENGL.

OLD MASTERS · ON THE · CONTINENT · N° 41 ·

PORTRAIT OF AN OLD MAN · (DRESDEN) BY DIEGO VELAZQUEZ (B 1599 · D 1660) SPANISH SCHOOL ·

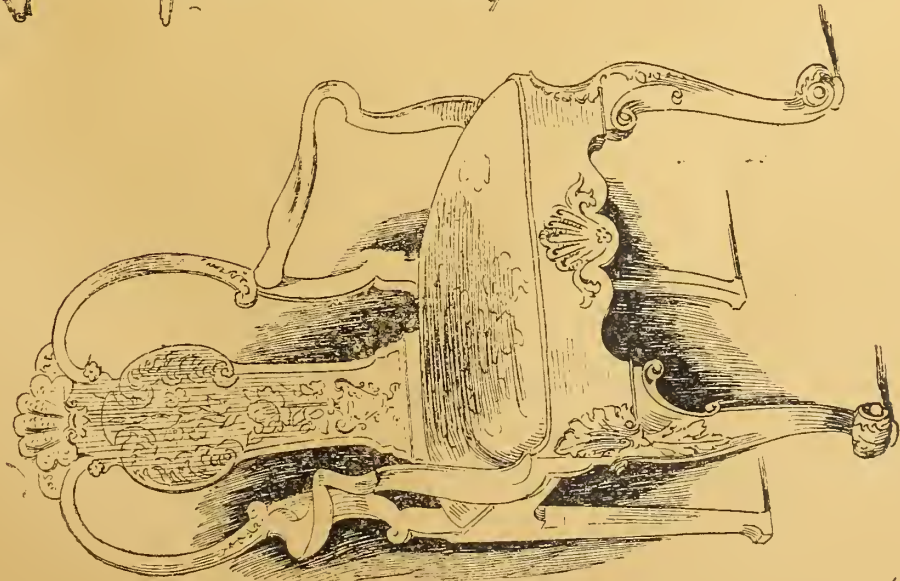
"PHOTO-TINT," by James Akerman, 6, Queen Square, London, W.C.



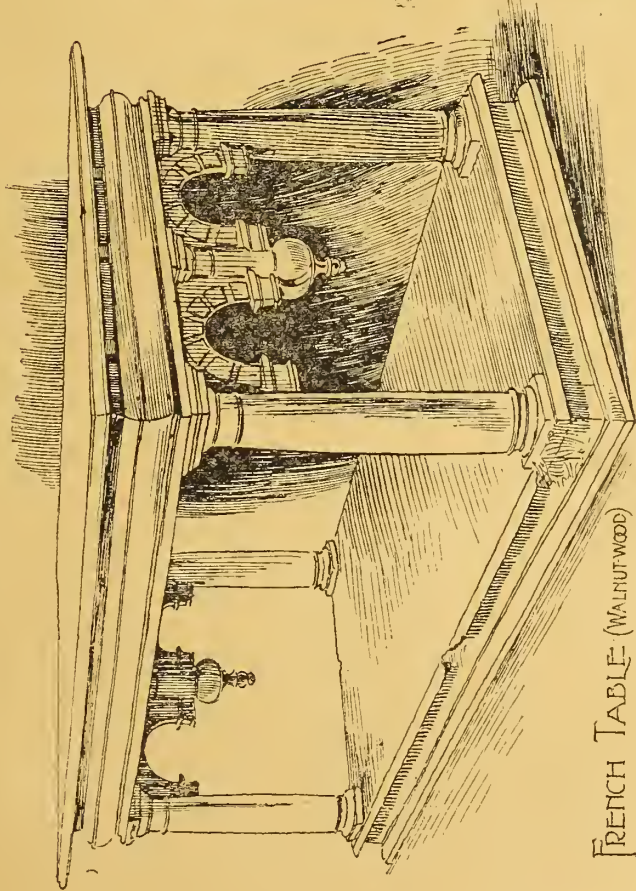
SECTION OF MOULD
TO PLATFORM UNDER
TABLE



NOTE: ALL THE BRACKETS
UNDER ARCHED WORK
OF TABLE ARE MISSING.



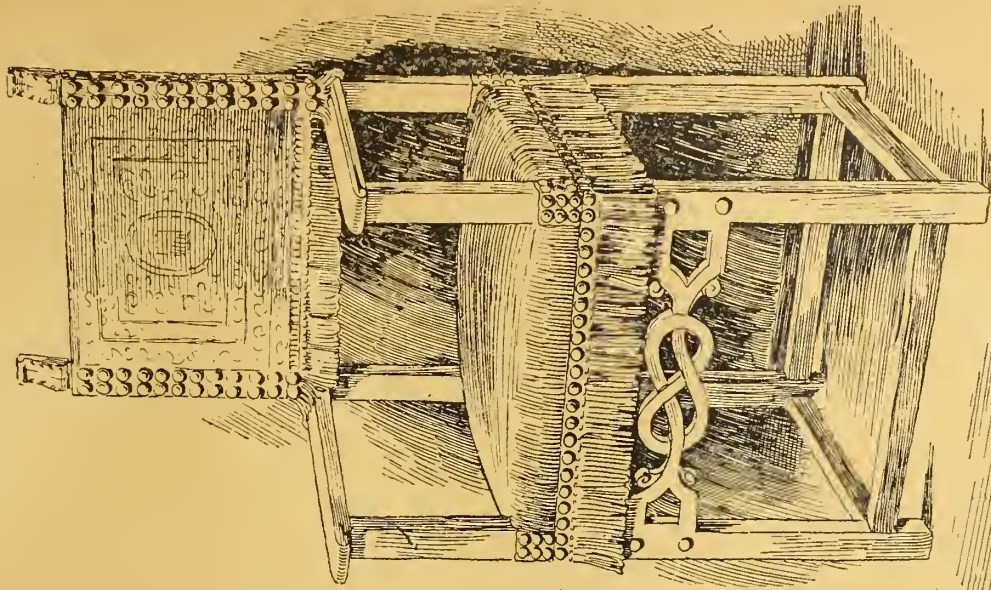
ENGLISH ARM-CHAIR (ABOUT 1760-80)
WALNUT WOOD CARVED & INLAID.



FRENCH TABLE (WALNUT WOOD)
2ND HALF 16TH CENTURY.

REPRESENTATIVE SPECIMENS
OF RENAISSANCE FURNITURE.

ITALIAN ARM-CHAIR
2ND HALF 16TH CENTURY
OF WALNUT WOOD WITH LEATHER SEAT & BACK



A. J. Russell del.

TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. All communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondents.]

It is particularly requested that all drawings and all communications respecting illustrations or literary matter should be addressed to the EDITOR of the BUILDING NEWS, 332, Strand, W.C., and not to members of the staff by name. Delay is not unfrequently otherwise caused. All drawings and other communications are sent at contributors' risks, and the Editor will not undertake to pay for, or be liable for, unsought contributions.

Cheques and Post-office Orders to be made payable to THE STRAND NEWSPAPER COMPANY, LIMITED.

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Advertisements for the current week must reach the office not later than 3 p.m. on Thursday. Front-page Advertisements and alterations in serial advertisements must reach the office by Tuesday morning to secure insertion.

SITUATIONS.

The charge for advertisements for "Situations Vacant" or "Situations Wanted" is ONE SHILLING for TWENTY-FOUR WORDS, and SIXPENCE for every eight words after. All Situation Advertisements must be prepaid.

NOTICE.

Bound copies of Vol. LXIX. are now ready, and should be ordered early (price Twelve Shillings each), as only a limited number are done up. A few bound volumes of Vols. XXXIX., XL., XLI., XLVI., XLIX., LI., LII., LIV., LVIII., LIX., LX., LXI., LXII., LXIII., LXIV., LXV., LXVI., LXVII., LXVIII. may still be had, price Twelve Shillings; all the other bound volumes are out of print. Most of the back numbers of former volumes are, however, to be had singly. Subscribers requiring any back numbers to complete volume just ended should order at once, as many of them soon run out of print.

RECEIVED.—Geo. B. Foster.—W. H. A.—R. S. and Co.—Draughtsman.—H. H.—F. P. (Chester).—W. B. and Co.

"BUILDING NEWS" DESIGNING CLUB.

DRAWINGS RECEIVED.

"Pickles," "The Wolf," "K. K.," "Geisha," "Scotland," "5 Opals," "Strag," "Nii Desperado," "Agon," "The Manxman," "Novocastrian," "R. E.," "Q. E. D.," "P in a circle," "St. Leonard," "Car," "Pot Luck," "Leone," "Percy," "The Dingy," "Hi-ki-ki," "Romulus," "Pickwick," "Caporal," "Jap," "Ard," "Oheron," "Baron," "Duniva," "Vlan," "J. H. W.," "Ashton," "B. S. A.," "Penrhyn," "Arch," "Nadsy," "Llafurus," "Don't Know," "Cyclist," "Alho," "Smiler," "Mostyn" (no name and address), "Zulu," "Forfar," "Poplar," "Hawthorn," "Enlisto," "Anglia" (Very late. All drawings must reach us by first post on the Saturday at latest. Twenty-eight days is the stipulated time given for each subject). "Etna" (Too late).

A. HUNT. (The tower of the village church should be over the crossing, by preference; but it may be contrived otherwise, provided it be central.)

Correspondence.

WOODCARVING AT THE CARPENTERS' HALL, LONDON WALL, E.C.

To the Editor of the BUILDING NEWS.

SIR,—A couple of visits within the last few days to this interesting exhibition suggests a few thoughts that may, perhaps, be of passing use if jotted down.

First and foremost, then, is the feeling of disappointment at the poverty of merit exhibited whenever our own Gothic art is touched upon by any exhibiting craftsman. I know, and know only too well, how English Mediæval art is, and has always been, disheartened in our art training schools. When, in the "fifties," I was apprenticed to a Sheffield carver, five out of my six evenings were spent at the School of Art in that city, at which, with the late Young Mitchell as the head master, and the late Godfrey Skyes as his second in command, a set of men were trained who, more or less, have (not a few of them) made marks for themselves in the history of this country's art revival. But, "Like master,

like man." Gothic was distinctly eschewed by our teachers, and for my part, I got no chance to study it, save after 9 p.m.; when, the school closing, it was my wont to go straight to the free library close by, and sketch or trace until shutting-up time, from James Kellaway Colling's "Gothic Ornaments" and other books of the same class.

The examples shown of Gothic carving in oak at the Carpenters' Hall suggest sadly, that the aspiring young minds of the present day suffer, in turn, from many of the same disadvantages that were experienced in mine. A partly-executed (No. 94A) "Oak Frieze for a Mantelpiece," by Mr. Frank Holder, is simply a repetition of continuous quatrefoils, very flat in their execution, and can only by a stretch of imagination be called, even then somewhat incongruously, an "oak frieze." No. 98A, a "Gothic Perforated Panel in Oak," by Miss Frances Bartholomew, quite misses in its execution the spirit of English Gothic work. It is, I suppose, of a sort of German type; but the youngest worker in our midst knows that the stamp, "made in Germany," is one every patriotic Englishman looks down upon with a feeling much approaching contempt. Hence it seems more desirable than ever that English examples should be chosen to work from, rather than those of the foreigner.

The response made to the offer of a gold medal and £20—for the best carved-oak font-cover—is simply painful. Yea, further, in its way, it is a national disgrace. Only one of the exhibitors seems to have had the least idea of how to treat his subject, and although the judges have stretched a point, and given one prize of a bronze medal and £2 to its maker, Mr. W. S. Masters, his efforts suggest the most elementary ideas of Gothic design and execution. The little carving upon this cover exhibits no sort of knowledge whatever of the class of work attempted; the crockets are, as it were, so much dough, whilst the spandrels and the cusps are not carved at all: they are simply haggled out. Anything more disappointing in the Hall of the Worshipful Company of Carpenters, standing as it does in the centre of civilisation and London town, it would be as difficult as it is undesirable to imagine. In the Lobby, Mr. J. Dunn, of King's College Carving School, exhibits a Late sort of linen panel. In this the moulds and their intersections are well enough worked; but the actual carving of spandrels and cusps is a character that would promptly get any ordinary workman "the sack," if he attempted to turn out such work in even a third-rate Gothic carver's studio.

So far as I observed, no other exhibits of modern Gothic work were included in the collection. The want of sympathy with and feeling for English Gothic, comes out even in the very labelling of some of the old examples shown on loan. For instance, Messrs. J. C. Crace and Son exhibit a 15th century tracery panel-head, originally taken from the front of a screen, or seat-backs or fronts, labelled, most remarkably, "Open Cresting"! How little the person who thus describes an ordinary tracery panel consisting of two quatrefoils in circles, above a couple of circular cusped heads, is in touch with Perpendicular art, it needs no remark of mine to suggest! Again, in the Loan Catalogue we read, No. 25, "Devonian Road Screen Carvings." Of course, for "road" the student must read "rood"; but the blunder is not creditable!

Mr. Phipps' exhibit of various kinds of worm-eaten timber, and the mummied bodies of actual animals that cause the destruction in question, is most interesting, although, from a general point of view, it is a pity the collection is of so distinctly a sub-marine character. Of walnut (into which the worm gets so quickly) and chestnut, which in constructional and ornamental architectural work, we know, is also greatly subject to the attack of the worm, I simply saw no examples.

The lack of ambition, as regards English Gothic work exhibited at this metropolitan exhibition, is field for serious thought. True it is, there is very little local stimulus. One may go from one end of London to the other, and then easily count on one's fingers the examples of Gothic oak carving—old or new—really worth studying. Here, in the provinces, it is different. Beneath our very noses, in the cathedral choir of SS. Peter and Paul, are the half-hundred miserere seats that Bishop Blucere caused to be carved in English oak in King Henry III.'s days, between the years A.D. 1245 = 1257. They are the finest examples of Early English oak carving in exist-

ence, and the wood is as sound to-day as when it was carved. Further, Bishop Stapeldon's throne, reared in the same choir in the time of Edward II., is also, in its turn, the most superb example of Decorated (early 14th century) work in the world. Of that there is not the slightest doubt. It is fully 57ft. high. The oak of which it is made was procured at Newton and Chudleigh (both small places not many miles from Exeter) in A.D. 1312, at a cost of £6 12s. 8½d. This was stacked for four years before using, and then this splendid—the most splendid—specimen of tabernacle and carved work of its period was made by, and under the direction of, Robert de Galmeton (Galmeton probably means Yealton, a village on the river Yealm, in South Devon). Another man—one Nicholas—seems to have carved the statues ("ymaginibus"); but of these to-day none remain. It is instructive to know that the oak pins by which the fabric of this vast throne is held together are called "clavis" in the Fabric Rolls.

Nothing in the above is said in the spirit of grumbling. We know "what man has done, man can do." But if English carvers are to do, or outdo, what their Mediæval forefathers were wont to create, they will have to work on very different lines to those suggested as the motive-power which prompts the majority of exhibitors at the Worshipful Company of Carpenters' recent and most well-intentioned Exhibition. It is well to remember that it is by our failures that we oftentimes get the best experience.—I am, &c.,

HARRY HEMS

Fair Park, Exeter, Nov. 14.

CHIPS.

Lord Stanley, M.P., opened the other day, the Technical School which has been erected at Radcliffe, Lancs, by the urban district council. The school has been erected at a cost of about £4,000, and there is provided accommodation for some 200 scholars.

Captain Balfour, the owner of Branksea Island in Poole Harbour, has decided to rebuild the castle, which was almost completely destroyed by fire in January of the present year.

The western window on the north wall of Pear Tree Green Church, Sonthampton, has been filled with painted glass from the works of the late Mr. William Morris, at Merton Abbey. The subject is a figure of Enoch, and was designed by Sir E. Burne-Jones, Bart. The window has been given in memory of the late Sir Stewart Macnaghten.

The vicar and churchwardens of Rowley Regis, having consulted a firm of architects as to whether the parish church should be renovated or rebuilt, have definitely decided to erect a new structure at a suggested outlay of about £10,000.

The Dublin United Tramways Company have contracted with the British Thomson-Houston Company, Limited, by whom the Dublin Southern Electric Tramways were installed, for the electrical equipment of their Clontarf branch. This section is approximately three miles in length. At present the Clontarf line is double track for about two miles from Annesley Bridge toward Dollymount; the rest is single track, with three turn-outs. It is proposed to double-track the entire line, and the elevated conductors now to be erected will be so arranged that a double line can be served without change in construction beyond spreading the trolley-wires apart.

A drinking fountain, for the "use of man and beast," has recently been erected at the junction of the four roads near Radcliffe Bridge, Bury, Lancs. It is Early Decorated in style, and stands upon three steps. The base is of Macclesfield stone, and the basins and die are of grey Aberdeen granite. Over this the stone is in the form of an octagonal spire, with four pediments moulded, each filled in with tracery, and with crockets formed of conventional foliage running up and carved finials to each. Four richly-carved bosses end a finial and a copper lamp. The work has been carried out by Mr. J. Rawson, Knowsley-street, Bury, from drawings by Mr. Alfred Hopkinson, architect, Agur-street, Bury.

The Hornsey District Council has decided to erect public baths in Western Park, Crouch-end. The estimated cost, including two acres of ground, is £21,000. There will be two swimming-baths, the largest 120ft. by 75ft., 24 slipper-baths, laundry, offices, &c.

At the meeting of the Westminster Urban District Council last week, the adjourned discussion on the report by Mr. Chatterton, C.E., of London, as to the best sewage disposal scheme for the town, was resumed. The report was discussed for close upon three hours. Five amendments were moved; but eventually the scheme recommended by the expert was carried by eight votes to seven.

Intercommunication.

QUESTIONS.

[11589].—**The Albert Memorial in Hyde Park.**—It is reported that a firm of architectural sculptors in London lay claim to have erected this national memorial. Of course, everybody knows its architect was the late Sir G. Gilbert Scott, R.A. Who was the actual contractor for the fabric generally, and who were the sculptors actually commissioned to carry out the sculpture upon and in connection with it?—HARTLAND.

REPLIES.

[11585].—**Salt in Sand.**—If there is no possibility of the sand being contaminated with decaying organic matter, the easiest and best way of detecting the presence of salt is undoubtedly to put a few grains in the mouth, or to taste the water in which some of the sand has been stirred. If this test is objected to, put some of the sand into a wineglass, cover with distilled water, and, after agitating for some time, dip a piece of clean platinum wire into the water, and hold it in a colourless Bunsen gas-flame. A persistent deep yellow colour imparted to the flame will indicate the presence of sodium. Another method is to filter off the water from the sand by means of blotting-paper, and to the liquid add one drop of silver nitrate solution. A curdy white precipitate will at once betray the presence of common salt. In ascertaining the presence of salt in sand, it is assumed that the object is to discover any tendency to absorb moisture, and, consequently, to cause damp walls. This could be equally well ascertained by drying some of the sand for some hours at a temperature of 212° Fahr. Its weight should then be accurately taken, and the sand exposed for some days to a moist atmosphere. Any increase in weight at the end of the period would be due to water absorbed from the air, probably owing to the presence of common salt. The best book on the chemistry of building materials is undoubtedly that of Capt. Abney, R.E., published by Mackay and Co., Chatham, at 4s. 6d.—E. BUSERIDGE.

[11586].—**Testing Levels.**—If the Y, or any other level, be set up and adjusted so that the bubble remains in a central position while the telescope is turned completely round, it does not follow that the instrument is in adjustment. It is correct as far as it goes; but the line of collimation may still be incorrect, and must be tested, and, if wrong, put right, or else the readings taken will be in error.—J. EZRA MILLER.

[11586].—**Testing Levels.**—In reply to "Level Adjustment's" inquiry as to any serious error arising from levels taken with an instrument out of adjustment, I can assure him that no error at all would arise in such a case if he takes care that the distance of his back-sight from the instrument equals that of his fore-sight, for by so doing the errors are eliminated. In a Y-level there are three adjustments to be made:—(1) The line of collimation must be set parallel to the axis of the telescope by the method already given by Mr. Yewdall. (2) The spirit bubble under the telescope must be set parallel to the line of collimation. To effect this, open the Y-clips, and set the telescope over two of the parallel plate-screws. Bring the bubble to the centre of its run, then lift the telescope out of its "Y's," and replace it end for end. If the bubble remains in the centre of its run, the adjustment is correct; but if it moves to one end, bring it halfway back by the parallel plate-screws, and the other half by the capstan-headed screws at one end of the bubble tube. Turn the telescope round 90° until it is over the other pair of parallel plate-screws, and go through the above operation in this new position. The bubble is now parallel to the line of collimation. (3) The height of the Y's must be adjusted so as to make them perpendicular to the vertical axis of the instrument. This is done by placing the telescope over a pair of the parallel plate-screws. The clamp-screw being slack, bring the bubble to the centre of its run by the parallel plate-screws. Swing the upper part of the instrument half-way round, so that the telescope is over the same pair of parallel plate-screws, but end for end. If the bubble keeps its centre in this reversed position, this adjustment is correct; but if not, bring the bubble half-way back by the levelling-screws, and half-way by the large capstan-headed nut under one of the Y's. When this is done, the instrument is in perfect adjustment.—J. BRUCE.

At the great church of St. Germans, Cornwall, the Bishop of Truro has dedicated a new stained glass window, the last work on which the late Mr. William Morris was engaged. The window is of ten lights, and is 30ft. in height and 16ft. across; it was designed by Sir E. Burne Jones.

The Bishop of Salisbury lately reopened the restored church of St. Mary, Charnminster. Under the guidance of Mr. C. E. Ponting, oak roofs and oak seats have been introduced, four round-headed Norman windows have been discovered in the clerestory, a large hagioscope, and an Early English piscina have been disclosed, the panelled arch leading into the western tower (erected by Sir Thomas Trenchard about 1500) has been opened out, and a memorial window has been executed by Mr. C. E. Kempe. At the same time, all the traces of colour and black-letter texts found on the walls have been preserved, and the bells have been rehung. The total cost has amounted to £3,000, some costly work being involved in underpinning the walls and arcades.

The Wesleyan Chapel at Pentre Halkin, near Holywell, which has been practically rebuilt, with the addition of a schoolroom, has this week been reopened. The structure has been erected by Mr. A. B. Lloyd, Flint, from plans prepared by Mr. W. Lloyd Jones, Bangor. The total cost has been £600.

LEGAL INTELLIGENCE.

T. DREW-BEAR, TOLPUTT, AND BROWN V. THE ST. PANCRAS GUARDIANS AND A. AND C. HARSTON. —The hearing of this important case, the earlier stages of which we reported in our issues of July 17 and 24 last (pp. 98, 133 *ante*), was resumed on Monday last, the 16th instant (and is still in progress), at the Old Bankruptcy Court, Portugal-street, W.C., before Mr. Edward Ridley, Q.C., sitting as the Official Referee, having been adjourned on July 18 over the Long Vacation. It was, it will be remembered, brought by several builders' merchants, suing as trustees of creditors of William Brook, of Folkestone, builder, against the Guardians of the Poor for St. Pancras, and their architects, Messrs. A. and C. Harston, for a balance of £24,226, or alternatively £24,265, alleged to be due on a building contract for the completion of St. Pancras Workhouse, Mr. Reginald Bray and Mr. A. A. Hudson appeared for the plaintiffs; Mr. English Harrison and Mr. W. Moyses for the defendant guardians; Mr. A. G. McIntyre and Mr. R. W. Turner for the defendant architects. The case for the plaintiffs is that some years ago the St. Pancras Guardians resolved to reconstruct their workhouse premises in King's-road, Pancras-road, and appointed Messrs. Kirk and Randall, of Woolwich. Disputes arose, and in 1892 Messrs. Kirk and Randall desired to be relieved of further duties under the contract; fresh tenders were invited for the completion of sections 1 and 2, and that of a Mr. William Brooks, of Folkestone, was accepted for £50,861. Brooks's contract was to have been completed in 15 months from May, 1892; but delays arose, and in November, 1894, the work was stopped. Messrs. Drew-Bear, Perks, and Co., 71A, Queen Victoria-street, E.C., who supplied the ironwork, Mr. Henry Tolputt, of Folkestone, who supplied the timber, and Mr. James Brown, of Cannon-street, E.C., and Braintree, who supplied some of the bricks, now sued as trustees of the creditors of William Brooks for £24,226, or alternatively £24,265 balance alleged to be due to Brooks. The first claim was made up as follows: net cost of executed work £65,479 plus 10 per cent. profit £6,547, making £72,026. On this account it was agreed that £47,800 had been received on account under the architects' certificates, leaving a balance claimed by plaintiffs of £24,226. The alternative claim estimated the net cost of the work executed at £65,479, as before, but reckoned the 10 per cent. profit to be added on a basis of the contract price of £50,861, so that £5,086 (in lieu of £6,547) was claimed to be added to the net outlay, making, with £1,500 claimed for damages, the total of £72,065, and the amount claimable, after allowing for the £47,800 already received under the architects' certificates, £24,265. In addition, plaintiffs claimed 5 per cent. interest from the stoppage of the works at the end of 1894 to the date of hearing. At the part hearing in July counsel for plaintiffs explained that their case would be that Brooks was hindered from continuing and completing the contract by the action of the clerk of works to whom the architect entrusted the absolute control of the job, George Poole, who rejected girders and other materials sent on to the works without sufficient cause, and owing to the treatment received from him Brooks had continually changed the foreman on the works, as no one would stay for any length of time. It was alleged that this clerk of works swore at and abused the foreman in charge, but wrote in very mild terms to the builders and architects, while the architects were seldom on the works. Brooks alleged that the rejection of material without sufficient cause occasioned a net loss of £2,526, in addition to £193 18s., the estimated value of materials left by Messrs. Kirk and Randall, and not permitted to be used. The defence was a general denial of the charges against the clerk of works, and it was alleged by the defendants that Brooks had not carried out his undertaking to complete the work left unfinished by, and accept the responsibilities of, Messrs. Kirk and Randall. The defendant guardians also relied on a provision in the Public Authorities Protection Act of 1893, and pleaded that they were not responsible for damages, as the matters referred to occurred more than six months before the commencement of the present action. Defendants Harston also pleaded that they received no complaints from Brooks as to the alleged conduct of Poole, the clerk of works. During the part hearing of the case, in July last, by the Referee, the only witness examined was Thomas Lawrence Fearon, manager to (and son-in-law of) Brooks, the contractor, who deposed to the alleged unfair condemnation of materials by Poole as clerk of works, the chief complaint being that a number of girders were refused by Poole on the ground that they varied in dimensions from those specified, whereas they were, Fearon contended, equally effective for the purposes in strength and utility.

Flooring timbers left by Kirk and Randall, the original contractors, and purchased by Brooks as part of his contract, were absolutely rejected by Poole, although, according to plaintiffs, it was sound and suitable for the purposes specified. When the floors in No. C block had been laid, Poole condemned every board left by Kirk and Randall, although equal to anything in the market. The first of the wholesale condemnations, Mr. English Harrison explained, was admitted, and was accounted for by defendants on the ground that Brooks had not sufficient capital to buy proper materials. Cross-examination of Fearon revealed the fact that in April, 1893, Brooks called a meeting of his creditors, and as a consequence a deed of inspectorship was drawn up, Messrs. T. Drew-Bear, Tolputt, and Brown being appointed as inspectors to look after the execution of the contract. When the threads of the case were taken up on Monday, Mr. English Harrison resumed the cross-examination of Fearon, who admitted that the diary which had been produced, and from which he refreshed his memory in his examination in chief, was written up at periods from rough notes made daily—generally on Saturdays, but occasionally at longer intervals. As to the flooring boards in Block C, condemned by Poole, they were left by Kirk and Randall, and were sold by the defendant guardians to Brooks, or, rather, were allowed for by Brooks in his accepted tender. Pressed as to whether the alleged obstacles put by the guardians in the way of getting possession of the east wing of the works in reconstruction of the H block, was not due to the facts that no covered way had been provided by Brooks, and that the removal of the further walling would have caused inconvenience to the inmates—lying-in patients—in the portion of the workhouse still standing, witness admitted this was the case—the covered-way was, he said, finished by him with all speed. The learned Referee remarked that the guardians seemed to want Brooks to begin work while the buildings were occupied. Mr. Harrison replied that this was so; indeed, the original conditions of contract accepted by Brooks, stipulated that the builders should, by these operations, "cause the least possible inconvenience to the inmates." As to the conduct of Poole towards the successive foremen, Fearon said Gosby, the first foreman on the works, was removed to the adjoining workhouse infirmary owing to illness; he was succeeded by Chapman, who left without notice with a small balance belonging to witness; then one Brown acted for awhile until Gosby, having recovered, returned to his duties. Witness would not allow that Poole simply did his duty during the progress of the work, nor did he ever accept Poole's plans of levels of certain drains, &c., as correct. Confronted with a letter of his to the architects, stating that Poole's plans of variations of foundations of blocks C, D, E, and H were accurate, Fearon said he afterwards found that the plans were incorrect, although he never mentioned this to Messrs. Harston. Witness was cross-examined as to the causes of delays in the work, with a view to show that the stoppages were due to the employment by the contractor of too few men, and to their not working overtime. Witness admitted that he had already stated that he had no trouble with the workmen, although he had in June, 1894, written to the architects complaining that the men, being trade unionists, thought they had the guardians at their back. This was the fact: the men would not hurry over the work nor make overtime. The wrought-iron girders and cast-iron columns, &c., were supplied by Drew-Bear, Perks, and Co., under a verbal arrangement as to prices, and amounted in weight to over 100 tons. When they were being supplied in November, 1892, two B L girders were rejected because too light, and a second lot was condemned because the top plates were too heavy by 2in. The second was brought down to weight, and was eventually used. Had no recollection of Poole complaining that the girder was still 47lb. too light, but that as Messrs. Harston did not lay stress on the weight, thought it might be used. Nearly all the ironwork was over the specified weight. The learned Referee: There seems to be no complaint in the architects' letters as to the quality, only as to the weight. Witness said it was true that Poole objected to the 32 cast-iron columns in Block C, on the ground that they were rough. Mr. Harston examined them, and rejected several. —The cross-examination of Fearon was continued on Tuesday, the witness being taken in great detail through the particulars of the ironwork. Witness admitted that on October 4, 1892, he wrote to Messrs. Harston agreeing that certain brackets were not exactly at right angles to the columns, and offering to replace them if necessary, but pointing out that the job was for a workhouse, and not for a drawing-room or a Regent-street shop. The columns were not of bad quality, and in fact Poole only condemned thirteen. He never kept any books in which were entered what goods came on to the works. The invoices, however, were properly booked up. He obtained the consent of Messrs. Harston for the sub-contracting for the ironwork—

that consent was not in writing; but the architects knew that witness could not cast the iron himself. There might probably have been a complaint on Oct. 25, 1892, about the columns not being in line. Poole complained about them on that day, and witness pointed out that the columns were not then fixed up. It was not true that Poole could have put his little finger into the joints of the columns when first fitted, nor were there any errors in setting-out. Witness received a complaint on Nov. 15, 1892, from Messrs. Harston, stating that lugs or ears were not cast on certain columns; he did not reply to that letter in any way, but immediately ordered fresh columns. On March, 1893, he received a complaint from Messrs. Harston that the columns in Block H were not in line; but they were put right when the building was sufficiently advanced, and they were braced together with the beams. Some of the rods used by him were welded. The bars were thin things, but they had no bottom flanges. There were welded rods used both in B and K Blocks. Witness could go to B Block, and point them out to the learned counsel. There were no complaints as to the rods in Block C, as they were put in according to the plans and specification. Examining the plan [produced], witness repeated that they put in the rods in two lengths according to agreement. On Oct. 9, 1893, Poole called his attention to the bars forming the grid on one floor, complaining that they were too short or in the wrong place. That was mostly an unfounded complaint or frivolous. The learned Referee said that his opinion was that the specification was at fault in this case. He thought the witness had done the best he could under the circumstances. Witness was next examined as to the facing bricks. He explained that on July 5, 1892, he arranged with Mr. E. P. Brown, who was a friend of Poole's, for him to deliver some gold-stock facing bricks at Blackfriars at 3s.—45s. for picked facings. Poole told him that he did not condemn the whole consignment of bricks, but only the picked stock facings. He received no discount on the bricks, with the exception of the 2½ per cent. for cash in a month. Probably Poole marked some brickwork on Sept. 28th, 1893, as he was continually so doing, and he might have complained that they were not proper facing bricks. The men rubbed Poole's marks off, and left the bricks there, although Poole had intended that they should cut the bricks out. These bricks were still in the building. The learned Referee said, that being so, they could see whether the bricks were really good or bad. If a man did not use his discretion in such matters reasonably, or acted capriciously, he (the Referee) should not regard it at all. If Poole capriciously rejected bricks, he would not recognise it. Mr. English Harrison thought, with all deference, that was not quite the point. The learned Referee replied that he wanted to see the clerk of works and the architects in the witness-box. He wished they were there at that moment. He should be very glad to hear what Poole had to say about it. He did not think it helped the case in the slightest to take the witness through all these details. Mr. English Harrison said that the plaintiffs were trying to make the learned Referee sit as a Court of Appeal on the discretion of the architects, so that he felt he must go into these matters. Witness continued that he got a barge-load of facing stocks from Smeed, and at slightly lower prices—a shilling or two a thousand, on an average; but they were rejected on account of colour. Poole also said they were chipped during selection; but this was not the case. In October, 1893, Poole pointed out to the then foreman, Brown, that the labourers were using best stock facing bricks in the basement; but those bricks had already been condemned by Poole himself, who did not recognise them again. They could not use the bricks for any better purpose, as they had been condemned. Samples were produced, when the learned Referee asked what fault could be found with those in court as facers for a workhouse? It gave him the impression that somebody or other was a martinet in the condemnation of these bricks. He could not see why the bricks produced could not have been used. On Wednesday the witness was further cross-examined as to the timber and woodwork used in the buildings. Witness admitted that in many cases—hundreds of instances—his men planed off from the small rafters the chalk marks made by Poole when he condemned the wood, and used the material in the roofs. The rafters with the plane marks on them could still be seen in the buildings. Poole was constantly condemning timber, and had declared he would only allow to be used wood without heart, knots, or sap, and witness replied that such timber did not exist. Within the past fortnight witness had read the whole of Poole's diary from beginning to end, in order to see how far it was correct, and to prepare himself for giving evidence. In September, 1893, witness obtained sixteen beams of timber from Tolputt, of Folkestone, as tie-beams for the laundry block, and they were condemned at once by Poole as d— rubbish. Some were chalked by Poole as unfit before being unloaded from the trucks, and witness sent them straight back to Folkestone. A second consignment of the

beams were sent by Tolputt, and some of these were also condemned by Poole; but after being seen by Mr. Harston were passed, and were used, with the exception of some pieces cut up for sundry purposes. Tolputt, after this, refused to send any more timber, and witness selected logs from Baynes and Beard, of Reading, and elsewhere. Witness paid 3s. a cubic load (delivered) to Tolputt, but had to pay more to the other firms to complete the order [quotations and invoices produced]. Witness had no place provided on the site on which to stack and season his floor-boards and other timber. Poole also objected to the quality of the slates, and to the way in which they were holed. Witness made a large profit (25 per cent.) out of the slates, and if he had been allowed his own way he would have done as well out of the contract all round. Complaints were also made as to the roughness and bad fixing of the ridge rolls, and better ones at a higher price were ordered. The whole story of the job turned on this, that a better class of materials was demanded than had been specified. The sub-contractors, including Messrs. Tilley, who sunk the well, and Messrs. Yates, Heywood, and Co., who supplied the stoves, delayed the work considerably by interference. Cross-examined by Mr. McIntyre, for Messrs. Harston: This was Brooks's first contract in London, nor had witness previously superintended a London job. Brooks's largest previous work was the Folkestone Hospital, £10,200, and local wages and prices were lower than in the Metropolis: this was allowed for by witness in making up his estimate, and added 10 per cent. as profit in sending in his accepted tender of £50,861, after its acceptance by the guardians. In May, 1892, Brooks asked to withdraw his tender, not for financial reasons, but on account of the probable worry. Mr. Harston would have treated witness better during the contract if it had not been for the clerk of works. There were cases in which Mr. Harston overruled the clerk of works. Witness was at first on friendly terms with the clerk of works, and invited him on a visit to his house at Folkestone. The cross-examination of Fearon by Mr. Macintyre was continued throughout yesterday (Thursday). Witness said that no difficulties arose with Poole till February, 1893, when a letter was written by Brooks to Mr. Harston, complaining of Poole's dissatisfaction with the materials and work. Mr. Harston came down and investigated the complaints, and said witness must comply with Poole's requirements to the letter. He afterwards wrote that the clerk of works' powers were limited, and they could appeal to the architects, but the materials must be up to sample and specification. On April 21, 1893, Brooks's creditors were called together, and it was arranged that he (Brooks) should go on, with their help. Witness wrote to Poole to that effect. As a matter of fact, the contractor went on till December, 1894. Witness often appealed to Mr. Harston, who invariably upheld the opinion of the clerk of works. Under the contract the clerk of works had no right to "condemn" materials, but he rejected them. In some cases witness ignored the condemnation, and left the work. Mr. McIntyre: I will put it to you that there were three courses adopted: Where you replaced work condemned by Poole, you knew it was not according to specification; where you appealed to the architect, you were not sure if he would allow it; where you ignored Poole's orders, you hoped it might pass muster. Witness: I cannot say. In order to get space on the works witness sold about 30,000 of the old bricks at 8s. a thousand, and it was true that he used some snapped bricks and bats in a boundary wall where it did not matter. After some further cross-examination the Court rose till to-day (Friday).

BRADFORD BUILDING PARTNERSHIP DISPUTE.—An action by Mr. Sawrey, of London, against Mr. Binns, a Bradford builder and contractor, claiming a declaration that he was an equal partner in defendant's business, which had engaged Mr. Justice Stirling in the Chancery Division since the previous Saturday, was announced, on Friday morning, to have been settled by the parties out of court. Mr. Graham Hastings, Q.C., who appeared for the plaintiff, said terms had been come to which, as the parties were *sui juris*, it would not be necessary to trouble his Lordship with; but he might say that the settlement was on the basis of no partnership, and the conveyance of plaintiff's moiety of the real estate, which had been purchased jointly, defendant indemnifying plaintiff in respect of any claim of the vendor building society, with liberty to apply. Mr. Tindal Atkinson, Q.C., for the defendant, said that the settlement was to be in satisfaction of all claims between the parties.

LONDONDERRY.—ASYLUM SITE ARBITRATION.—A court of arbitration, constituted by Order in Council under a special Act of Parliament, to determine the amount of money to be paid to the landlords and the tenants of the lands at Gransha proposed to be taken for the purpose of erecting on them a new asylum for the county, was held on Friday in the Londonderry Courthouse. Mr. J. A. Alexander was appointed foreman of the jurors. Gransha was, it was explained, situate

about 3½ miles from the city. The lands the Board of Control proposed to take contained 291a. 2r. 21p. The total tenement valuation was £305 15s. The lands were held at a judicial rent of £300 a year. It was a statutory tenancy, which was in lieu of a lease made in the year 1874 by the Irish Society to the Messrs. M'Learn, at the yearly rent of £445. The Board of Control, being unable to agree with the parties as to the amount to be paid for their respective interests in these lands, had, under the statute provided for the purpose, summoned the jurors there to act as arbitrators to fix what sum should be paid. There was no compulsion, the lands having been offered to the Board of Control. Evidence having been given at some length, the jury, after deliberation, awarded the Irish Society £6,000, and Mr. William M'Learn and Mr. Paul B. M'Learn £5,000.

IS A CYCLE SHELTER A PUBLIC BUILDING?—At the Hastings County Police-court, on Saturday, Henry Young, of Cooder Mount, Little Common, a member of the Bexhill Urban Council, was summoned for contravening the by-laws in the erection of a building—a cycle chalet—on the sea front at Bexhill. Matthew Graves, surveyor to the council, proved the accuracy of a plan showing the Bexhill front and the position of the chalet. It was erected of glass, wood, and iron; the foundation was of concrete. After its erection defendant sent in plans, and they were rejected. Cross-examined: As surveyor he found himself unable to say it was a public building. As far as he knew, it was not built for human habitation. The building could be made to comply with the by-law only by erecting a wall 13½ in. wide inside the present shell. Practically, however, the present building would have to come down and another one put up. The cubical contents were about 8,000c.ft. For the defence, George H. Gray, surveyor to Lord De la Warr's estate, said the building was now 8ft. 2in. from the kerb from the nearest point. There had been a recent alteration in the line of the kerb. The land on which the shelter was built and around it belonged to Lord De la Warr. There had, to his knowledge, never been any dedication of the roadway to the public. The Bench came to the conclusion that the building was a public one, and defendant was fined 10s. and costs. The Bench agreed to state a case for the Superior Courts.

DRAIN OR SEWER?—VESTRY OF ST. MARTIN-IN-THE-FIELDS V. WARD.—In the Court of Appeal, on Friday, the Master of the Rolls, Lord Justice Lopes, and Lord Justice Rigby gave judgment in an appeal by the plaintiffs from the judgment of Mr. Justice Wills at the trial of the action. The plaintiffs sought to recover from the defendant, as the owner of No. 19, Buckingham-street, the costs incurred in constructing a drain to his premises and in connecting the drain with a sewer. The premises had formerly been drained by a drain communicating with an old sewer, which lay to the rear of the premises. In 1894 the vestry made a new sewer in front of the premises, and they called upon the defendant to connect his premises with the new sewer by a drain. The defendant having failed to do this, the vestry executed the necessary work themselves, and brought this action to recover the expenses incurred thereby. The plaintiffs' case was that the drain connecting the defendant's premises with the old sewer was an insufficient drain, and that, under section 73 of the Metropolis Management Act, 1855, they were entitled to require the defendant to connect his premises with any sewer within 100ft., and, on his default, to make the connection themselves and charge the defendant with the expenses. The defendant's case was that, under section 69, it was the duty of the plaintiffs to construct the new drain and connect it with the new sewer, and therefore they were not entitled to recover from the defendant the costs which they had incurred in so doing. Mr. Justice Wills gave judgment for the defendant, and the plaintiffs appealed. The Court, without calling upon counsel for the defendant, dismissed the appeal. The Master of the Rolls said that the vestry in this case had made a new sewer, and, contrary to the will of the defendant, had made a new drain from his house to the new sewer. The question was whether they could make him pay for the work of making the new drain. The two sections of the Metropolis Management Act to which they had been referred—sections 69 and 73—gave the vestry different powers in two sets of circumstances. By section 73, if the vestry had a sewer vested in them, and if a house within 100ft. of the sewer was not drained by a sufficient drain communicating with that sewer, they might require the owner of the house to construct a drain connecting his house with the sewer, and on his neglecting to do so they might do the work themselves and charge him with the expenses. Section 69 gave them the power to consider the existing state of the sewage in any district, and if they came to the conclusion that the system was bad, to make a new system; and in such a case they might cause the houses which had been drained into the old sewer to be drained into the new sewer which was substituted for it. But they could not then make the owners of the houses pay the

expenses. In the case of "Vestry of St. Marylebone v. Viret," Mr. Justice Willes laid it down as law that, where a vestry purporting to act under section 73 has found that any drains are insufficient, it must be ascertained whether the proceedings are properly proceedings under section 73 or section 69. In the present case the vestry were acting under section 69; they were making a new system of drainage for the benefit of a district. They, therefore, had no power to make the defendant pay the expenses with which they sought to charge him. The judgment of the learned judge was right, and the appeal must be dismissed. The Lords Justices delivered judgments to the like effect.

A NOTTINGHAM ARBITRATION.—Sir Frederick Bramwell, who was appointed arbitrator in regard to the claims of the Nottingham Corporation and the Nottingham Board of Guardians against the Manchester, Sheffield, and Lincolnshire Railway Co., as to the property to be acquired in the borough for the purpose of the company's extension to London, has given his award. The total claim of the Corporation amounted to £225,155, and that of the Guardians to £130,986. Evidence upon the matter was heard by Sir Frederick Bramwell at the Surveyors' Institute, Westminster, the proceedings commencing on July 27th and concluding on August 7th. Sir Frederick has now awarded the Corporation £122,653, and the Board of Guardians £31,244.

DRAIN OR SEWER.—**APPELLEED V. LAMBETH VESTRY.**—This action, recently heard by Mr. Justice Hawkins, sitting without a jury, in the Queen's Bench Division, was brought for a *mandamus* and a declaration. The question was whether the drainage of four houses in York-road, Lambeth, was carried by a "drain" or a "sewer." Mr. McCall, Q.C., for plaintiff, said that on September 20, 1838, a building lease of the land in question and other land in York-road, occupied by the houses 85, 87, 89, 91, was granted to Messrs. Grissell and Peto. Messrs. Grissell and Peto erected these houses with drains as they now exist. The plaintiff had acquired the property by devise under his father's will. In 1895 there were several cases of diphtheria in these houses. On November 28, 1895, Mr. Barfoot, the sanitary inspector of the defendant vestry, served upon the plaintiff a preliminary notice requiring him to remedy the drainage of these premises, the drain then being an old brick barrel drain. The drain leading to the main sewer ran under No. 89. On January 13, 1896, the statutory notice from the defendants to the plaintiff was served, requiring the plaintiff to reconstruct this drainage. It was an admitted fact that the drainage was defective. The plaintiff, having received the notice, consulted his surveyor and solicitor, and an inquiry was made into the history of the so-called drain, and the plaintiff was advised that it was a sewer, and the vestry were liable to repair it themselves. Plaintiff contended (i.) that the building of the houses was commenced in 1838, and finished in 1840; (ii.) that the houses were rated to the poor in 1840 by the description of Nos. 8, 7, 6, and 5, Charles-Place, York-road, Lambeth; (iii.) that the present system of combined drainage of the said houses has existed from the date of the erection of the said houses. There were two branches running into the drain. This so-called drain or combined system of drainage, he contended, was a sewer, if it received the sewage from and drained these four houses; unless the defendants could satisfy his Lordship it was a drain for draining a group or block of houses by combined operation, laid or constructed before January 1, 1856, and pursuant to an order or direction, or with the sanction or approval, of the Metropolitan Commissioners of Sewers. This was contained in 25 and 26 Vict. c. 102, s. 112. There was no presumption that any such sanction had been given from the mere fact that the drain existed before 1856; this was established by the case of the "Vestry of St. Leonard's, Shoreditch, v. Phelan." The defendants had produced no order showing any sanction. Mr. Thompson, a surveyor, gave evidence of the drain. He said the left branch drained other houses, the right branch, which was a 12in. drain, was sealed up. The drains were defective and injurious to health, and required clearing, cleansing, and emptying. Mr. Tindal Atkinson, Q.C., for the defence, said the whole question was whether this was a sewer or drain. In order for the plaintiffs to succeed in getting a *mandamus* they must show the defendants were liable. The plaintiffs relied, presumably, upon 18 and 19 Vict. c. 120, section 68; but in order to succeed he must show the defendants were liable, and the onus of proving this lay on him. The definition of "drain" and "sewer" was contained in section 250 of the Act of 18 and 19 Vict. c. 120, and from that it was clear that a thing only became a "sewer" when it was shown not to be a "drain." Then section 112 of 25 and 26 Vict. c. 102 came, and under that the onus was on the plaintiff of showing this was a "sewer," because it could not be a "sewer" until it was shown that it was not a "drain." In the case of "St. Leonard's, Shoreditch, v. Phelan," which had been cited, the question of onus was not decided. The moment it was

shown this was for the drainage of a combined system it was *prima facie* a "drain." There was an intimation in section 74 of 18 and 19 Vict. c. 120, of the meaning of a combined system. The presumption was that this drain on private property was a "drain" and not a "sewer." If the onus was on the defendants it was a more difficult question. Before 1855 the drainage of this district was vested in the commissioners of sewers for certain districts in Surrey and Kent, and until 1843 this was undoubtedly private property over which the commissioners could have no control. The records at the County Council, he contended, showed that this drain was made with the sanction of the Commissioners of Surrey and Kent, the predecessors of the Metropolitan Commissioners of sewers. Mr. McCall, Q.C., in reply, said, as to the onus of proof, that question was concluded by "Kershaw v. Taylor" and "Regina v. Bethnal Green," from which cases it was clear that the moment it was shown that this drain received the drainage of the two houses and these four houses, *prima facie* it was a sewer. As to the other point, when the statute mentioned the sanction of the Metropolitan Commissioners, it could not mean the sanction of the Commissioners of Surrey and Kent. Mr. Justice Hawkins reserved judgment.

BREACH OF BY-LAWS.—On Wednesday, the 18th instant, H. Weaver, of 51, Ingrave-street, Battersea, was summoned before the Wimbledon magistrates by the Wimbledon Urban District Council in respect of two houses being erected by him in Trinity-road, Wimbledon, for contravening by-law 58 by using purlins which were not of sound and good quality in the construction of the roofs, and for not building in accordance with the deposited plans. The timber used for purlins had previously been condemned when fixed as floor-joists. The defendant was fined the full penalty in each case, amounting in all to £20, together with 2s. costs, or in default of payment one month's imprisonment.

CHIPS.

The proposed Suchan line of railway and a line between Hankow and Canton has been sanctioned by the Emperor of China.

Mr. John W. Cowfoot, B.A., Senior Hulme Exhibitioner of Brasenose College, Oxford, has been elected to the studentship at the British School at Athens for the years 1896, 1897.

The Sedgwick Memorial Museum Syndicate of Cambridge University recommend that the Sedgwick Memorial Museum be erected upon a portion of the Downing College site, and that the grace of the Senate which assigned a site for the building on the old Botanic Garden be rescinded. This alteration of the site will make it necessary that fresh plans be prepared.

At a largely-attended meeting held on Wednesday, in the Palace, Dublin, the Archbishop of Dublin, presiding, it was decided to perpetuate the memory of the late Archbishop of Canterbury by erecting memorials to him in the following cathedrals:—Christ's Church and St. Patrick's, Dublin; St. Brigid's, Kildare; St. Patrick's, Armagh; St. Colomb's, Derry, and in the new cathedral which is about to be erected in Belfast. The form of the memorial in each case is to be left to the authorities of the cathedrals to decide upon.

Hillas Hudson, a builder, who had been residing at Clacton-on-Sea, was committed for trial, bail being allowed, at West London Police-court on Wednesday, on a charge of obtaining money on two cheques drawn on the Chiswick branch of the London and South-Western Bank by false representations. It was alleged that the cheques were drawn after the prisoner's account had been closed.

The Lancashire, Derbyshire, and East Coast Railway—generally known as the "East to West Railway"—was opened for goods and coal traffic yesterday (Thursday). To-day (Friday) the Duke of Norfolk will cut the first sod of the Sheffield District Railway, which will carry the Lancashire, Derbyshire, and East Coast Railway, and over it the Great Eastern Railway also, on to Sheffield. The line will be about nine miles in length, extending from the junction at Beighton with the East to West Railway to a terminus at Attercliffe, in the centre of the steel industries.

A Bill will be promoted in the next session of Parliament for the construction of a railway connecting the harbour now in course of construction at Hastings with the South-Eastern line. The line will be $\frac{1}{2}$ miles long, and the cost is estimated at £200,000.

A gigantic wheel is to be built at New Brighton above the roof of the present Palace buildings. The tower contractors are rapidly making a transformation in the grounds at Rock Point on the property. About 300 men are employed on the ground, and the football inclosure, which is to be surrounded by a cycling track, is so far advanced that the grass is being laid down. The extensive buildings at the base of the tower are also well on towards completion.

Our Office Table.

THE Dean of Salisbury, Dr. Boyle, makes a fresh appeal for funds to assist in the work of securing the safety of the tower and spire of Salisbury Cathedral. The foundations of the tower have, he states, been strengthened with large stones and Portland cement concrete. Great progress has been made on the tower and spire, and the work has met with the perfect approval of the architect to the Dean and Chapter, Sir Arthur Blomfield, A.R.A. The replacement of shattered stones, with strict regard to the original design, is a work of great delicacy, and is being carried out by Mr. Thompson, of Peterborough. If the Dean and Chapter are able to complete the work, they believe the tower and spire of Salisbury will be secured for many generations. But they still want funds. The sum of £9,500 has been collected, and a further £5,500 is still needed.

THE well-known church of St. George, Hanover-square, which was greatly injured by fire on Wednesday night, is one of the fifty new churches built in London during the reign of George I. It was built by John James, and was consecrated in 1724. The lofty and well proportioned tower of Portland stone has been almost completely destroyed, together with the greater part of the organ-loft, and many of the fittings of the church have been consumed and the stained-glass windows broken. The fire, which taxed the resources of the Fire Brigade, under its new chief, Commander Wells, and was not extinguished till after midnight, originated in the belfry, the conjectured cause being the fusion of electric wires passing through the structure.

WE understand that the Surveyors' Branch of the Department of the Director of Engineering and Architectural Works of the Navy has recently been reorganised, and that a competitive examination is shortly to be held for three vacancies for established assistant surveyors of the second grade, with a commencing salary of £125 per annum, and £50 additional when employed in London. Under the new scheme it is impossible for an assistant surveyor of the second grade to rise by merit, through the intermediate grades of assistant surveyor, first grade, and surveyor, to the position of chief surveyor, for which the maximum salary is £800 per annum. Particulars of the forthcoming examination can be obtained by applying to the Secretary, Civil Service Commission, applications to be received by the 2nd December, as mentioned in the advertisement in these columns.

LORD HASTINGS is taking steps to lay out his estate at Seaton Sluice, between Hartley and Blyth, Northumberland, the most picturesque coast scenery within easy reach of Newcastle, as a seaside resort. The scheme now being worked out by Messrs J. Potts and Son, architects, of Newcastle and Sunderland, in conjunction with Lord Hastings' agent, Mr. H. J. Snowball, includes an alteration of the main turnpike from Tynemouth to Blyth where it passes through the village, the road being widened and a fuller and better curve given to it. Eventually this road will be widened and improved where it forms the approach to a new bridge over Seaton Burn, and from the north end of the bridge it is proposed to carry the road straight on to Blyth instead of having to make, as is now the case, an inconvenient turn to the left. An area of over an acre in extent, now occupied by old cottages, will be cleared and laid down in grass and paths, with seats for visitors. On the ground between this open space and the top of the cliff two terraces of houses are being laid out facing to east, seaward over the rocky bay, and to the west on to the new village green. On the left hand of the main road a new crescent, now being rapidly built up, will extend from the Co-operative Stores to the old Reading-room. The effect of the alterations will be to give those living in, or passing through, the village a full and uninterrupted view of the links and sandy coast stretching from the village to Blyth, a distance of $3\frac{1}{2}$ miles. New streets are being laid out, and houses are in course of erection to the south-west of the village. A system of drainage has already been carried out.

An infectious diseases hospital is being built for the Bristol Corporation at Ham-green, on the Avon, from plans and under the supervision of Mr. T. H. Yabbicom, the borough engineer.

MEETINGS FOR THE ENSUING WEEK.

MONDAY.—Surveyors' Institution. "The Agricultural Rates Act, 1893," by Walter C. Ryde. 8 p.m.
Society of Arts. "The Use of Gas for Domestic Lighting," Cantor Lecture No. 1, by Professor Vivian B. Lewes. 8 p.m.

TUESDAY.—Institution of Civil Engineers. "Bacterial Purification of Water," by Dr. Percy F. Frankland, F.R.S. 8 p.m.

WEDNESDAY.—Society of Arts. "Recent Developments in Mechanical Road Carriages," by W. Worby Beaumont. 8 p.m.
Carpenters' Hall. "Sanitary Requirements," by Professor H. Robinson. 8 p.m.

THURSDAY.—Society of Architects. Presidential Address, by Robert Walker, J.P., of Cork. St. James's Hall, Piccadilly. 8 p.m.
Arts and Crafts Exhibition, the New Gallery, Regent-street. "Public Gardens and Squares," by Reginald Blomfield. 8.30 p.m.

The Society of Architects.

Founded 1884. Incorporated 1893.

The FIRST ORDINARY MEETING of the Society of Architects for the Session 1895-97, will be held at the Rooms of the Society, at St. James's Hall, Piccadilly, W., on THURSDAY, NOVEMBER 26th, 1896, at Eight p.m., when the PRESIDENTIAL ADDRESS will be delivered by Mr. ROBERT WALKER, J.P.

ELLIS MARSLAND, Hon. Sec.
MONTAGU BALDWIN, M.A., Sec.

The local gas company have just completed alterations and improvements at their gas works at Northallerton, having erected carbonising plant, which has been fitted up on the generating principle by Messrs. J. Welsh and Sons, of Halifax. The new building has been designed by Mr. Wm. Bell, architect, Northallerton. The company have also laid down an annular condenser by Messrs. Clayton and Co., of Leeds. The works have been erected under the superintendence of Mr. W. Marshall, for 25 years gas manager at Northallerton. The supply of gas can now be doubled, while the cost of the new plant is a trifle over £1,200.

The hall of the Cordwainers' Company, in Cannon-street, E.C., has just been redecorated throughout. The former decoration had been in existence for many years, and the introduction of the electric light into the premises in the spring of this year necessarily defaced certain parts. The plaster decorations of the hall are of the Brothers Adam style, and an anaglypta dado has now been fitted round the room, serving as a base for the upper part. Two mirrors in the same style have been fixed on the north wall. The general colour of the walls is buff above the brown dado, and the plaster frieze is finished in green, with the ornamentation picked out in white. The whole of the gilding has been renewed. The work has been executed by Messrs. Campbell, Smith, and Co., of Newman-street, Oxford-street, and the mirrors were supplied by Messrs. Jackson and Sons, of Rathbone-place. The decorations were designed by the company's surveyor, Mr. Howard Chatfield Clarke, of Bishops-gate-street Within, and have been carried out under his personal superintendence.

The Dormer aisle, together with the central transept of the church of St. Mary, Loug Crendon, Bucks, have recently been restored, according to the plans of Sir Arthur Blomfield and Sons. The cost of the work is some £450. A new oak roof has replaced the dilapidated old one; new lead work and glass have been put in the two late Perpendicular east windows in the Dormer aisle, and the west window of the like date has been adjusted and made firm. Much of the stonework in the walls has also been repaired. The central columns that support the tower, together with the chancel arch, have also undergone a restoration.

In the Consistory Court of London, on Friday, Dr. Tristram, Q.C., granted a faculty to sanction improvement in the neighbourhood of the churchyard of St. Peter Cheap by throwing into the roadway of Wood-street a portion of the churchyard. St. Peter Cheap was one of the parishes in London where the church having been destroyed by the Great Fire, the building was never re-erected. The churchyard, however, has remained, and was used for purposes of interment up to 1859, when it was finally closed. An agreement has now been entered into with the Commissioners of Sewers for throwing into Wood-street about 94ft. of the churchyard, the purchase-money, £200, to be paid into the Bank of England. Any human remains discovered will be removed to Ilford Cemetery. The Rev. Dr. Sparrow Simpson (the rector), and Mr. Francis Chambers (of 11, College-hill), the surveyor, gave evidence in support of the application, Mr. Chambers mentioning that the celebrated plane-tree, which had formerly been one of the landmarks of the City of London, would not be interfered with, although it was proposed to build the rector's house near it.

Trade News.

WAGES MOVEMENTS.

HARTLEPOOL.—The ex-Mayor of West Hartlepool, Councillor T. Clarkson, who was appointed umpire to settle the dispute between the house joiners in the Hartlepoons and the employers, gave his award on Friday in favour of the masters. The joiners demanded an advance to 9d. per hour, and after a strike they obtained 8½d., and returned to work on the conditions that the other ½d. should be referred to arbitration. Two arbitrators were appointed—namely, Mr. W. H. Fisher for the masters, and Mr. R. Martin for the men; but as they could not agree, they decided to refer the question to Councillor Clarkson, who was then mayor, and, having considered both sides of the question, he has decided that the wages shall be 8½d. per hour.

NANTWICH.—The strike of Nantwich joiners, which commenced six months ago, terminated on Friday by the action of the men themselves. Having failed to obtain an increase of 1d. per hour in wages and an alteration of working rules, the men have concluded a compact under which no union men will be allowed to receive employment from builders in the district who decline to grant the advance. Repeated attempts to arrange a conference of employers and representatives of strikers failed. During their long struggle the men have been supported by levies from various trades societies in Loudon, Lancashire, and the Midlands.

CHIPS.

A Methodist New Connexion chapel is about to be built at Pelton Fell, near Gateshead, from plans by Mr. J. W. Thompson, of Collingwood-street, Newcastle-on-Tyne.

New schools are being erected at Pitt-street, Norwich, and special consideration has been given to the ventilation, which will be carried out on the Boyle system.

In the village of Wigginton, near Tring, there has been opened a new parish room. The building is in the 16th-century Perpendicular style, with red brick facing and Bath stone dressings. At the east end there is a window with four lights, and the roof is open, with red tiles. The large room is 40ft. by 22ft., and the reading-room 30ft. by 14ft., there being accommodation for about 300.

The Great Western Railway Co. will seek powers next session to construct a line between Chacewater and Newquay, with intervening stations at St. Agnes, Perranporth, and Conhaven. It will be 13 miles in length, exclusive of a piece of an old mineral railway relaid *en route*, and is estimated to cost £135,000.

A Local Government Board inquiry took place on Friday, at King's Heath Institute, by Colonel A. G. Durnford, R.E., in respect to an application by the King's Norton Rural District Council for sanction to borrow two sums of £1,400 each, to be expended in the execution of works of sewerage for the parish.

The city council of Worcester decided on Tuesday to advertise for plans for a scheme of sewage disposal, premiums to be offered to those considered most satisfactory. The sewage committee were instructed to draw up conditions.

At Glossop parish church on Monday week Archdeacon Freer preached at the dedication of new carved oak choir-stalls, erected by the congregation at a cost of £180. The stalls were designed and made by Messrs. Jones and Willis.

The reopening services in connection with the improvement and enlargement of the Congregational church at Plaistow took place on Thursday in last week. The alterations consist of throwing the gallery entirely into the building, the erection of an organ loft, while the roof is now entirely in one section. This will give increased seating accommodation to the extent of 260 persons. Mr. Jacobs has been the architect, and Mr. Holland, of Leyton, the builder, the contract being for £2,077.

Sir Arthur Hodgson presided at a special meeting of the Governors of the Midland Counties Home for Chronic and Incurable Diseases, held at the Pump-Room, Leamington, on Saturday afternoon, at which plans by Mr. Hawley Lloyd, of Birmingham, hon. architect to the institution, were conditionally adopted for adding a new wing containing thirty beds to the home at Leamington, the estimated cost for erection and furnishing being £7,000.

Application having been made by the Trowbridge Urban District Council to borrow £20,000 for the purpose of carrying out a sewerage scheme, an inquiry was held in that town, on Friday, by Mr. F. H. Tulloch, on behalf of the Local Government Board. Mr. W. H. Stanley, engineer for the works, explained the proposal.

The course of business at the Auction Mart last week reflects the general tendency of the market, which shows that the demand for investments of a solid character is unabated, while those of a more speculative nature, or of inferior quality, are little sought after. On three days the supply was short and of a mediocre class; but on the fourth day, when some good properties were brought forward, there was considerable competition, and every lot was disposed of at unusually good prices, the result being that a satisfactory week's work was recorded.

Building operations will shortly be commenced in connection with the removal of the Theological College of the Presbyterian Church of England from the present premises in Bloomsbury, London, rented from the Foundling Hospital, to a permanent home of its own at Cambridge, in the vicinity of St. John's College, with the architectural style of which the new structure will be in keeping. The architect is Mr. H. T. Hare, whose designs were recently selected in a limited competition.

Harborne parish church was reopened on Friday after being closed for the past six weeks for renovation. The work has included new clerestory windows in the roof of the nave, windows in the roof over the galleries, reslating the roof, new hot-water radiators, and enlargement of choir and clergy vestries at a cost of about £710. Mr. R. Heatou was the architect, and Messrs. Moffatt and Sons were the builders.

Memorial stones of a new Baptist Chapel for Pudsey, now in course of erection, were laid on Saturday. It is fifty years since the Baptist cause was started in Pudsey, and the present chapel, which it is now proposed to be converted into a school, was opened in 1851. The total cost is estimated at £2,600.

Sir J. Fitch unveiled on Saturday a brass tablet at the Borough-road Polytechnic, to preserve a record of the fact that the site had been occupied for educational work for nearly 100 years.

The London and North-Western Railway Company have issued their Parliamentary notice with regard to the Flintshire section of their line. It is proposed to carry out alterations in Saltney, Greenfield, Tremostyn, Trevaelod, and Gronant. The company also seek power to acquire land in the townships of Whelston, Holywell, Greenfield, Isglan, Blycton, and Hawarden.

Mr. Robert H. Bicknell, M.I.C.E., Local Government Board inspector, held a public inquiry at the Bootle Town Hall on Tuesday with reference to the application of the corporation for sanction to borrow £1,698 for the acquisition of land adjoining the town hall for the purposes of a technical school and the future extension of corporation buildings.

There is no truth in the rumour that the little church of St. Mildred, Bread-street, E.C., is threatened with speedy destruction. The vaults of the sacred edifice are being cleared of some ancient human remains, and it will, in consequence, be closed for six months; but there is no project on foot for destroying the building.

Beaumont Lodge, the quaint old house in Wood-lane, Shepherd's Bush, which was for many years the residence of Mr. E. J. Poynter, the new President of the Royal Academy, is about to be pulled down in order to make room for the terminus of the Central London Railway. When Mr. Poynter removed to his present house in Albert-gate, another eminent artist, Mr. Walter Crane, became the tenant of Beaumont Lodge, and lived and worked there until two or three years ago.

It was reported at a meeting of Glasgow City Parish Council on Friday that a license had been granted by the General Board of Lunacy for the new asylum at Gartloch. The institution will be opened on Thursday in next week, and will accommodate at once 100 male and a similar number of female patients. We illustrated the building, of which Messrs. Thomson and Sandilands, of Glasgow, are the architects, in our issue for Dec. 11, 1891.

New board schools in Cleveland-road, Ilford, were opened on Tuesday week. They have been built from plans by Mr. C. J. Dawson, at a cost of upwards of £20,000, and accommodate 1,614 children. The building is three stories in height, and is planned on the central-hall principle. Messrs. Kirk and Randall, of Woolwich, were the contractors, and Mr. George Wren was the clerk of works.

A meeting was held on Thursday se'nuight in the library of the Royal Scottish Academy at Edinburgh to present diplomas and medals to the recently-elected Honorary Professors, Academicians, and Associates. The president, Sir George Reid, occupied the chair. The recipients were:—Emeritus Professor Masson, elected Hon. Professor of Ancient Literature; Dr. Joseph Anderson, elected Hon. Professor of Antiquities; Messrs. John Lavery, W. G. Stevenson, Hippolyte J. Blanc, William Leiper, and John Honeyman, Academicians; and J. Thorburn Ross, R. Paton Reid, James Paterson, and Wellwood Rattray, Associates.

CHIPS.

The Duke of Cambridge has consented, on the invitation of the Lord Mayor, to open the new extension of the Jew's Hospital and Orphan Asylum, West Norwood, early in the spring. The Lord Mayor and the sheriffs will attend in state.

It is not, the *Athenaeum* understands, the intention of the new President of the Royal Academy to resign, at least for the present, the directorship of the National Gallery. Like Sir Charles Eastlake, Mr. Poynter anticipates no difficulty in filling both these distinguished offices.

An inquiry was held at the Guildhall, Lichfield, on Wednesday, before Colonel A. G. Durnford, R.E., an inspector of the Local Government Board, respecting the application of the city council to borrow £3,000 for works of sewerage in the Trent Valley-road district.

Contracts are in hand, under the supervision of Messrs. John Judson and Moore, architects, Keighley, for the enlargement of the Keighley Drill Hall, at a cost of about £700. In the present yard is to be placed a two-story building, with gymnasium, billiard-room, and canteen on the ground floor, and a large band-room above.

The Admiralty have given instructions for plans to be immediately prepared for the erection of new naval barracks at Sheerness for the accommodation of the gunnery school established at that port four years ago. The block of buildings occupied at present affords insufficient accommodation, and quarters are to be provided in the new buildings for 30 officers and 1,000 seamen.

The Cheshire County Council have adopted a scheme propounded by the public health committee for grouping the county (after excluding the larger boroughs) into nine joint isolated hospital districts, in each of which a hospital for infectious diseases is to be provided.

Lady Henry Somerset has agreed to sell to the local authority at Reigate, for the sum of £300 an acre and a half of ground in practically the centre of the town, as a site for the erection of municipal buildings. In accepting the offer the town council acknowledged its munificent character.

The Piper's House in Jedburgh, No. 1, Dack-row, at the foot of Canongate, in that town, is at present undergoing alterations, so as to meet modern requirements. The house, one of the oldest in the burgh, was built by one Adam Ainslie at the beginning of the 17th century. The initials "A. A." and "J. A.," with the date 1604, are to be seen on a lintel over one of the windows. The house is two stories in height, with attics. The walls have been built with clay instead of lime; at the tops of the gables are corbie steps, and at the top of the wall next Canongate is seen the effigy of a piper with his bagpipes, carved in stone. The upper half of one of the gables was found to be 4½ ft. thick, while the lower half was only 3½ ft.

A meeting of the Finance Committee of Sutherlandshire County Council was held in Golspie, on Friday, to draw up a report to be submitted to a meeting of the county council with reference to the promotion of light railways in that county. Mr. William Roberts, C.E., was present on behalf of the Highland Railway Company, who have consented to promote and work the proposed line from the Mound to Dornoch. Mr. Roberts explained that the line would be 7½ miles in length, and would pass Little Ferry and Embo. It would cost £26,700, or £3,500 per mile. After discussion, it was agreed to recommend the scheme. The committee also took up consideration of the proposed Forsinard, Melvich, and Portskerra Railway, which is estimated to cost £42,000, and it was resolved to join in the promotion of the line. Mr. William Roberts was appointed engineer.

At Exmouth Police-court, last week, George Hooper, builder, of that town, was fined £1 and costs for building a house in Maer-lane, that being less than the 36ft. in width provided by the local by-laws. It appeared that the lane is but 23ft. wide at the part where defendant is building, and Mr. E. G. Chamier, agent for the Rolle Estate Trustees, said that body would have been willing to give to the town the land required to widen any road to the 36ft. demanded by the urban district council. The Bench agreed to state a case on the ground that defendant was not personally liable, and awarded the urban district council £20 expenses.

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LATEST PRICES.

IRON, &c.

	Per ton.	Per ton.
Rolled-Iron Joists, Belgian.....	£5 5 0 to	—
Rolled-Steel Joists, English.....	6 0 0 "	—
Wrought-Iron Girder Plates.....	6 15 0 "	—
Bar Iron, good Staffs.....	7 0 0 "	£7 5 0
Do., Lowmoor, Flat, Round, or Square.....	17 0 0 "	17 10 0
Do., Welsh.....	5 15 0 "	5 17 6

Boiler Plates, Iron—

South Staffs.....	7 10 0 "	7 16 0
Best Snedshill.....	9 0 0 "	—
Angles 10s., Tees 20s. per ton extra.		

Builders' Hoop Iron, for bonding, &c., £6 10s. 0d. per ton.
Builders' Hoop Iron, galvanised, £13 10s. 0d. per ton.
Galvanised Corrugated Sheet Iron—

	No. 18 to 20.	No. 22 to 24.
6ft. to 8ft. long, inclusive gauge.....	Per ton. £10 15 0	Per ton. £11 0 0
Best ditto.....	11 5 0	11 10 0
Cast-Iron Columns.....	25 10 0 to	£3 10 0
Cast-Iron Stanchions.....	5 10 0 "	8 10 0
Cast-Iron Sash Weights.....	—	4 2 6
Cast-Iron Socket Pipes—		
3in. diameter.....	4 10 0 "	4 15 0
4in. to 6in.....	4 5 0 "	4 10 6
7in. to 24in. (all sizes).....	4 0 0 "	4 2 6
[Coated with composition, 2s. 6d. per ton extra; turned and bored joints, 5s. per ton extra.]		

Pig Iron—	Per ton.
Cold Blast, Lilleshall.....	105s. to 110s.
Hot Blast, ditto.....	57s. 6d. to 62s. 6d.

Wrought-Iron Tubes—Discount off Standard Lists f.o.b.	
Gas-Tubes.....	75p.c. Fittings 77½p.c.
Water-Tubes.....	70 " 72½
Steam-Tubes.....	62½ " 65
Galvanised Gas-Tubes.....	60 " 62½
Galvanised Water-Tubes.....	55 " 57½
Galvanised Steam-Tubes.....	45 " 47½

	10cwt. casks.	5cwt. casks.
Sheet Zinc, for roofing and working up.....	Per ton. £20 0 0 to	Per ton. —
Sheet Lead, 8lb. per sq. ft. super.....	12 2 6 "	12 5 0
Pig Lead, in 1cwt. pigs.....	11 0 0 "	—
Lead Shot, in 28lb. bags.....	15 0 0 "	—
Copper Sheets, sheathing and rods.....	55 0 0 "	—
Copper, British Cake and Ingot.....	49 0 0 "	50 12 0
Tin, Straits.....	59 17 6 "	60 0 0
Do., English Ingots.....	63 10 0 "	65 0 0
Spelter, Silesian.....	16 12 6 "	16 15 0

	Per ton.	Per ton.
Cut Clasp Nails, 3in. to 6in.....	8 5 0 "	—
Cut Floor Brads.....	8 0 0 "	—

Wire Nails (Points de Paris) —	
0 to 7 8 9 10 11 12 13 14 15 B.W.G.	
8/6 9/0 9/6 10/3 11/0 12/0 13/0 14/3 16/3	per cwt.

TIMBER.

Teak.....	per load	£11 0 0	to	£16 0 0
Quebec pine, red.....	—	—	—	—
" yellow.....	2 5 0 "	—	4 5 0	—
" pitch.....	—	—	—	—
" Oak.....	5 0 0 "	—	6 10 0	—
" Birch.....	3 5 0 "	—	5 0 0	—
" Elm.....	3 10 0 "	—	4 15 0	—
" Ash.....	2 15 0 "	—	4 0 0	—
Danitic and Memel Oak.....	2 10 0 "	—	3 10 0	—
Fir.....	1 15 0 "	—	3 15 0	—
Wainscot, Riga p. log.....	2 0 0 "	—	4 5 0	—
Lath, Danitic, p.f.....	4 10 0 "	—	5 10 0	—
St. Petersburg.....	5 0 0 "	—	6 10 0	—
Greenheart.....	8 5 0 "	—	8 15 0	—

Deals, per St. Petersburg Standard, 120—12ft. by 1½in. by 11in. —

Quebec, Pine, 1st.....	£21 10 0	to	£24 0 0
" 2nd.....	15 0 0	"	17 0 0
" 3rd.....	7 0 0	"	10 10 0
Canada Spruce, 1st.....	8 0 0	"	10 0 0
" 2nd and 3rd.....	7 5 0	"	8 10 0
New Brunswick.....	7 0 0	"	8 10 0
Riga.....	6 10 6	"	7 10 0
St. Petersburg.....	8 0 0	"	13 0 0
Swedish.....	8 0 0	"	16 0 0
Finland.....	8 0 0	"	9 0 0
White Sea.....	9 10 0	"	16 0 0
Battens, all sorts.....	5 0 0	"	20 0 0

Flooring Boards, per square of 1in —	
1st prepared.....	0 9 0 " 0 15 0
2nd ditto.....	0 8 0 " 0 12 6
Other qualities.....	0 4 6 " 0 7 6

Staves, per standard M:—	
Quebec pipe.....	—
U.S. ditto.....	35 0 0 " 42 10 0
Memel, cr. pipe.....	225 0 0 " 240 0 0
Memel, brack.....	200 0 0 " 210 0 0

OILS.

Linseed.....	per ton	£16 15 0	to	£17 10 0
Rapeseed, English pale.....	"	26 10 0	"	28 0 0
Do., brown.....	"	24 0 0	"	24 10 0
Cottonseed ref.....	"	15 10 0	"	16 10 0
Olive, Spanish.....	"	29 0 0	"	29 10 0
Seal, pale.....	"	23 0 0	"	24 0 0
Cocoonut, Cochin.....	"	27 0 0	"	—
Do., Ceylon.....	"	24 0 0	"	—
Palm, Lagos.....	"	23 10 0	"	—
Olefin.....	"	19 0 0	"	20 0 0
Lubricating U.S.....	per gal.	0 6 0	"	0 7 3
Do., black.....	"	0 4 9	"	0 6 6
Tar, Stockholm.....	per barrel	0 19 6	"	—
Archangel.....	"	0 12 6	"	—
Turpentine, American.....	per ton	18 15 0	"	19 10 0

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immediate use.

TENDERS.

* * * Correspondents would in all cases oblige by giving the addresses of the parties tendering—at any rate, of the accepted tender: it adds to the value of the information.

ALDERSHOT.—For boys' school to accommodate 580, with board and waiting-rooms, in Queen's-road, for Aldershot School Board. Messrs. Nash and Son, Farnham, architects. Quantities by Mr. A. Brymer, 22, Surrey-street, Strand, W.C.:—

	A.	B.
Bottrill and Son, Reading.....	£8,343 13 9	£299 3 0
Jenkins and Son, Bournemouth.....	8,343 0 0	307 0 0
Pond, Aldershot.....	7,995 0 0	390 0 0
Peters and Son, Horsham.....	7,900 0 0	432 9 0
Smiggs, Aldershot.....	7,777 0 0	433 0 0
Garland Aldershot.....	7,596 15 0	404 0 0
Martin, Wells, & Co., Aldershot.....	7,590 0 0	360 0 0
Wallis, Maidstone.....	7,549 0 0	345 0 9
Hughes, Aldershot.....	7,452 7 10	386 6 0
Kemp, Aldershot (accepted).....	7,369 0 0	312 0 0
Tompsett and Co., Farnham.....	7,265 0 0	350 0 0
Hughes, Wokingham.....	7,230 2 5	302 2 8
Fitt, Reading.....	7,227 0 0	305 0 0
Architects' estimate.....	7,184 0 0	308 0 0

A.—School building, board and waiting-rooms, latrines, playgrounds, covered shed, fencing, drainage, &c.
B.—Extra if playground tar-paved.

AVONMOUTH.—For cold-storage accommodation at Avonmouth Docks, for the Bristol Docks Committee:—
Linde British Refrigerating Co. ... £4,500 0 0
(Accepted).

BARNSLEY.—For the alteration of the Eldon-street Schools. Accepted tenders:—

	Joiner:—	
Ashworth, E. ...	...	£396 0 0
	Mason:—	
Taylor, F. ...	...	343 0 0
	Heating:—	
Rushforth, S. ...	...	124 0 0
	Plumbers:—	
Rogers and Squire ...	...	66 10 0
	Slater:—	
Fleming, E. ...	...	62 0 0
	Plasterer:—	
Fleming, E. ...	...	39 15 0
	Painter:—	
Charlton, J. ...	...	13 10 0

BRISTOL.—For the erection of premises at the corner of Clare-street and Marsh-street as the Law Union and Crown Insurance Offices. Mr. Henry Williams, of Bristol, architect. Mr. A. Barratt, quantity surveyor:—

Chinchin, Bournemouth.....	£26,500 0 0
Boye, London.....	6,260 0 0
Wilkins, G. H.....	6,153 5 10
Wilkins and Gosling.....	5,999 0 0
Davis, J. E.....	5,970 0 0
Humphreys, G.....	5,930 0 0
Church, W.....	5,873 0 0
Cowlin and Sons.....	5,843 0 0
Hughes and Weeks.....	5,710 0 0
Wilkins, R., and Sons.....	5,688 0 0
Eastbrook and Sons.....	5,550 0 0
Hayes, C. A.....	5,477 0 0
Forse, H. A.....	5,400 0 0
Beaven, A. J.....	5,350 0 0
Clarke, E.....	5,263 0 0
Perrott, J. (accepted).....	5,174 0 0

EDINBURGH.—For excavations and other preliminary works at the cable-power stations for tramway traction, for the City Council. Accepted tenders:—

Tollcross Station:—		
Waddell, Andrews, and Sons	...	£3,363 6 0
Shrubhill Station:—		
Wallace, R.	... ..	888 0 0

(Continued on page XVI.)

LIST OF COMPETITIONS OPEN.

Shotley Bridge, Co. Durham—Cottage Homes for Children	No premium	Geo. Craighill, Clerk to Guardians, Gateshead	Nov. 23
Tredegar—Vagrant Wards	No premium	J. Alex. Shepard, Clerk, Tredegar, Mon.	" 24
Willesden—Kensal Green Board School (1,270 places)	No premium	W. Vincent, Clerk, Dyne-road, Kilburn	" 24
Peel, Isle of Man—Approach Road to Shore-road	£20, £10, £5	Geo. Cannell, Town Commissioners' Office, Peel	" 30
Newport, Mon.—Hospital (£16,000 limit of cost)	£100, £50	J. K. Stone, Secy., 39, High-street, Newport	Dec. 1
Rhos-on-Sea, Colwyn Bay—Laying-out Building Estate	£100, £35, £15	Philip J. Kent, Rhos Abbey, North Wales	" 5
Weston-super-Mare—Pavilion at Knightstone (£8,000 limit)	£50, £20, £10	Wm. Smith, Clerk U.D.C., Town Hall, Weston	" 10
Earlsheaton, Yorks—Fever Hospital (Local Architects)	No premium	G. T. Lee, Clerk, Town Hall, Dewsbury	" 12
Kieff, Russia—Theatre (£48,000 limit, 1500 seats)	£280, £160, £120, £76, £32	Imperial Society of Architects, 83, Quai de la Moika, St. Petersburg	" 15
Longton, Staffs—Schools and Free Library (£8,000 limit)	£75, £25	Geo. C. Kent, Town Clerk, Longton	" 31
Liskeard, Cornwall—Rebuilding Tower, Parish Church (£3,000 limit)	£50 (merged in commission), £25	Nettle and Bone, Hon. Secs., Liskeard	Jan. 1
Knaresborough—Grammar School (£4,000 limit)	£10	Wallace Gill, Solicitor, Knaresborough	" 1
Sevenoaks—Four- and Five-roomed Cottages (£150 each)	£5	Herbert J. Thompson, Clerk, High-road, Sevenoaks	" 1
Tottenham—Higher Grade Schools, Wood Green (900 places)	No premium; commission 3½ p.c.	J. F. A. Adams, Clerk to School Board, Tottenham	" 15
Sunderland—Technical School (£18,000 limit of cost)	£100, £50, £25	Fras M. Bowey, Town Clerk, Sunderland	" 16
St. Gilles, near Brussels—Town Hall (£42,000 limit of cost)	£160 and two lesser premiums	Municipal Authority, St. Gilles, Belgium	Feb. 1
Osgodby, Lincolnshire—Wesleyan Chapel & Schools (cost £600)	No premium	E. H. Davy, Secretary to Trustees, Kirkley, Market Rasen	"
Kesteven District Lunatic Asylum (C. H. Howell, Assessor)			
Eccleshill, Bradford—Sewage Disposal	£20, £10	Jos. Richardson, Clerk, U.D.C., 4, Town Hall-square, Bradford	"
Barry, Glam.—Municipal Buildings (£10,000 limit)	£100, £50	Clerk to Urban District Council, Barry	"
Leeds—Hotel	25gs., 10gs., 5gs.	Fred. Beanland, Hotel Engineer, Harrogate	"
Chapel, Cropton, near Pickering		Robert Harland and T. Pickering	"
Warmley, Bristol—Out-Relief Offices	10gs., 5gs., 2½gs.	S. F. Andrews, Clerk to Board of Guardians, Keynsham	"
Leicester—Isolation Hospital (Local architects only)	£100, £50, £25	Borough Surveyor, Town Hall, Leicester	"
Harrogate—Hotel Extension	25gs., 10gs., 5gs.	Fred. Beanland, Hotel Engineer, Harrogate	"
Colwyn Bay—Electricity Lighting Scheme	£30, £20	The Clerk, Urban District Council, Colwyn Bay	"
Worcester Corporation—Sewage Disposal		City Clerk, Worcester	"

LIST OF TENDERS OPEN.

BUILDINGS.

Canterbury—Bath-room and Water Supply	Canterbury Hospital Board	A. Bromley, Cathedral Precincts, Canterbury	Nov. 23
Moira—Station Master's House	Great Northern (Ireland) Ry. Co.	T. Morrison, Secretary, Amiens-street, Dublin	" 23
Maryport—House in Camp-road		Jos. Kendall, Crosby-street, Maryport	" 23
Londonderry—Front to First Presbyterian Church		W. E. Pinkerton, M.R.I.A. 1, 8, Diamond, Londonderry	" 23
Llangefni—County Buildings	Anglesey County Council	C. M. Roberts and Son, Architects, Portmadoc	" 24
Castle Maine, Co. Kerry—R.C. Church		W. G. Doolin, Architect, Dawson Chambers, Dublin	" 24
Woolwich—Underground Convenience, Beresford-square	Local Board	The Clerk, Local Board, Town Hall, Woolwich	" 24
York—Additions, Wenlock Laundry		G. H. Fowler Jones, Architect, 8, Lendal, York	" 25
Bideford—Police Station	Devonshire County Council	H. Michelmores, Clerk, Exeter	" 25
Eccles, Lancs.—Town Hall Extension	Town Council	Geo. W. Bailey, Town Clerk, Eccles	" 25
Acton, Middlesex—Board School	Acton School Board	Walter Adam Brown, Clerk, Petersfield-road, Acton, W.	" 26
Mundesley, Norfolk—Wesleyan Chapel	Trustees	Rev. J. S. Puir, Bacton-road, North Walsham	" 26
Portsmouth—Additions to Brewery	United Breweries Co., Ltd.	The Secretary, Eldon-street, Portsmouth	" 26
Manchester—Warehouse and Stabling, Hyde-row	Slack and Cox	W. W. Kenworthy, Architect, 7, Chapel-walk, Manchester	" 26
High Pittington, Co. Durham—Shops and Stables	Amicable Industrial Society	W. and T. R. Milburn, Architects, 20, Fawcett-street, Sunderland	" 27
Halifax—Alterations to Central Stores	Halifax Industrial Society	Horsfall and Williams, Architects, Halifax	" 27
Grimsby—Two Semi-Detached Villas		W. C. Butler, Welholme-road, Grimsby	" 27
Heavyley, Stockport—Vicarage		Austin and Paley, Architects, Lancaster	" 27
Abercarnid—Cottage	Welsh Congregational Trustees	T. S. Thomas, 1, High-street, Abercarnid, Merthyr-Tydfil	" 27
Alberton, Yorks—Villa, Pearson-lane	School Board	Fairbank and Wall, Architects, Bradford	" 28
Thornton—Enlarging School	Rev. J. H. Mitchell	J. H. Keen, Clerk, 6, Victoria-street, Fleetwood	" 28
St. Sennen, Land's End—Rectory		Oliver Caldwell, F.R.I.B.A., Victoria-square, Penzance	" 28
Pelton Fell—Methodist New Connexion Chapel	H.M. Commissioners of Works	M. Prout, 6, East View, Pelton Fell, Co. Durham	" 30
Leamington Spa—Enlargement of Post Office		Hon. Reginald B. Brett, Secretary, H.M. Office of Works	" 30
Leeds—Shed, Harehill-lane (2,000 yards)	Corporation	A. E. Dixon, Architect, 84, Park-lane, Leeds	" 30
Widnes—Cemetery Chapels and Lodge, Moss Brook	London County Council	H. S. Oppenheim, Town Clerk, Widnes	Dec. 1
Battersea Park—Refreshment House	Uxbridge Hospital Board	C. J. Stewart, Clerk, Spring-gardens, S.W.	" 1
Hillingdon—Hospital, Bathroom and E. Closets	Vestry	Chas. Woodbridge, Clerk, 38, High-street, Uxbridge	" 2
Plumstead—Eight-roomed Building	North Wales Asylum Committee	Edwin Hughes, Vestry Clerk, Maxey-road, Plumstead	" 3
Denbigh—Corrugated Iron Buildings (100 beds)		Wm. Barker, Clerk, Denbigh Asylum	" 3
Hipperholme—Engine-House and Chimney	Corporation	Raymond Berry, Architect, Commercial-street, Halifax	" 3
Southampton—Electric Generating-station Buildings	Bath Brewery Co.	Geo. B. Nalder, Town Clerk, Southampton	" 4
Weston, Bath—Malt-House	H.M. Commissioners of Works	Fred. W. Gardiner, Architect, Bath	" 5
Epsom—Post Office	Yorkshire Penny Bank	Hon. Reginald B. Brett, Secretary, H.M. Office of Works	" 7
Sowerby Bridge—Bank and Shop	E. E. Bevan	Horsfall and Williams, Architects, Halifax	" 7
Neath—Cambrian Hotel	School Board	Lambert and Rees, Architects, Neath	" 9
Kirkley, Lowestoft—Schools, Lovewell-road	Corporation	R. B. Nicholson, Clerk, Lowestoft	" 9
Colne, Lancs.—Refuse-Destructor Chimney (70 yards high)		T. H. Hartley, Borough Surveyor, Colne	" 16
Blackpool—Three Houses	School Board	Thos. Fox, Layton, Hawes	"
Burnley—New Board Schools	School Board	W. A. Quarumby, Architect, Grinshaw-street, Burnley	"
Leeds—New Board Schools		W. S. Braithwaite, Architect, Leeds	"
Nottingham—Pulling Down Buildings	Hide Company, Limited	C. H. Kitchen, Warsengate, Nottingham	"
Sheffield—Shops	D. Rees and Co., Limited	Holmes and Watson, Architects, St. James's-row, Sheffield	"
Nottingham—Painting Interior of Premises, Easteroft		— Dawson, Easteroft	"
Cardiff—Rebuilding Haycs Market		J. P. Jones, Richards and Budgen, Architects, Cardiff	"
Woodlesford—Houses		W. Simpkins, Swan Junction, Hunslet, Leeds	"
Manchester—Row of Six-Roomed Houses	School Board	Manchester Guardian Office	"
Sherriff Hill, Newcastle—Three Cottages	City Council	Shepherd Inn, Blue Quarries, Sherriff Hill	"
Burnley—Rose-grove Schools		W. A. Quarumby, Architect, Imperial Chambers, Burnley	"
Leeds—City-square Improvement (Granite Work)	F. Wright	Wm. Bakewell, F.R.I.B.A., 38, Park-square, Leeds	"
Kettering—Semi-Detached Villas		M. Hall, Huntly-grove, Kettering	"
Kettering—Three Houses, Cavendish-street	School Board	M. Hall, Huntly-grove, Kettering	"
Chelsea—Middle-class Flats	Rees and Co.	Alfred J. Best, Surveyor, 38, Sloane-street, S.W.	"
Edgefield, Norfolk—School and House	Official	H. J. Green, Architect, Norwich and Lynn	"
Cardiff—Rebuilding Haycs Market		Jones, Richards and Budgen, Architects, St. Mary-street, Cardiff	"
Antwerp—Covered Quay (about £6,800)		Eastern Railway Station, Antwerp	"
Manchester—Rebuilding Tivoli Theatre, Peter-street		Harry Percival, Architect, 22, Buckingham-street, Strand, W.C.	"
Robin Hood's Bay—Hotel	Rogers and Co.	Jno. Rickinson, Robin Hood's Bay, Whitby	"
South Hampstead—Additions to Day Dawn House	Joseph Brown	L. Sinclair, Netherhall-gardens, South Hampstead	"
Hereford—Iron Warehouse, Commercial-road	B. Hewetson	W. W. Robinson, Architect, Hereford	"
High Spen—House and Shop	G. King, Gravesend	T. C. Nicholson, F.R.I.B.A., 24, Grainger-street West, Newcastle	"
Gaywood, Lynn—Six Houses	C. J. Vaughan	B. Hewetson, King-street, Lynn	"
Billerica—House		W. L. Wood, Architect, 26, Alexandra-street, Southend	"
Barry, Glam.—Pair of Semi-Detached Villas	Councillor Bettison	Jones, Richards and Budgen, 18, St. Mary-street, Cardiff	"
Leeds—Sixteen Houses, Haddon-avenue	Frank P. James	Carlton Brothers, Leeds	"
Leeds—Two Shops, Kirkstall-road	Urban District Council	J. W. Thackray, A.S.I., 3, Rossington-place, Leeds	"
Bristol—Leather Factory, Old Market-street	C. J. Vaughan	Fred. Shove, Architect, Clare Chambers, Bristol	"
Rushden—Alterations to Vestry Hall	W. D. Todd	Wm. Pare, Surveyor, Rushden	"
Barry, Cardiff—Semi-Detached Villas		P. J. Jones, Richards and Budgen, Archts., 18, St. Mary-st., Cardiff	"
Carlisle—Three Shops, Botchergate	Artificial Silk Spinning Co.	J. S. Williams, 23, Montague-terrace, Aberdeen	"
Blaengarw—Hotel	Anthony Gibson	F. W. Baker, 1, Broad-street Corner, Birmingham	"
Brandon, Rugby—Mills	Market Hall Co.	T. C. Nicholson, F.R.I.B.A., 24, Grainger-street West, Newcastle	"
South Moor, Newcastle—Residence	Kensington Freehold Land Trust	John Roberts, Secretary, Narberth	"
Narberth—Iron and Glass Roof (115ft. Sin. by Sift.)	Directors	Booth and Fox, 9, John-street, Adelphi	"
Kensington—Six Residences	Board of Guardians	H. Percival, Architect, 22, Buckingham-street, W.C.	"
Manchester—Rebuilding Tivoli Theatre, Peter-street	School Board	Nicholson and Heavitt, Architects, Hereford	"
Crickhowell—Alterations to St. Edmund's Church		Alex. Gordon, M.S.A., 107, Queen Victoria-street, E.C.	"
Southsea—Salvation Army Barracks, Albert-road		T. Phelan, Clerk, James-street, Dublin	"
Dublin, South—Workhouse Alterations		J. T. Belk, Clerk, Middlesbrough	"
Middlesbrough—Marton-road Schools (1,040 places)		Simpson & Richardson, Architects, Southgate Chambers, Wakefield	"
Calder Vale—Rebuilding Foundry		Thompson and Greenhalgh, Architects, Bank Chambers, Southend	"
Southend-on-Sea—Eight Shops, Whitegate-road	B. W. Tolhurst	Thompson and Greenhalgh, Architects, Bank Chambers, Southend	"
Southend-on-Sea—Substructure, Hotel Victoria	S. J. Burdett	Duncan Cameron, Architect, Inverness	"
Fort William—Two Houses		Preston and Vaughan, Architects, Diocesan Chambers, Manchester	"
Newchurch, Lancs.—New Chancel and Vestries, St. Nicholas			"

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AIMLESS ART.

IT is a pity so much of our practical invention and skill is so aimless, that we see numerous instances of failure of means to the end. Whenever a great engineering feat is accomplished, a new material introduced, or any mechanical invention brought out, we cannot fail to notice how very little art has had to do with it. The early iron bridge shocked us by its glaring defiance of the canons of good taste. When iron construction first made its appearance, we were astonished at the audacity with which its details violated our sense of architectural propriety; and now we have the motor car in our streets, we wonder why so useful a mode of locomotion could not have been presented to us in more artistic form than an ordinary carriage without horses, as if no better type could have been thought of than an ordinary phaeton, or brougham, or landau, admirable for horse-carriage, but absurd when applied to another mode of traction. The only idea seems to have been to fit a motor to the body of a conveyance. If the problem had been placed before the artist, he would at once have designed a body suitable for the new motive power, or shaped it upon new lines for self-propulsion. Our architectural work has been seriously hindered in the same way by adhering to old forms after new requirements or motives were introduced. For a long time the adapters of iron found nothing better than to copy stone details, as in the design of their cast-iron columns and arches. Those who adopted the congregational idea of worship persisted in erecting churches on Mediaeval lines; builders of theatres for a long time followed the models of temples. Other instances will occur to anyone who has observed how slow is the process of adaptation to meet modern wants or new materials. Adapting new and more reasonable forms to them seems to be one of the last things thought about. The manufacturer goes on making his products to old patterns. What was only designed for stone is reproduced in cast iron, as he did, and still turns out many of his iron stoves and ornamental ironwork. Our practical man seems unable to break through the older form, or think of any other. He is unable to understand that craftsmanship is the beginning of art, not its end; and that if he invents a new method of construction, a new lock or door-fastening, or a new kind of decoration, it ought to be accompanied by a corresponding change in design.

A like mode of reasoning can be applied to all mechanical employments and handicrafts. It has been proved again and again that the man who is able to make drawings of exceeding minuteness and neatness seems incompetent, without artistic aid, to do anything better than the most ordinary work. Of anything artistic in conception, or any beauty of line, he is quite incapable. He can draw with extreme neatness a steam-engine, in which every detail of pin and crank is to be seen, or a working drawing of a truss, or a piece of complicated masonry, but only in a heartless sort of way. The technical school classes afford evidence of this mechanical excellence. It would be better if the instructors of these classes asked for rougher diagrams or sketches to illustrate their subjects instead of finished geometrical drawings, so that the meaning and intention of the design may accompany the manual skill. The pupil who spends all his time in drawing an elevation or a section allows his eye

and hand to outrun his mind. Anything that appeals to the sense of beauty or pleasing line is ignored; and it is precisely the same with the actual workmanship one sees done by students of these classes. Exceedingly clever in mechanical manipulation and turned out with extreme neatness, much of it is aimless. How else could it be? The student takes a drawing or a model and sets to work to execute the object to a certain scale. It is a mere fragment, perhaps only a portion of a Gothic pointed window with splayed soffit, executed in brickwork, or the first flight of a geometrical staircase in stone, or the pedestal of a column. Capital practice, without doubt, but there is no reference to practical conditions in any of these subjects. The window-head may teach the student how to cut and rub the bricks to form the soffit, but nothing as to design, and the "torso" of a staircase or column may mislead as to proportion of details. But he does not trouble. In each example the design is a secondary matter; workmanship is first. For instance, in a piece of masonry we find the joints have been placed without any reference to those rules of good architecture which ought to be considered. We see a joint at the angle of a ramp which is not desirable, or in a traceried window the joints are placed where solidity is necessary, or at very unequal distances in the monials. Curved lines are not set out with any relation to the straight ones—perhaps a too sudden curve is joined to a straight piece. In details like mouldings the proper laws of good composition are not obeyed. We frequently observe ovolos and other curved members of varying flexure placed together without intervening fillets, and the agreeable diversity of curved members is thereby lost. Mouldings are not a strong point in the technical school; few students have learned to understand the laws which govern moulded surfaces and contours.

There is a good deal that is aimless in our architecture. To mention a few instances, how many architects who have to design buildings exposed to the weather and to rainy quarters, as in many of our seaside towns, design their work and details to meet these conditions? Instead of a defence against the weather, we see many fronts facing south and west which have all kinds of flat arresting cornices and details which invite the entrance of moisture, instead of a plain surface and weathered features. It scarcely appears, on this ground, reasonable to adopt half-timbered gables and stories, which we find so common in new residences on the sea-coast. The flat roof and the balcony seem inadvisable for these reasons, though they, especially the balcony and verandah, have become almost necessary adjuncts to houses facing the seaside promenade. The balcony is certainly a protection from the weather, and serves as a shelter to the wall itself. Again, there is aimlessness in placing elaborate detail where it cannot be seen with advantage—a very common error. In other buildings we find heavy cornices and pediments over windows in narrow streets where light is scarce. Then there is a lamentable want of intention in the ornamentation of buildings. Ornament is placed in positions where it is not wanted, where it is sure to get black with soot, and be lost to view, or it is lavishly introduced in doorways where it is likely to be injured. We find also aimless planning, as in entrances to a public office embarrassed by shafts and angles and awkward projections, instead of being made as unobstructive as possible, doors and windows placed just where they are not required, or the rooms themselves are of wrong proportions, too high or too short.

Aimless design is one of those provoking qualities of modern architecture which meet us on all sides. We cannot walk through a London street or visit a modern showroom without a painful reminder of

this defect at almost every turn. Here we see an ambitious edifice crowned with mansards and cupola, and of columnar magnificence, which turns out on closer inspection to be a block of tenements or a Civil Service store; we pass along a little further and come upon what looks like a façade to a place of worship, but behold! it is a music-hall. These are the kind of rebuffs which modern "architecture" delights to give us. And there is a want of purpose in the details also and the style, the kind of window, the ornament used—things which never deceive us in the Mediaeval building or in any old work. The designer imbued with the true meaning of architecture will be sure to give us modifications of the style he practises in to suit the purpose. In his commercial offices in the City he will adapt the smallest detail to its use, as in his window jambs or the mouldings of the entrance vestibule, so that they may not be exactly the same as those he would introduce in, say, a church in the same style. In the forties and fifties we were accustomed to see such things as church Gothic features, pointed windows, buttresses, and all the rest used for a country villa; but if we do not see such glaring inconsistencies, we still meet with misapplied detail.

In manufactured goods, purposeless design is common enough. We may meet at every showroom with things like chairs, and tables, and cabinets that seem to have been designed without any reference to the uses they are made for. In one piece of furniture we saw the other day there were book-shelves, or shelves for porcelain, made to return at the sides; but how books or ornaments could be placed, or made to appear, it would puzzle the designer to say. As for chairs that can neither be sat upon comfortably, nor lifted, it would be easy to find hundreds; and also tables with rails and cross-framing just where the sitter's feet or knees come. In a variety of articles which minister to domestic use or ornament, like jugs, tea and coffee-pots, vessels for pouring liquids of all kinds, it is quite certain the designer has had no thought of the effect of the shape of the vessel and the proper position of the spout and handle in reference thereto. Such things as grates, fireirons, coal-vases are often satires on art applied to common uses. They are as much devoid of use as of ornament. The fundamental aim and intention of the article is entirely wanting, and the craftsman seems to have commenced his work where he should have left off. So long as the object is beneath the notice of the "artist" craftsman or "ornamentist," we have a guarantee that attention to aim has been thought of—in other words, we have real art; but where the object has to be ornamental as well as useful, the designer appears to think he is no longer under any obligation to decide which is the best shape, but only to adopt that which can be made decorative. We are afraid our art craftsmen are addicted to this habit. They begin at once to turn their art to account, whether they are brick-carvers and rubbers, modellers, carvers of wood, embossers of metal, or what not, in the easiest manner they can; they alter this or that, not because it is better for use, but because it gives a better opportunity for the display of their handicraft or their ornament, and so, when they have done, they turn out an article, or a piece of work, admirable only as a sample of their own craft—a specimen, but not a work of art in which the aim is conspicuous and never lost sight of even in the ornament itself. Thus it is that the engineer loses sight of design altogether in his girder bridge, or studies his piece of machinery or motor more than the shape of the thing propelled, and the workman, ornamental designer, and decorative artist each contents himself with proclaiming his own craft or skill, entirely overlooking the real intention of the work. What can we expect from a

system which puts a design or a piece of work into the hands of one or several individuals who have overlooked the main end, and whose ideas are restricted by their own field of vision?

SURVEYORS' CHARGES.

WHILE architects have their recognised schedule of remuneration for designing and superintending buildings, there are services of a more or less incidental and miscellaneous character which have not yet been satisfactorily dealt with by the profession. One kind of duties which often falls to the professional man is in respect of the alteration of buildings. In a case of this kind there is often no distinct basis on which a professional charge can be made. A part of the old buildings may be taken down and re-erected from the design of the architect, which includes a survey, plans, elevations, and specification and general superintendence. The cost of the new buildings or the estimate may in this case form a good basis for a percentage; but how is this to be obtained? There are many circumstances of the old structure, such as raising floors and roofs, the re-use of old materials, which make it almost impossible to determine the cost of the new work, or to say how much is new work and how much only alterations, such as altering a wall, re-using the old materials, making new openings, and like work. The schedule of rules issued under the authority of the Institute gives no positive rule for charging on such work. Clause 10 says: "For works in the alteration of premises, a special charge may be made on account of the special difficulties and trouble generally involved"—a rule which gives no definite instruction as to how the architect's labour is to be estimated. A "special charge" may be a charge above or below the usual 5 per cent.; generally the extra trouble involved in works of this description calls for a higher remuneration. How such remuneration is to be determined is a question that must largely depend on the circumstances of each case. If the cost of each sort of work can be kept distinct, that of alteration or day-work, and that of the new work, it would be easy to fix on a fair percentage; but it is not always possible to do so.

There are other matters equally uncertain. For example, an architect is often called upon to negotiate with solicitors and estate agents about the site of a building, which may entail calculations as to value; or he may be called upon to value an easement of the adjoining premises; to inquire into the right of light or of support, or party-walls—duties quite outside his regular architectural employment. Such services are generally charged for in addition. Here, again, it is almost impossible to lay down any rule, except that such services may be charged for per day, which, of course, varies according to the professional position of the architect, three guineas per day being considered the minimum charge. We think that in some of these miscellaneous duties an approximation to fixed rates may be made. Thus in surveys and plans of buildings, taking levels, making arrangements about right of light and party-walls, certain charges might be made, depending on the extent and area of the survey, the superficial area of window light, or the extent of the work for which negotiations are carried out, and whether successful or not. The want of some definite criteria is perplexing to the younger men in the profession, who constantly ask for advice. They naturally hesitate to incur displeasure by asking too much, or even to charge by the day at the rate some of their more successful brethren do. Most of these professional services come strictly rather within the surveyor's than the architect's province; but, still, they form, so to speak, the fringe of the general practitioner's vocation.

There is one particular class of practice about which much uncertainty exists as to remuneration, owing to the difficulty of finding any definite rule amongst the profession. We allude to charges for estate plans. There is a rule, if it can be called one, which merely says that the charge for taking a plan of an estate, laying it out, and arranging for building upon it should be regulated by the time, skill, and trouble involved, which practically gives nothing at all to guide the practitioner. "Time, skill, and trouble" are rather vague, for an expert would take less time than a novice in surveying and laying out an estate, and skill and labour may be similarly estimated, so that "time" is, after all, the principal element, and the expert surveyor would take only half the time which the inexperienced hand would take, so that if the remuneration was charged by the day the expert surveyor's charge would be probably less than that of the inexperienced hand. We often receive inquiries from correspondents on this point. Only a week or two ago a "Surveyor" wrote asking for information on the charges usually made for laying-out building estates, including several items, such as the survey and sections of the land, planning of new streets, and depositing plans with corporation or local authority, setting out the roads and plots and superintending the same, drainage, &c., partly done by contract and partly by daywork, keeping accounts and paying wages, effecting sales of plots, block plans, and particulars of same supplied to the solicitors. We do not know whether he has received any answer, but in all probability no two of the replies would be the same. Here we have a number of distinct and separate duties, from making a plan of the ground and taking levels, planning the new streets and plots, with all the skill and labour these services imply, to keeping account of the lots sold. Each of these ought to be determinable by some rule. The survey and levels are distinct from planning the estate, and should be separately charged for, the former by the area or time, the latter on the amount of estimate, or, perhaps better still, on the sales effected. How this work can be regulated by the "time, skill, and trouble involved" it is not easy to say, as one surveyor may, as we have said, do it in half the time of another, taking the same scheme. Skill and trouble ought no doubt to be taken into consideration in charging a percentage; but both these factors can be best determined by taking some unit, say, the average or the yards length of roads or plots to the acre. If the scheme was abandoned at this stage, some kind of estimation on this principle must be adopted, unless, of course, an agreement has been made between the professional man and his employer; some surveyors charge a small percentage on the estimated ground-rents. But if the estate is proceeded with, the subsequent duties of preparing specifications or superintending the formation of roads, drainage, fences, and other work carried out at the owner's cost; inspection of the buildings during their erection (so as to insure the conditions being carried out), and certifying the leases, have to be charged in addition. The latter duties are charged by some surveyors by a percentage of $\frac{1}{2}$ per cent. up to £5,000, and above that sum by special arrangement. There is, however, no definite scale in practice; a few surveyors have their own schedules, which is perhaps the best way under the uncertain state of the profession. It is stated that some surveyors charge for all the above preliminary work of surveying, laying out, depositing plans, setting out and superintending the drainage, streets, paying wages, and effecting sales, only $2\frac{1}{2}$ per cent. on the sales of plots—a rate of remuneration ridiculously low in some cases, as where

the sale of the property is slow. One scale gives for surveying land and preparing plan of plots, with estimate of ground-rent &c., from 10s. to £1 10s. per plot; for drawings, specification, tenders, supervision of roads and sewers, $2\frac{1}{2}$ per cent. In addition, for inspecting buildings during progress, to see if conditions are complied with, certifying for lease, $\frac{1}{2}$ or 1 per cent., or per visit. If drawings and skeleton specifications are prepared, $2\frac{1}{2}$ per cent.—a much more liberal scale. On estates when the houses erected are all on one plan, $1\frac{1}{2}$ to 2 per cent. has been charged; for one house, $2\frac{1}{2}$ per cent., and a reduced percentage for the remaining. These charges are sometimes paid by the builder on the amount advanced. It will readily be seen that the remuneration must depend largely on the circumstances of each case, on the size of the estate, difficulty of letting, &c. From $2\frac{1}{2}$ per cent. to 5 per cent. is charged for selling lots up to the first hundred. From these figures it will be seen how various are the scales of remuneration. Surveyor's handbooks are far from unanimous in the scales of charges they publish on these semi-architectural duties, though for valuations the charges are more definite. In these cases there is a more definite basis to work upon, and it is the same for dilapidation, the charge being generally 5 per cent. on the estimate. It would be much to be desired if architects and surveyors would agree to a schedule of rates for miscellaneous services of the kind we have been discussing, as until some bases of calculation are recognised, we shall continue to see conflicting charges made that can only afford profit and amusement to lawyers and the public.

GARDEN DESIGN.

AT the third ordinary meeting of the Architectural Association for the present session, a paper entitled "Notes on Garden Design" was read by Mr. F. Inigo Thomas, who illustrated his remarks with numerous plans and limelight lantern views. Mr. John Begg, vice-president, occupied the chair. For nearly a century past, the lecturer observed, it had been the fashion to dispense with a garden altogether, and the substitute that had usurped its place would in a better period have been called a wilderness. In their haste to obtain a luxurious growth of rare shrubs and plants, people had lost sight of the subtle charm that lay in a fusion of well-designed architecture and symmetrical spaces with natural foliage, and had ignored the sense of fitness that a frankly-designed garden bore to the architecture of the house itself. Nowadays, horticulture was the only point of view that was in any way recognised; in the time of John Evelyn, a keen appreciation of design balanced the interest taken in the growth of plants, or in new species. During the last few years the point had been discussed at some length in the leading papers and reviews. This has been partly due to the almost simultaneous appearance of two small books on the subject called "Garden Craft" and "The Formal Garden in England," the latter finding a spirited antagonist in the editor of the *Garden*. The point at issue was the comparative artistic value of two rival methods, for there had never been more than two ways of laying out a garden—the "formal" and the so-called "landscape" or "natural" style. Paradoxical though it might sound, the formal method seemed to have been the natural one until the middle of last century, and then, at a time when art in this country was on the decline, there sprang into vogue this fashion of attempting artificial landscape in the neighbourhood of the house. On a large scale, such as at Blenheim, it proved successful in the course of years. But surely, until the garden itself had been fitly and properly laid out, it was no time to launch into improvements to the surrounding country. And, furthermore, in a "landscape" scheme, by the time it was nearly ready for criticism, all traces of the originator's hand had been "kindly obliterated by nature," which made a comparison of results somewhat difficult. The development of architectural design in this direction proceeded by very natural stages. In building, the prime object of man was always to protect himself from the weather and from his

enemies. Next came a stage in which men built for the pleasure of building, in addition to convenience. And lastly, a period into which was imported a third element—namely, that of display and magnificence. Beyond this stage nature reasserted itself, and drove us back to the verge of barbarism. Now, the formal treatment arrived at its climax in England in the second half of the 17th century, and in its fullest development we found two distinct spheres of design. There was the greater lay-out of avenues and approaches, scattered broadcast over fields and park land, heralding the proximity of the house; and there was the smaller lay-out of garden courts, and bosquets that clustered round the house itself. The two lays-out and the plan of the house itself were made to accord in the schemes of the 17th century. In the earlier examples that are left, we seldom found signs of a greater lay-out. Avenues, to be seen to advantage, should be planted on wide plains or table lands, for the long perspective, which was their chief beauty, was lost in a rolling country. But, in the smaller lay-out, the opposite held good; so that the ideal site to treat would be one with more or less fall towards a level plain stretching away to the distance. The Roman Campagna, lying as it did in a circle of mountain spurs, afforded these conditions in a very marked degree, and the Roman magnates of the Renaissance were not slow to make use of them to the best advantage. The lecturer showed a few views of the Villa Mondragone at Frascati, pointing out that the whole scheme of buildings and surroundings was planned so as to fall on four successive levels. A centre line could be imagined running through from end to end, on which the principal features were plotted and a certain symmetry was observed on either side. Great pains were sometimes taken to preserve this balance, even in the most difficult situations. The terrace was probably paved throughout with "palombino," and used for the reception of magnates, with their retinues, from Rome. But there seemed to have been a garden under the palace windows on ground that rose gently to the level of the main courtyard. Here the buildings lay on three sides of a court planted round with rows of elms, the fourth side being divided by a niched wall from the Priory garden. This was laid out with plots of turf in borders of flowers, and two circular fountains in the centre. A fine arcaded loggia, by Ponzio, filled one end, and raised on a terrace opposite was an amphitheatre of inlaid marble fountains. From here a door and flight of steps led back to the main-cour entrance, and opposite this a wealth of flowers bordered the foot of a great bastion wall that supported the bosquets and vineyards at a higher level still. One curious thing about this plan was the small garden that lay on the roof of part of the building at about the same level as the great court of the palace. Now let us turn, Mr. Thomas continued, from the neighbourhood of Rome to a level site and a humbler effort in one of our Midland Counties. Thorpe Hall, of which this is a survey, was built and laid out by Webb. You will see he has surrounded the house with a wall inclosing an oblong space 120 by 200 paces. He has put a gateway in each of the four sides opposite the entrances to the house, and relieved the long stretches of wall with a couple of niches at intervals. Next he has divided the space unoccupied by the buildings and offices into six parts. One is given to the forecourt, four to pleasure gardens, and one to the kitchen garden. The forecourt is bounded on either side by a wall balustraded on top, and has elaborate piers at the entrance. On the right side as you enter, a narrow alley is screened off as a way to the offices. The large garden to the east is again subdivided by yew hedges into three parts. There is one long vista taken through from east to west. On the whole, it is a very compact lay-out, under the simplest conditions, and is interesting as an instance of contemporary design in house and garden. Some of the principles that are common to both Frascati and Thorpe, and that ran through all garden design, will be evident enough. First of all, inclosure decided and uncompromising. Not of sunk fences or iron palings, but of good honest masonry, high enough to cast broad shadows early and late, and keep the wind from the flowers and fruit trees. Then subdivision, either by subsidiary walls or hedges of yew or box almost as dense as the masonry itself. Then the proportioning of the surface of the ground with much the same treatment that a designer deals out to the façade of a building. What was

brought so forcibly into play at the Villa Mondragone was change of level, though there it was probably more from necessity than for beauty's sake alone. And a feeling after this quality was just traceable at Thorpe, too, in the terrace, where the flat site afforded no variety of itself. In neither was there an attempt at a greater lay-out, nor was water at all prominent as a means of effect. To trace the history of garden design we need not go further back than the time of Elizabeth, for the first decided impulse in this direction followed on the dissolution of the monasteries by Henry VIII. A house of that period was approached through an avenue and one or more courts in quiet tones of green and grey. Out of this rose a stately mass of buildings—two wings and a centre-piece—with broad, retreating shadows between, sparkling with myriads of small panes set among softly-moulded mullions. Through the walls on either hand, festooned with a wealth of climbing roses, there would be splashes of sunlight and colour from garden courts beyond, while at the back the brewhouse, offices, and so forth would be screened off from garden courts and orchards by walls of ample height. If there was one thing more characteristic than another of the pleasure-grounds of the past it was this system of inclosure and subdivision, and, to my mind, when that was abandoned the main charm of the old English garden vanished. In the time of Elizabeth, it was foreign to the idea of a garden to allow forest trees within the walls. The grove had its place, and that was outside the garden inclosure, where a lofty cliff of green would be more than welcome as a background to fruit and flowers. And it was probably from a wish to obtain a background of even tone that hedges first came to be trimmed. This trimming, or pleaching as it is called, which seems reasonable enough on these grounds, was eventually carried to absurd lengths. They had felt the need of single yews to mark the salient points in complicated patterns of flower-beds, and these they cut into a variety of forms—first into cubes and obelisks, and then, by degrees, into every shape that fancy might suggest, until at last the repose of the garden was as much hampered by verdant sculpture as Westminster Abbey is with its monuments. And since, of course, to keep the yews in shape requires considerable labour, it is hardly surprising that there should be few of the kind remaining. Old gardens were divided into several departments, and each of these bore a character distinctly its own. There was the parterre, or flower garden, with its fountains, and flower-beds in geometrical designs of box; the bowling-green with its garden house and shaded seats; the fruit orchards, wilderness, and so forth. There is always a charm, too, in length of vista that could not have failed to appeal to garden designers. And to give point to the long perspectives that were planned to pass through house and grounds alike, they were adorned at intervals with fountains, statues, or other objects of interest. Each of these would form the centre of a network of cross vistas, so that sunlight or shadow, front view or profile, should offer the scene afresh as often as it was approached from a new direction. When large sheets of water came to be included in the dressed grounds, they, too, were treated in the same formal manner. The development of garden design may be said to have been the elaboration of these few principles, for the object of the old-time designer was to make a stage on which to play the drama of everyday life; but, unlike the stage, the scenery was real, and the acting an unaffected pleasure in existence and in the sights and sounds and scents of nature. Architecture lost a little of her sobriety in the summer-house, and sculpture a trifle of her classic finish in the garden. The statuary used in the ornamentation of English gardens was mainly composed of lead, and, if we are to believe the date on a figure of Nelson at Fingask, in Scotland, the old moulds were still in use as late as the year 1820. Sometimes these castings represented figures, sometimes vases, often exquisitely wrought. The same vase designs reappear at places as wide apart as Sprotborough and Penshurst. Later on there was a fashion for hounds and sphinxes, which latter seem to have come in with the Brothers Adam. Perhaps the period of greatest activity may be placed in the reign of William and Mary, for to that time belongs the English classic on the subject, a fine folio of views drawn by Knyffe, and engraved by a fellow-countryman of the name of Kyp. Then we have the diary of Celia Fiennes, a lady who spent some years riding

about England and taking a lively interest in the improvements that her many friends and relatives were making to their country places. And to this time, too, belong the great plans of Wren's devising for the beautification of Hampton Court. But with the progress of the 18th century interest seems to have flagged. People, perhaps, began to tire of spending the sums that their overgrown schemes must have needed to keep up. Pope struck a note of ridicule, and the stupidity of a decadent age was ripe to root them out of fashion. Then came the opportunity of the landscape gardener. Kent and "Capability" Brown stepped on to the scene, and though they mowed down avenues, and destroyed every vestige of dignity under the protest of "helping Nature," they seem to have forgotten how to make a garden. It is mainly due to people of this persuasion that so few of the fine old places are left intact. But there is a more potent influence at work in many parts of England at the present day. The smoke of factories, mines, and foundries is killing the timber, robbing the colour from the stonework, and driving out the occupants from many an old-world paradise. And the only hope is that force of association will lead them to build and lay out their new homes with some of the dignity that still clings about the old. The influence Versailles had on contemporary work in England was probably through the medium of Hampton Court, and to follow the changes through which that palace has passed is to read the history of garden design in England. Then, too, there was the Dutch influence that came in with the Hanoverians. This sheet from an old atlas of the country round Delft goes to prove that an architectural lay-out was not altogether unknown there in the 17th century. A careful inspection of the map shows the meshes of the intricate network of dykes to be filled with the most elaborate designs, in which the paths, borders, fountains, and even the statues are distinctly visible. And, judging from the pains these Dutch engravers took over their work, there is not much reason to doubt their accuracy. Here is one, for instance, in the environs of Ryswyk, near the Hague. The house and dependencies lie round a square court, and are approached from the road between two groves, with glades radiating from circular pools in the centre of each. Then comes the forecourt, laid out in plots of turf and walled off from small flower gardens on either side. Through the house a long terrace runs right and left, and then the main garden, set out with four large fountains, two pavilions, covered alleys, turf plots, and flower beds. Round the whole a double row of trees, a wall, and then the inevitable canal. Here is another engraving that tends to show how lavish was the expenditure of the Dutch nobles in their country homes. Ideas direct from Italy do not seem to have had much influence in England after the time of Elizabeth. Their work was always more severely architectural than ours, and in the meantime we had begun to look to nature for more of our effects. In outdoor architecture there has always been a scenic and playful character, though with us a certain restraint runs through the work that is not so observable in the south. There is a tendency on foot in some quarters to treat the subject of the garden with that seriousness that all thoughtful work deserves. And to illustrate this I will try to describe to you one or two places of my own devising that are either finished or in progress at the present time. But we have been flying high, and though I have the greatest respect for the pluck that some of my clients have shown, still we are in the 19th century, and it must necessarily be a great descent from the work of the old master to our moderate efforts. Here is a plan of one in Dorsetshire that has been finished and growing into shape some three years or more. The house was of various dates, mainly from Edward VI. to Elizabeth, but with other additions, down to the present century. The wing to the left and that containing the dining-hall it was decided to leave untouched; but the comparatively modern work in the south and right wings was rebuilt on the same lines as the older portions. The site of the present gardens was a grass field, falling somewhat from left to right. There were a few trees here and there, and a larch plantation across the windows of the south front. The high road bounded the ground on the left, and a back drive skirted the near side of the field, and continued behind the grove to the back of the house. When the ground was cleared of trees, and the roots grubbed up, the soil from the south garden and

pool was excavated and removed to form the terraces round the sunk garden. Lines were laid down to make vistas through the centres of the courts, and sundial, fountain, or wrought-iron grille placed where most they seemed to be needed. There are three main lines on which the work is planned: One from the south gate catches the reflection of the house in the long pool, passes through the doorway in the south front, and out into the court beyond, thence down the centre of the tennis-lawn, and across a pool at the end to a sculptured figure in a yew hedge by the river. Another line, centring with a window in the left wing, passes down the rose-garden, and through the circular coronet to a niche-fountain between the two arches at the far end. The third is taken from a summer-house in the grove to the right, across the south garden, through the coronet, and up a flight of steps with a wrought-iron gate, to the sunk garden. Here it catches the fountain, and continues up another flight of steps to end in a stone seat that projects from the back of the terrace. The water for the fountains is forced up by a ram in the river to a couple of tanks in the roofs of the pavilions, which gives it a fall of about 20ft. to the long pool in the south garden. All the stonework, with the exception of a little Douling, came from the Ham Hill quarries. It is a warm, rust-coloured stone, taking a grey lichen, and I have tried to embody some of that variety in the walling that makes such a marked contrast between the old work and that done at the present day. A second work is rather a disconnected scheme, and has the prime fault that neither of the main axes leads up to the chief block of the house itself. However, this must often be the case when the house and contiguous buildings have already been erected before the grounds are designed. The plan may be divided into two distinct parts—namely, the gardens proper, which are inclosed within walls or other architectural boundaries, and the scheme of avenues, planting, and earthworks outside. Here is a cricket field bordered with banks and terraces, hedged round and planted on three sides, with a pavilion and seats for onlookers under the trees. East of this is a paddock and deer shelter, where the herd would be fed in the winter—forming a pretty picture among the surrounding timber. And south of this again is an apple orchard and circular pool inclosed in a grove and centring with a door from the walled gardens. Unfortunately the flower gardens have had to be planned on the north side of the house, where the ground is formed into three successive levels ending in a balustrade and sunk fence towards the park. The extent of the walled gardens is marked by a pavilion at either end, and the long central vista is terminated eastward by a bastion with a figure of Sir Philip Sydney, and to the west by a semicircle of twelve terminal figures representing the months of the year, with piers and wrought-iron gates in the centre. There are square-walled sun-traps set about with seats at either end of the lower terrace. A third is a simpler scheme of suggestions that was made for a place in Norfolk a few months since, but is, I regret to say, going to remain on paper. The problem was to add some gardens to a house built some twenty years ago, and designed without envisaging any architectural treatment of the grounds about it. The principles I have been enunciating were not, of course, confined to the surroundings of country houses only. They were, and are still, equally applicable to town houses where there is any ground to treat, and also to the streets and squares of towns. There are not many towns and villages in England that have been laid out with much attention to this, though with thought one could enumerate a few. Pitcairn-green, in Scotland, for instance, has a pretty plan and festooned arrangement of trees that gives it quite a gala-like appearance. It is easier to call to mind instances in France, and the two that suggest themselves most readily are Quimper and Quimperle in Brittany. I have been applying these principles to a budding town in Ireland. Strange though it may seem, there is apparently one spot in that "distressful country" in which trade seems to be on the increase. Taking time by the forelock, the intelligent owner of this village and the land about it has had a scheme prepared. The principal streets and squares are laid out, and by the time the place is built up the avenues and groves should be affording some shelter from sun and wind. The court-house forms the focus of the whole arrangement. Beneath it is the butter

market, and through the trees across the road the houses and shops that form the market square. There are two pools and groves of trees at one side of the square, with tall columns for electric light at intervals in the balustrade. Down the street to the west we catch a glimpse of the Calvary in the churchyard wall, and up to the east a fountain. The main buildings and shops round the market square are designed in the rough, but are only to be built as they are required. I have not long returned from a miscellaneous tour in Scotland, a tour comprising most things, from surveying the pace of a race-horse to pacing the survey of a scheme of laying out. And I will close with a slight sketch of what I saw there. It is the gardens, of course, that I am going to tell you about. Castle Kennedy, near Stranraer, was the first point I made for. I had been told by all the young ladies at the Ayr meeting that, with the exception, perhaps, of Versailles, there was no such place in Europe. Well, here is a plan of the laying out as it was in 1830. It is large for Scotland (about half a mile through), and lies in a beautiful situation between two lochs. But, do what I could, I could find no exceptional merit in it, and, on the whole, went away disappointed. The specimen tree is rampant, even to the extent of some of the ilex avenues having been replanted with puzzle-monkeys. And the new Castle of Loch Inch has been built across the upper end since the plan was made. Thence to Dalziel, in Lanarkshire, which is a fine old castle, with hanging gardens between it and a barn that runs close under the walls; and while there I paid a visit to Wishaw House, only to find the old garden forlorn and derelict, a playground for the rabbit and the mole. From Dalziel I went to Edinburgh, and so to Newhailes, a fairly complete lay out, finished and adorned probably by the Brothers Adam. On the other side of Musselburgh lies Pinkie House, with its beautiful gallery ceiling and stately walled courts. Perth was the next point, and a good centre for most of what is interesting in Scottish architecture. Drummond Castle, near Crieff, claimed priority from its reputation, but excepting the terraces below the castle walls and the green court, I thought it disappointing. There are grand masses of yew, and the floriculture is wonderful; but the great garden below lacks inclosure, is marred by the specimen shrub, and, moreover, it is not levelled. But the harmony is most destroyed by the high note of colour struck now and again in the white marble figures and busts, of which, to say the least, there is no scarcity. Next I went to Fingask, and fell in with a jolly band of leaden peasants, and not far from them, guarded by a terrible watch-dog, was a charming abour. The garden at Murthly is small, but full of surprises. It was the subject of Sir John Millais' picture of an old garden, and lies under the shadow of a huge "modern Elizabethan" house, a house that never was tenanted, but can boast of a fine approach of lime avenues, and a bowling green, overlooked by story above story of blank mullioned windows. Not many miles away from this lay Stobhall, on a steep green slope, overlooking the brawling waters of the Tay. Scattered up the hillside and along the crest by the wood was a haphazard cluster of buildings; and spires of yew topping a terrace wall betokened the presence of an old garden. Melville, in Fife, came next, and was interesting for its scheme of planting, and also for a forecourt designed something like that at New Park, in Surrey. The house and wings inclose one end of this forecourt, and the end towards the avenue has a gate in the centre, with flying figures on either side. The gilded vanes of two pavilions fall on a line with the counter avenues. This view shows the effect from the main approach, with one of the lodges on the left. The gardens were no doubt at one time on the far side of the house, but the site of them has long ago been thrown into a park, the main entrance made on that side, and the original forecourt converted into a flower-garden. In the woods at Melville, which, by the way, are all part of the design, there is a circle of beeches, 100 paces in diameter. The effect is magnificent. A wall of sombre green all round, 100ft. in height, melting from shade into sunlight, and row behind row of sturdy trunks, receding into the gloom of the woods beneath. Eight paths in a level lawn radiate from the centre, where no doubt there once stood a temple dedicated to some sylvan deity. A fortnight later I came upon a somewhat similar arrangement in the woods at Tynningham, but on a much larger scale. This time

with a terrace all round. But in the interval rain and wind had stripped the beeches of their leaves, and robbed it of half the charm it might otherwise have possessed. Crathes was the next to be visited, and perhaps the salient feature of the place is the great yew hedge on which it would seem a coach and four could travel quite gaily. The castle itself is interesting, and has a fine lime avenue on either side of the old approach. In conclusion, Mr. Inigo Thomas described the gardens at Gordonstown, in Elginshire, adding: It is with flat sites in low-lying countries that we generally find the boldest schemes in artificial water and planting. The land is probably divided into squares or rectangles by the necessary dykes, and to plant the banks of these dykes with rows of trees seems only natural, both to protect the cattle out at grass from the wind, and also to lend shade to the wide droves between the pasture.

Mr. J. ALFRED GOTCH proposed, Mr. FRANCIS G. H. HOOPER seconded, and Mr. E. M. ELGOOD supported a vote of thanks to Mr. Thomas, which was carried by acclamation, and was acknowledged by the lecturer.

WROUGHT IRON AND STEEL IN CONSTRUCTIONAL WORK.—V.

By JOSEPH HORNER.

"OPEN-HEARTH steel" is so termed to distinguish it from the Bessemer metal, notwithstanding that the two products are so nearly alike, and often used for identical purposes. It is so termed because it is manufactured on the hearth of a reverberatory furnace, instead of in a closed converter or in closed crucibles. The term "ingot iron" is applied indifferently to both Bessemer's and Siemens' products, because each, after fusion, is cast into ingots. The term "iron" is also not unfrequently loosely applied to both. The differences in the open-hearth and the Bessemer iron are chiefly those due to the fact that the former is capable of more extended and leisurely treatment than the latter, and is therefore more under exact control; that larger quantities can be treated at one charge, and that ore as well as pig can be used. Although Bessemer's was first in the field, yet the open-hearth processes are of more extended commercial value at the present day, for reasons which we shall note after having briefly sketched the methods of open-hearth steel manufacture.

The open-hearth processes are the development of several patents of the Siemens Brothers. It is, of course, well known that the Siemens furnaces are mostly heated by gas, worked on the regenerative principle. This means the yielding up of heat which would otherwise be dissipated and lost, to an absorbent material, which in turn yields it up to cold air and gas used for subsequent combustion, so raising the temperature of the latter before it enters the furnace. Dr. Percy suggested the term "accumulators," instead of regenerators, applied to the brickwork, a term which seems to express its function more accurately. The regenerative principle was, however, not applied to steel-melting at the first, but to the construction of an abortive steam-engine about the year 1847. When the inventor applied the principle to furnaces for melting glass (patent, Dec. 2, 1856) its success became assured. Before the end of 1862 about 100 of the Siemens glass-melting furnaces had been licensed by the patentees in England and on the Continent. The last lecture of Faraday at the Royal Institution, June 20, 1862, was on the regenerative furnace. Another patent of the Brothers Siemens contributed to the success of these furnaces—that of the substitution of gaseous fuel, or, as it is now termed, "producer gas," for solid fuel (Jan. 22, 1861), coinciding with the period when extensive experiments were being made on the regenerative furnace. The contingency of melting steel without crucibles had been provided for in this patent; but it does not appear that steel-making was contemplated until the French firm of Pierre and Emile Martin, of Sireuil in the Charente, working under a license from the Brothers Siemens, produced, as well as melted steel.* Siemens' first patent for making steel was not taken out till Aug. 21, 1867, and this embodied the making cast steel in a reverberatory furnace, employing producer gas and the regenerative method.

* It is curious that Messrs. Martin first made open-hearth steel by the fusion of cast and wrought iron, a method long before suggested by Réaumur and others.

Briefly, the difference between solid fuel and gaseous fuel is this: The fuel of an ordinary reverberatory or arched furnace is burned in the same chamber as that in which the metal lies, though not in contact therewith, and the hot gases which are given off therefrom are deflected by the low arched roof of the furnace over the metal lying upon the hearth. The object of the gas-producer is to burn the fuel in a block of furnaces *distinct* from the steel-melting furnaces, and to lead the combustible products, carbonic oxide and hydrogen, thence to the hearths where the steel is melted. This invention has not only effected a saving in cost, because inferior fuel can be employed, but the greater purity of the gas, and the absence of solid carbon or ashes from the melting chamber, and the more uniform temperature attained has enabled a better steel to be made than was previously obtainable apart from the use of closed crucibles.

The following is a brief account of the regenerative furnace: In certain arched chambers or flues of the Siemens steel furnaces, respirators or regenerators are constructed of fire-brick arranged like chequer-work or lattice-work, giving at the same time abundant surface, and a free passage. The specific heat of brick is high, and therefore these chequer walls absorb and retain large quantities of heat. The highly-heated products of combustion, after quitting the furnace hearth, pass through this chequer-work on their way to the chimney, yielding up so large a portion of their heat thereto that they are discharged from the chimney at a comparatively low temperature. Thus, while the temperature of the furnace may be 4,000° Fahr., that of the escaping gases in the chimney will, perhaps, not exceed about 300° Fahr. At the London and North-Western shops at Crewe, an ingenious plan was adapted of proving this. A piece of freshly-cut wood was inclosed in the chimney flue, and kept there under lock and key for a certain number of days, and if, on being examined, it was found to be burnt, or even badly charred, the men who worked the furnace were fined for want of care and waste of fuel.

At a certain stage, usually at intervals of from thirty to fifty minutes, when the regenerators have become highly heated, the escaping current is diverted by means of a reversing valve into another passage, to heat another set of regenerators similar to the first; and simultaneously the air and gas intended for combustion are brought through those from which the current has been just diverted, and gathering heat therefrom, enter the furnace at a temperature nearly equal to that of the furnace itself. Thus, nearly all the otherwise waste heat from the furnace is given up to the chequer-work, to be in turn rendered up to the gas and air, by the combustion of which the metal on the hearth is to be melted. The gas and air are therefore highly heated before they enter the furnace, by the heat which in an ordinary furnace would be directly discharged and wasted up the chimney. The air and gas are, of course, conducted through separate passages, so that they do not mingle until they reach the hearth, and the regenerators are therefore worked in pairs. The saving of fuel effected by this transfer of waste heat to the air and combustible gas does not represent the only advantage gained by the adoption of the regenerative system, for the air entering the hearth being so hot, the combustion of the fuel is correspondingly more intense, and the result is that much higher temperatures are thus attainable than were possible under the older conditions—a manifest advantage in the fusion of highly refractory substances. Hence in the early experimental stage, the difficulty which the brothers Siemens encountered was the selection of materials sufficiently refractory to withstand the high temperatures obtained. The hearth of the modern steel-making furnace is formed of a stratum of vitrified sand 14in. or 16in. thick, backed with bricks and iron plates. Ports or openings come in above the hearth, through which the gas and the air necessary for combustion enter.

Without explaining minutely the details of the process of open-hearth steel-making the following facts will serve to show the broad lines on which it is conducted.

The furnaces hold, as a rule, from 15 to 20 tons of steel at a charge. They are, however, made as small as 6 tons and as large as 30 tons capacity. A furnace measuring about 16ft. by 10ft. will yield a 9-ton charge. The capacity, therefore, averages higher than that of the

Bessemer converters. But the process occupies a longer time. The Bessemer process will occupy about half an hour; the open hearth from six to eight hours, which proves an advantage in respect of the grading of the chemical composition of the metal. Again, in the open hearth, the charge may consist of pig and ore (original Siemens), or of pig and scrap, or crop ends; or of pig, ore, and scrap (Siemens-Martin). It may also be basic, as when pure hematites are used, or acid as when phosphoric ores or pigs are used, in these last respects resembling the Bessemer. In the basic open-hearth process the ore—oxide of iron—is used to burn out the impurities, and lime acts as a fixing agent to hold these in the slag when burnt out.

Essentially the stages in the manufacture of this mild steel, or iron, are two. There is first the decarbonising stage, in which the carbon is almost entirely removed from the iron, and secondly the recarbonising stage, in which a definite percentage of carbon is added to the fluid metal. If the decarbonisation were continued until the exact final percentage required were left in the metal, the result would be a short worthless article. To make the metal workable it is essential that manganese in some proportion be added. But manganese in the pure state is expensive, while manganese combined with carbon and iron as ferro-manganese or spiegeleisen is cheap. Hence it is preferable in every way to wholly decarbonise the bath of metal, and then add thereto an ore of iron, or an alloy containing a known amount of carbon and manganese. And this is what is done in practice.

The Siemens process is that which is most frequently employed in England. About 30 per cent. of hematite pig-iron and 70 per cent. of steel scrap are a usual charge. The scrap is not essential, but it is convenient to utilise it in this way. This is melted first on the furnace hearth. When fused, small quantities of hematite iron ore are added, the ferric oxide in which acts as the *decarbonising* agent, burning out the carbon and silicon in the metal. Each addition of ore causes a violent ebullition of the metal on the hearth, due to the escape of the gaseous oxides of carbon, which result from the union of the oxygen in the ore with the carbon in the pig and scrap. From 25 to 28cwt. of ore may be added to a charge of eight tons; but samples of the metal are withdrawn from time to time, and tested rapidly, a portion by rough chemical analysis, and another portion for malleability by striking it with hammer blows. When the metal is fully decarbonised, and has been allowed to stand a little while, carbon and manganese are added thereto in the form of spiegeleisen or ferro-manganese of known degrees of carbonisation, so that steel of any precise grade is therefore easily produced. In the Siemens-Martin process, pig-iron and scrap-iron, or steel, are fused together on the hearth of the furnace, the carbon being oxidised until less than one-tenth remains, when spiegeleisen, or ferro-manganese, or both are added, either after the metal is tapped or while still in the furnace. The Siemens-Martin process is essentially the same as the Siemens, the differences being due mainly to the difference in the character of the charges, no ore being used in the latter.

The commercial successes of the Siemens and Bessemer processes are due to the fact that steel of any required degree of carbonisation, and in large quantities can be manufactured at a low cost. The comparatively low cost is due to two causes—first, the fact that the steel is produced direct from pig, which is the cheapest form of iron, or from ore and scrap; and, second, that the amount of fuel required is much smaller than that used for the more roundabout processes. In making steel by the open-hearth processes the cost of manufacture of malleable iron is altogether dispensed with, and not only so, but the fuel used is not solid, but gaseous, and the gas producers are constructed on the regenerative principle, by which nearly all the heat units, which in ordinary furnaces pass away unconsumed into the atmosphere, are utilised. Again, in the Bessemer process, the only cost incurred for fuel is that required for the first smelting of the pig, and its remelting in a cupola furnace, and even the latter cost is now generally saved, the metal being run directly from the blast furnace into the converter. For these reasons the cost of production is very economical, and there is the additional advantage that the composition of the material produced is under much more strict control than in the other processes.

In regard to the element of time: In the

puddling furnace about an hour and a half would be required for dealing with 4cwt. or 5cwt. of pig, and two good men could not make more than about 22cwt. of puddled bars for a day's work. But a day suffices to work off the heavy charge of a Siemens melting furnace. In the Bessemer converter a quantity of iron will be refined in half an hour that would take nearly a week by the ordinary puddling processes. Of course, the initial capital outlay on steel-making plant is very heavy, and for many years, therefore, steel was much more costly than iron. Rails that now cost less than £5 a ton, cost £17 in the early days. The first Bessemer rails exported to America cost £20 a ton. The product of the earlier open-hearth furnaces was also very uncertain. The material was too hard and brittle, and often unsound. The requirements of inspecting bodies were severe, and high prices ruled. All that is changed now, and steel is as cheap—often cheaper—than iron, always very much cheaper than the best iron. It is not easy to institute comparisons between the two, because of the variable conditions which exist in different localities, and the economies of small and large works. But the following will give a rough idea, sufficient for our present purpose. It is a comparison which was embodied in a lecture delivered by Mr. Riley at the London Institution. Taking the case of an ironworks making 1,000 tons of puddled bars weekly, and a steel-works making 1,000 tons of ingots weekly, the cost would be as follows:—

Puddled iron works.—Cost of plant, exclusive of land, £50,000; area of land required, 10 acres; number of workmen employed, 500; foremen, 10; pig-iron used per ton of iron made, 22cwt.; workmen's cottages, 200; fuel used per ton of iron made, 30cwt. of coal; fuel used per week, 1,500 tons; cost per ton, taking £2 pig-iron, £3 13s.

Steel-works.—Cost of plant, £25,000; land required, 5 acres; number of workmen employed, 120; foremen, 4; pig-iron used per ton of ingots made, 24cwt.; workmen's cottages, 40; fuel per ton of ingots, 4cwt. of coal and 3cwt. of coke; fuel used per week, 350 tons; cost per ton, taking £2 pig-iron, £3 7s. 6d.

The subsequent treatment of steel is, briefly, the casting into ingot moulds, the ingots being oblong and of square section, with rounded corners, and of masses varied according to the weight of the plates or sections which have to be rolled from them. These are reheated and cogged—that is, reduced in sectional dimensions by passing the ingots between rollers, which operate on opposite faces in turn. They are afterwards rolled, cut up, reheated, and rerolled. To go into the details of these processes, which are not always of a uniform character, would involve the consideration of the massive machinery used for these purposes, machinery which had no parallel in that used in the puddling furnaces. The subject is an attractive one; but I must pass it by, as not being quite within the scope of the present subject. With the main exception—that the operations of the modern steel-rolling mills are Titanic by comparison with those of the iron-works—the operations have a certain similarity, and the results in each case are the finished plates, bars, and sections.

Although the convertible terms "mild steel" and "ingot iron" are applied alike to the Bessemer and Siemens products, there are certain differences in the two which have apportioned to each its special sphere. We can now understand the reasons for this, after having followed the processes in outline. Thus the open-hearth processes are conducted on a larger scale, and are more under control than the Bessemer. Hence, it follows that for the most massive work, and for the mildest steels—i.e., those which differ least from pure iron, and for those steels in which the degree of carbonisation is required very precise—the open-hearth processes are better adapted than the Bessemer, and they have accordingly steadily displaced the latter for many purposes. So that now Bessemer is used mainly for the harder qualities of steel required for rails, for tires, and for castings, while open-hearth is employed mostly for plates, bars, angles, and other sections used in general engineering, and in constructional work. Of course, this rule is not invariable, but general only, yet of very general application nevertheless. But for the fact that rails and tires are made almost exclusively from Bessemer metal, that process would not have held its own to so great an extent as it has done. Castings are made indifferently from both pro-

ducts. The adoption of acid and basic methods, employed, as already remarked, in both processes, depend for their relative utility chiefly on the availability or otherwise of suitable ores. In districts where pure hematite ores are plentiful, or easily accessible, the acid process is adopted in both Bessemer and open-hearth methods. In countries where the cost of these is prohibitory, phosphoric ores are used, and the basic process is followed. Good steel can be prepared by either method, and the question is therefore one of cost. In fact a premium has been paid in certain cases on highly phosphoric pig, because of the greater calorific intensity obtained by the oxidation of the phosphorus. In Germany the acid process is largely adopted, in America the basic, in England both.

Having now rapidly traced the manufacture of iron and mild steel from their earthy ores, we can appreciate the special characteristics of each, and the precise differences which exist between the two products, and by which their value for specific purposes is determined. There are clearly two principal ways in which methods of manufacture adopted must influence the resulting materials. One is through chemical composition, the other through mechanical treatment. These determine the whole range of physical characteristics of the weld irons and ingot irons, their degrees of strength and ductility, homogeneity, and relative dimensions, the nature of the work which can be done upon them both in the workshops and in the form of strains, and their susceptibility to wear and tear. They determine further the most suitable disposition of material in structural work, so that special characteristics shall correspond to special requirements. And all the care bestowed on the processes of manufacture is insufficient in itself to insure products having precise and reliable characteristics. Hence the necessity for the application of tests of many kinds to both materials in order to determine their precise behaviour, and their reliability or otherwise for the purposes for which they are required. These aspects of the subject, therefore, will now be considered.

ADAPTABLE SPECIFICATIONS. — XIX.*

SPECIFICATION PART X. (continued): PLUMBERS', BRASSFOUNDERS', AND SUNDRY WORKS.

X. 29. **BATH.**—Provide and fix in the bathroom a [best 6ft. porcelain enamelled-iron beaded bath, fitted with a self-locking supply apparatus, so that the water cannot be turned on while the waste is in action, and with 2in. copper quick waste], [broad-lipped taper oval-end bath, galvanised tinned iron, white inside and green marbled outside, with sunk washer and plug for waste, and hole for 1½in. overflow]; and fit to the bath Tylor's inch loose valve, screw-down bath valves, with brass spoke knobs with porcelain centres, lettered "Hot" and "Cold," and connect these bath valves with the hot and cold-water service pipes respectively. These valves are to be fixed above the highest possible level of the water in the bath. The overflow to be fitted with a 1½in. lead warning-pipe, carried [through the wall, so as to discharge on the roof]. Immediately below the waste-plug fix a 2in. self-cleansing lead siphon trap; and continue from this a 2in. lead pipe discharging [over the head of the external iron waste-pipe], [over an open 4in. stoneware channel discharging into the trapped gully shown for that purpose on the drains plan]. The overflow pipe is to be entirely disconnected from the waste-pipe, and both overflow and waste are to be entirely disconnected from the service pipes by which hot and cold water enter the bath.

X. 30. **LEAD SAFES.**—Put under the bath a proper watertight lead safe of 5lb. milled lead soldered at the angles, 3in. longer than the bath and 3in. wider (if the size of the bathroom permits, and if not, reaching from wall to wall under the length-way of the bath). At the back and ends, the lead is to be turned up vertically for a height of 4in., and in front it is to be dressed over a 3in. by 2in. doubly chamfered fillet, and close-nailed with copper nails. Put in the safe a 1½in. lead overflow pipe carried [through the wall to discharge on the roof] as a warning-pipe. Put below each [w.c. apparatus] [valve w.c. apparatus] a similarly constructed safe as long as the width of the w.c. chamber, and [18in.] wide, with similar overflow pipe, discharging [where the architect may direct].

X. 31. **BUTLER'S SINK.**—Form where shown on drawings a butler's sink, lined with 6lb. milled lead, soldered at the angles, the lead turned over the upper edge and closely nailed with copper nails. Fit with a 2in. butler's pantry washer, soldered in, and provide plug and strong brass chain, with 2in. self-cleansing siphon trap immediately underneath the aperture for waste, and 2in. lead waste-pipe carried from it..... to discharge over a 4in. open channel leading to a trapped gully. The siphon trap is to have a 2in. brass cap and screw soldered in.

X. 32. **BUTLER'S SINK (alternative).**—Provide and fix where shown on the drawings a [Bolding's] white earthenware wash-up sink and drainer, 24in. by 14in., with plug-hole, and plug and brass chain and overflow. From immediately below the plug-hole is self-cleansing lead siphon trap of the same clear inside diameter as the plug-hole. Put to this siphon trap a brass screw-cap for inspection, and connect the trap to a lead waste-pipe of the same internal diameter, discharging [over a 4in. open stoneware channel leading to a trapped gully] [over the open head of the external waste-pipe shown on the plans]. Connect a lead overflow pipe, of the same internal diameter as the hole left for it, with that hole, and take it [through the external wall] to discharge and act as a warning-pipe. Lay on hot and cold water to the butler's sink with ¾in. pipe, and provide and fix to each service a Lord Kelvin's ¾in. indestructible water-tap.

X. 33. **HYDRANT (in places licensed for public entertainments).**—Provide for the purpose of fixing in the [large hall] No. 2½in. hydrants, and for connecting each of them by a 3in. [main with the Water Co.'s high-pressure street main] [with the cisterns required by the London County Council's regulations, and for providing those cisterns and the pipes and other apparatus connected with them], the sum of £.....

X. 34. **SCHOOL LATRINES.**—Provide and fix in the [boys' w.c.'s] a set of [Adams's patent automatic flushing latrines] for [6] seats, with pans in highly-glazed earthenware; a patent automatic flush tank for about six gallons per seat, with fall-pipes, bend, and connection for the horizontal flush-pipe, and with shaped and hinged pitch-pipe unvarnished seats. In addition, provide and connect with each pan and with the flush-pipe a 6in. stoneware glazed drain-pipe, and at the lower end connect to this a 6in. stoneware S-trap, connected with the drains, and ventilated by a 4in. cast-iron drain-pipe carried up to as directed for soil-pipes. The closets and pipes are to be set on a continuous bed of cement concrete 18in. wide and 6in. deep, and all the work is to be done in conformity with the directions in the drainage specification. Lay on the water to the flush-tank from with ¾in. lead pipe. (Note.—For numerous other forms, see manufacturers' catalogues).

X. 35. **SIZES OF VALVES, UNIONS, &c.**—Except where specifically described to the contrary, all taps, ferrules, unions, valves, and connections of pipes are to have a waterway of the same size as, and not smaller than, that of the pipes in which they are fixed, or which they connect together.

X. 36. **TESTING PIPES AND APPARATUS.**—The whole of the plumbers' work, including pipes, joints, traps, soil-pipes and ventilating pipes, w.c. apparatus, baths, sinks, lavatories, latrines, and every other part of it, is to be tested after completion when required by the architect. Any defects which may appear are immediately to be made good, and the work is to be re-tested wherever defects have appeared, or wherever there is any reasonable possibility of injury having been done in the course of making them good. The whole of the work is to be given up sound and perfect.

X. 37. **PROTECTING PIPES FROM FROST.**—The following pipes, namely, are to be closely wrapped round for their whole length [above ground] with a double thickness of the best stout non-conducting hair felt, such as is used for protecting steam boilers from loss of heat, fastened by neatly-winding stout copper wire round it, with about two turns to an inch in length of the pipe [or for schools, fastened by closely and neatly winding out galvanised iron wire round it, with not less than three turns to every inch in length of the pipe, and then painting the wire and the outside of the felt three times in good oil colour].

X. 37. **PROTECTING PIPES FROM FROST (alternative).**—The main pipes to and from the cistern are to be carried up together in the [sheet-zinc

flue, hinged in sections] provided for them on the plans, the top of this [zinc flue] opening immediately under the bottom of the cistern. Provide and fix near the bottom of this flue [a short, plain gas-bracket with a tap and a No. 5 Bray's gas-burner connected with the general gas-service of the house] [a stand for a small petroleum or other lamp] to supply heat and keep the pipes and cistern from freezing in unusually severe weather. Put a small zinc door in a convenient place, with catch or button, to give access to the [burner] [lampstand], and hinge one side of the zinc flue [which is to be of No. 15 gauge] in convenient sections all the way up, to give access to the pipes. Carefully cover all branch waterpipes leading from this flue or from the cisterns with a double thickness of stout hair boiler felt, fastened on them by strong copper wire neatly wound round the pipe with about two turns to every inch in length of the pipe, the pipes so felted being covered in by the pipe-casings described in the joiner's specification.

X. 38. **DIRECTION TABLE FOR INSTRUCTION OF TENANTS.**—Provide the sum of for making, painting, and fixing in a light position in a direction tablet on No. 16 gauge zinc, with an inscription, of which a copy will be supplied by the architect, to instruct future occupants of the building what to do in case of severe frost; in case of the bursting of pipes and similar accidents; and how to use the various stopcocks and other apparatus that have been provided. Also mark, by notches or otherwise, as directed, each stopcock with a distinguishing mark peculiar to it.

X. 39. **PREVENTING THE EMIGRATION OF COCKROACHES, &c., TO THE UPPER FLOORS.**—Wherever a hot-water pipe passes through a wall, floor, or partition, it is to be inclosed in a stout zinc pipe at least 2in. larger in diameter than the outside of the hot-water pipe or pipes, and having flanged ends. The flanged ends of these zinc pipes are to be sunk flush into the plaster, and closely bedded in it, or in Keene's cement; and the space inside the zinc pipe, between it and the hot-water pipe or pipes passing through it, is to be tightly rammed for its whole length with silicate cotton (otherwise called "slag wool"), so that no insects can find their way through it.

GLAZIERS' WORK: FACTS AND MEMORANDA.

1. *Composition of Glass.*—Glass, as used in the arts, is essentially a compound of silica with various metallic oxides, the silica being in excess, and the compound being devoid of crystalline structure. Ordinary window glass frequently contains about 70 per cent. of silica, 14 per cent. of soda, 14 per cent. of lime, and a small quantity of iron and alumina. Here soda is used for the sake of cheapness; but a better kind of window glass contains 60 per cent. of silica to 25 of potash, and 13 of lime. Good English plate glass, now become something of a rarity, was composed of about 76 per cent. of silica to 17 of soda and 7 of lime. Hard Bohemian glass contains, according to one analysis, 73 parts of silica to 17 of potash and 9 of lime, with traces of magnesia and manganese.

Flint Glass, so-called, contains much silicate of lead in place of lime and soda. It is chiefly used for glass utensils, optical instruments, and artificial gems. "Strass," a pure whits glass, which forms the basis of most artificial stones, contains 38 parts of silica to 53 of oxide of lead together with 8 parts of potash and 1 of alumina.

2. *Manufacture of Glass.* *Crown Glass* was formerly almost the only kind used for window glazing. A lump of glass is taken up in a pasty state at the end of the iron tube used by the glass-blower. By blowing through this tube and whirling it round, the glass is next formed into a sort of hollow globe, or rather spheroid. By this time the glass has cooled considerably and needs re-heating. It is, therefore, hung up, blowpipe and all, to a hook in the ceiling of the glass-oven. When it has softened considerably a fresh workman, called the "finisher," takes it up, and by more whirling and other dexterous movements flashes it out into a disc of glass. The disc is then removed from the blowpipe by touching it at the junction with a drop of water, and is placed in the annealing oven to cool. The largest discs are little more than 5ft. in diameter, and as the centre is always occupied by the "bull's-eye" to which the iron tube was attached, a pane 22in. square is about the largest which can be obtained in crown-glass.

Sheet Glass is made by first preparing, by means

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of the iron blowpipe and a great deal of clever manipulation, a long hollow cylinder of glass. A number of these cylinders are formed, and placed in the "plate-oven." This oven consists of two chambers—one for heating and one for annealing. In connection with the plate-oven there is a large plate or table of fireclay. When the cylinders have been re-heated sufficiently, they are laid one by one on this table, cut down longitudinally, and then opened out into sheets of glass. The sheets are kept in the annealing room several days, and when they leave it they are ready for use.

"British" Plate-Glass is made by casting. It is composed of carefully selected materials in order to be as colourless as possible. The sand, which is the form in which its silica is supplied, must be quite white, and free from oxide of iron. The materials are first melted together into glass. Then this glass has to be freed from impurities. Next it is cast into plates, rolled out, and cooled, and lastly it goes through the different processes of rough-polishing, fine-polishing, and finishing. "Best British plate" can be distinguished from "Patent plate" by the spherical shape of the minute air-bubbles it contains.

"Patent" Plate-Glass is a superior kind of sheet-glass, which has been polished. The minute bubbles in it are, therefore, from the mode of its manufacture, oval or irregular in form. This glass should be cut with the convex face of the air-bubbles downwards, and glazed with their convex face outwards.

Rough-rolled Plate is of many kinds: some with a wavy, dappled, or roughened surface, and some with various patterns stamped into it, or embossed on it, in the process of rolling. It can be obtained either pure white—being then similar to unpolished plate-glass—or of various tints, lighter or darker. It can also be supplied "ground."

Pluted-sheet is a cheap rolled glass with projecting flutings or "reedings" on both sides, so that it obstructs the view without diminishing the light to any great extent. Its corrugated section makes it stronger than ordinary sheet-glass.

"Bone glass" is milk-white and semi-transparent. It is made by adding to white glass about 20 per cent. of white bone-ash. "Opal glass" is somewhat similar; but less translucent. "Cryolite glass," or "hot-cast porcelain," has been made with 67 per cent. of silica, 24 per cent. of cryolite, and 9 per cent. of oxide of zinc. *Aventurin glass* formerly made only at Murano, consists of a brown mass in which metallic spangles are dispersed. It may be imitated by melting ordinary glass with equal parts of protoxide of copper and protoxide of iron. Another variety of Aventurin glass, containing spangles of oxide of chromium, has been made by adding chromate of potash, in considerable quantity, to white glass.

Coloured Glass is of two main sorts: that which is coloured throughout, and that which is really white glass covered on one side with a thin film of colour. In the second kind, the colouring material is generally very powerful, and the glass made with it would be almost opaque if the whole thickness of the sheet were coloured. Ruby glass is of this kind, the colouring matter being usually sub-oxide of copper. Protoxide of copper colours glass green. Oxide of iron, treated in different ways, gives a different red and a different green. Another green is afforded by oxide of chromium. Yellow and topaz-yellow are obtained by means of antimoniate of potash, and by chloride or sulphide of silver. Oxide of cobalt furnishes a blue, and oxide of copper another blue. Oxide of manganese and saltpetre give a purple tint. Black may be produced by adding the oxides of iron, copper, manganese, and cobalt. Oxide of uranium imparts a greenish yellow, and sesquioxide of iridium yields a beautiful black.

Glass Enamel is made of easily-fusible glass, rendered semi-opaque and white by the addition of oxide of tin. There are also a great number of coloured enamels, by applying which people have tried, with little success, to get on a single sheet of glass the effect that is only to be had by fitting together a mosaic of differently coloured pieces. The enamels at best are dull, heavy, and muddy-looking in comparison. They consist essentially of soft glass, variously coloured and ground to powder. This powder, mixed with a suitable vehicle, is painted on the sheet of glass which is to be adorned, and then this sheet is placed in a muffle-oven till the enamel is melted and adheres to it. The lines and shading on stained glass are usually drawn, on this principle,

in brown enamel; but enamel of other colours finds little favour in good work.

"Embossed" glass may be made by etching on plate-glass with hydrofluoric acid, and then grinding the face of the glass afterwards. The piece of glass, carefully cleaned with whiting, is placed over the drawing of the pattern to be produced, and the ground around the pattern is traced on to the glass with Brunswick black. When the tracing is complete, a raised margin, made watertight with hot tallow and carbonate of iron, is formed all round the glass to hold the acid. This, of medium strength, is then poured on, and left for half an hour. By this time it ought to bite in about $\frac{1}{16}$ in. It is then poured off, and the glass washed, after which the surface is ground with emery powder applied by a bit of plate glass. The powder does not affect the sunken pattern, and this stands out transparently on a frosted surface.

THE SURVEYORS' INSTITUTION.

At a meeting of the above society, held at the temporary premises of the Institution in Savoy-street, Strand, on Monday evening last, a paper was read by Mr. Walter C. Ryde, barrister-at-law (Associate) on the new Agricultural Rates Act, which, as Mr. Ryde said, had, although it was so short an Act, effected a great change in the incidence of local taxation. The general scheme of the Act was extremely simple, while its practical operation would be very complicated. For a period of five years after March, 1897, the occupier of agricultural land would be liable to pay only one-half of the rates in respect of buildings and other hereditaments and to meet the deficiency an annual grant was to be made to each of the "spending authorities" out of Imperial revenue during the five years. But this would not merely transfer one-half the burden of rates on land from the occupier to the tax-payer (whoever he might be), for the deficiency must certainly fluctuate from year to year, while the amount of the annual grant would be a fixed sum, ascertained once for all, and therefore, in many cases, insufficient or more than sufficient. The author of the paper pointed out that the Act extended to the Metropolis (as there were certainly market-gardens and other lands coming within the definition of the Act within the Metropolitan area), and also, he thought, even to the City of London itself. The Act defined "agricultural land," and for the purposes of explaining what was a "cottage garden," it defined a "cottage" as "a house occupied as a dwelling by a person of the labouring classes." There were important differences between the partial exemptions created under the Public Health Act, and those under the Agricultural Rates Act. The former extended to tithes, tithe-rent charge, woodlands, land covered by water, canals, and railways, &c., none of which are exempt under the new Act. Again, the exemption under the Public Health Act was three-fourths; under the new Act one-half only. The definition of "Agricultural Land" as "land used as meadow or pasture ground only," to the exclusion of "land used mainly or exclusively for the purposes of sport or recreation," was, he thought, confusing. It was difficult under this definition to say exactly what would be the rating of a piece of land usually used as pasture, and occasionally, for instance, as a cricket ground. "Meadow land," and "land occupied together with a house as a park," were also distinguished, but the line of distinction was a fine one to draw. The question had already given rise to some difficulty, for it had been urged that meadow land adjacent to the owner's house, which in the hands of a tenant would be entitled to exemption, became, when left on the owner's hands, part of the "land occupied with the house as a park," and consequently free from exemption. In measuring a "cottage garden" under the Act, for the purposes of exemption, it seemed clear that the land occupied by the cottage itself, or any other building within the ambit of the garden, or adjoining it, must be excluded. The meaning of the words "cottage garden" depended on the definition of the word "cottage," and that, again, on the meaning of the term "labouring classes"; but the line of demarcation was quite impossible to be laid down with any precision, each case depending on its own facts. The author of the paper proceeded to point out one or two anomalies in the Act, such as, for instance, the fact that a "cottage garden" must be one attached to a cottage occupied by a person of

the "labouring classes," and exceeding one quarter of an acre in extent, while, if the same piece of ground came under the undefined classification of an "allotment," neither condition need be fulfilled. Serious difficulties also arose in the definition of nursery grounds and market-gardens, which had been held to include, under the Public Health Act, 1875, ground covered with glass houses for the purpose of growing fruit, &c. Whether, under the new Act, this land would be classed as agricultural land or "land covered with buildings," seemed a little doubtful. The word "buildings" was not defined in the Act, and no doubt in different Acts bore different meanings; but it seemed impossible to contend that the term "buildings" did not include structures built on brick foundations. The phrase "spending authority," in Section 9 of the Act, meant any of the local authorities mentioned in the schedule, which included county and borough councils, boards of guardians, school boards, surveyors of highways, and many others, but did not include parish councils, overseers, or vestries and district boards in the Metropolis, to whom no share of the annual grant will be paid. Mr. Ryde proceeded to give examples showing the working of these particular provisions in the case of boroughs, and their application in cases where the rate to be reduced by one-half was not levied for the purposes of any of the "spending authorities" mentioned in the schedule, with the effect that there would be a deficiency caused by the partial exemption of agricultural land in respect of such a rate. In conclusion, Mr. Ryde showed, in a table which he had prepared, that the different allowance or partial exemption in the case of different classes of property under different Acts of Parliament, constituted in itself an element of almost hopeless confusion. Thus, allotments under two acres, for example, were, under the Public Health Act, 1875, entitled to an exemption of three-quarters; under the Lighting and Watching Act to two-thirds; under the new Act to one-half; and under the Public Libraries Act to none at all. And so on in other cases.

A vote of thanks to Mr. Ryde for his paper was moved by Mr. A. Vernon, and seconded by Mr. J. H. Sabin, and carried unanimously. After a few remarks from Judge Lumley Smith, Q.C., and the President, the meeting adjourned.

SUSPENSION BRIDGES—A STUDY.

By GEO. S. MORISON, Past-President Am.Soc.C.E.
(Continued from page 731.)

SUSPENDED SUPERSTRUCTURE.—The suspended superstructure embraces the floor beams and the stiffening truss, with all the necessary cross-bracing, laterals, &c. The stiffening truss is the principal feature of the whole, and its peculiar function is such that the calculation of the exact strains is a work of extreme difficulty. It is possible, however, in an investigation of strains to bring them without extreme difficulty within limits which they surely will not pass in either direction, and as everything is based on elastic changes in which there must always be a small percentage of irregularity, these results are, at least, as accurate as the material is uniform, and the error will always be on the safe side. A stiffening truss with a hinge at the centre has the advantage of greater simplicity in the calculations; but the details of the hinge are much more objectionable than any irregularities of strain which might occur, and a continuous stiffening truss without a hinge has been used in this design. The functions of a stiffening truss may be considered in two ways. It may be regarded simply as a floor stiffener, preventing short local changes; or it may be considered as a complete stiffening truss which distributes the entire moving load with practical uniformity over the whole length of the structure. The former is the usual function performed by the stiffening truss of a long-span highway bridge; the latter is the function which a stiffening truss must perform in a short-span bridge or in a railroad bridge of moderate length. In the former case the proportioning of the stiffening truss is comparatively simple. The greatest possible distortion of the cables under a moving load must be calculated, the moving load being considered uniform for such distance as will produce the greatest distortion; the amount of deflection which will occur within the limits of this load must then be determined, and the stiffening truss made of such depth that it can deflect this amount without overstraining the metal in the chords; as the

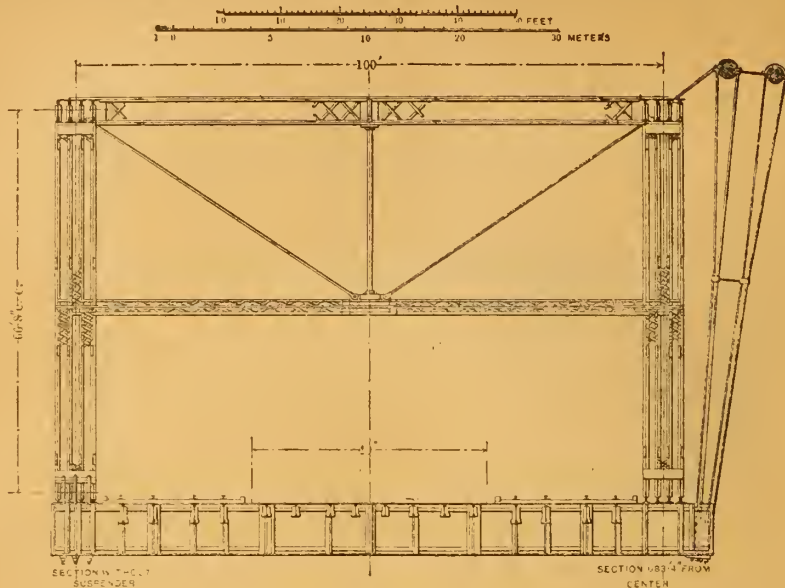


FIG. 17.

deeper the truss, the greater the unit stress in the chords for the same deflection, it follows that the stresses must in this instance be kept down by using a shallow truss. This works well in highway bridges; it would work equally well in a railroad bridge of such dimensions that the dead load would be so great in proportion to live load that the deflection would not exceed the limit over which trains could conveniently be run at high speeds. In the case of a railroad bridge in which the dead load is light in proportion to the moving load the stiffening truss must be proportioned on such a basis that it will virtually distribute the whole moving load uniformly over the

deducting this difference from the total moving load the amount of moving load is determined which the stiffening truss must distribute. On this basis a stiffening truss may be proportioned, though the exact strains must be a matter of subsequent computation. The condition of loading which will cause the greatest deflection in the loaded portion of the stiffening truss will occur when the maximum moving load covers one-half of the 2,800 suspended feet of stiffening truss, occupying 1,400ft. on either side of the centre; this is also the case in which calculations are most simple. A limit of deflection of one four-hundredths of the half-

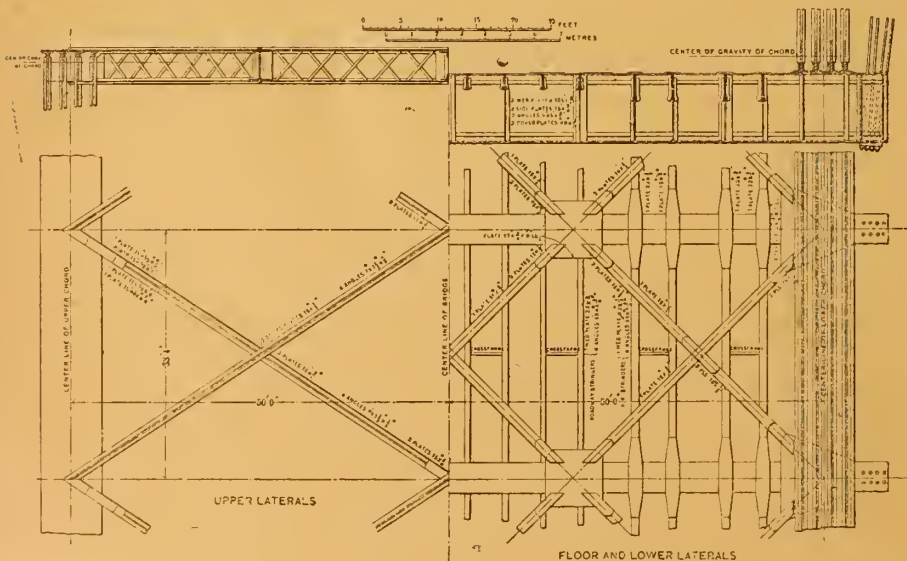


FIG. 18.

entire length of span. As the deflection of the stiffening truss has little influence in such calculations, the deeper the stiffening truss, the less will be the stresses in the chords. In the present case the dead load is so great in proportion to the moving load that the distortion of the cables will be comparatively small, even under the passage of trains; it will, however, be so great that if the stiffening truss performed no other functions than that of a floor stiffener, the deflection might disturb the rapid passage of trains. In this case, the proper method of proportioning a stiffening truss is to decide, first, what deflection will be allowable under maximum conditions; then to determine what depth of stiffening truss will correspond to the maximum unit stresses which it is considered wise to adopt; then to determine the amount of difference in load which will be required to create a corresponding distortion in the cables. By

span, or 3½ ft. in 1,400ft., corresponds to a one per cent. grade at each extreme end of the deflection, and has been selected as the limit in this case. The moving load which the cables are capable of carrying is equivalent to 11,000lb. per lineal foot over the entire structure, and it is assumed that this load is distributed over the equivalent of six railroad tracks, corresponding to 1,833lb. per foot of track. In estimating the effects of an unequal load, a weight of 12,000lb. per lineal foot is taken in accordance with the provisions stated at the beginning of this paper. While it may be considered that the load per foot on one-half or one-third of a span ought to be more than 10 per cent. greater than the load per foot on the whole span, it must be remembered that the peculiar conditions of this bridge are such that it is only under very rare conditions that any considerable portion of the moving load must be distributed by the stiffening truss. In

fact, two passenger-trains could cross this bridge side by side without disturbing the position of the cables beyond the limits of deflection which are permissible; it is only when the load exceeds that of two maximum passenger-trains that the stiffening truss has any duties to perform beyond that of a floor stiffener. The excess load required to produce a distortion of 3.5ft. at the quarter on a 2,800ft. span with a versed sine of 310ft. (which corresponds to the design), will be 9.424 per cent. of the load on the unloaded portion. Taking the dead load at 39,000lb. per lineal foot, 9.424 per cent. of this is 3,675lb.; deducting this from 12,000lb., there remains 8,325lb. as the weight per foot to be distributed by the stiffening trusses, or 4,162lb. for each truss. By the use of nickel steel, as hereafter explained, considerably greater strains may be used in the stiffening truss than would be considered good practice with ordinary structural steel; a stress of 17,000lb. per square inch has therefore been selected as the limit. This having been assumed, the depth of the stiffening truss may be calculated by the following formula:—

$$d = \frac{5 S l^2}{24 E r_o}$$

in which—

S = stress per square inch = 17,000.
 E = modulus of elasticity = 30,000,000.
 r_o = deflection = 3.5.
 l = span = 1,400.

Solving this equation, $d = 66.11$. For convenience the depth has been made 66ft. 8in., equal to $200 \div 3$. The required section of the chords of the stiffening truss will then be determined by the following formula:—

$$a = \frac{w}{8 d s}$$

in which: $d = 200 \div 3$
 $l = 1,400$
 $s = 17,000$
 $w = 4,162$.

Solving this equation, $a = 450$.

In the design the chords of the stiffening truss have a gross section of 600sq.in. and a net section of 560sq.in.; the net section is 24 per cent. greater, and the gross section 33 per cent. greater than the approximate calculation requires; it is expedient, however, to provide an excess of metal above that required by these advance calculations. The gross section is the one to be used in calculating deflections. Should the modulus of elasticity assumed (30,000,000) be criticised as being too high, it must be noted that this modulus is applied to the calculated section of the chord, whereas the actual section would be materially increased by splices and connection plates, so that a modulus of 27,500,000 in the metal would correspond to at least 30,000,000 in the calculated section. This is a simple solution, and gives data to start from; but while considering the effect of the distorted cables in carrying unequal loading, it does not consider the bending effects on the stiffening truss due to the deflection of the cables as a whole, all of which must be taken into consideration in the final calculations. In these final calculations it is necessary to assume certain sections of cables and stiffening truss chords as well as loads. It is not possible to make a strain sheet in advance and then proportion the sections in accordance with the strains. Everything is determined by deflections, and deflections are themselves determined by sections. A careful investigation of the theory of the stiffening truss has been made on entirely independent lines by Mr. Charles S. Piercc. By the use of the formulas which this investigation has developed, the strains in the stiffening truss have been calculated for three different conditions. In the first of these a moving load of one-third the length of the span, 3,100ft., is assumed to occupy the first third of the 3,100ft. In the second supposition it is assumed to occupy the second and third sixths of the 3,100ft., the end of the load being at the centre. In the third supposition it is supposed to occupy the central third of the 3,100ft. The moments developed by these calculations are a satisfactory confirmation of the capacity of the stiffening truss. In this connection it is interesting to compare the duty which is to be performed with that on the East River Bridge. The stiffening truss of the East River Bridge is simply a floor stiffener; both chords are cut at the centres of both the main and the side spans, having sliding joints which can transfer no bending strains whatever and a comparatively small amount of

shear. The trains which run over this bridge weigh about 100 tons each, or half a ton per lineal foot, about two-thirds the weight of a first-class passenger train, and they are about half as long as an ordinary passenger train; and yet, in spite of the lightness and theoretical inadequacy of the stiffening truss, the action of the bridge under these trains is entirely satisfactory. In all these calculations no account has been taken of the stiffness of the cables themselves, which are more than 3ft. in diameter, of the chords of the stiffening truss, which are 4ft. deep, nor of the stringers of the floor system, all of which would have decided influences of their own. The two stiffening trusses designed are each 66·67ft. deep between centres of gravity, or 70ft. over all. They are placed 100ft. between centres. There is a stiff riveted lateral bracing between the top chords and a transverse bracing, as shown in Fig. 17, at every panel point. The floor system is entirely below the bottom chord, and the bottom laterals are built in as a portion of this floor system. The webs are riveted lattices with four independent lines of bracing. The suspended portion of the truss is carried by the floor beams, and as its weight exceeds the amount of moving load which has to be distributed, its action really amounts to varying the portion of its own weight which is transferred to the floor beams, there never being any conditions under which any portion of the weight of the floor system has to be transferred to the stiffening truss. Beyond the limits of the suspenders the floor beams are hung from the stiffening truss to which they transfer the weight of the floor system. The arrangement of the floor system as worked up is shown in a general way in Fig. 18. The floor beams are strong enough to carry the whole weight from truss to truss, thus leaving a clear space for the whole distance. The two double-track railroads are placed next to the trusses, thus reducing the weight of the floor beams to a minimum, while the possible deflection of one end of the beam below the other is found not to be enough to produce trouble. There will be eight railroad stringers in each panel and eight lighter stringers which carry the roadway or the rapid transit tracks. Each railroad stringer is proportioned for a total load of 4,230lb. per foot of stringer, the strains in the extreme fibre being 9,025lb. per square inch of gross section, and weighs 6,300lb. Each light stringer is proportioned for a total load of 1,000lb. per foot of stringer, the strain in the extreme fibre being 9,620lb. per square inch of gross section, and weighs 2,540lb. The floor beams are proportioned to carry a weight of 45,667lb. at each single railroad stringer connection, and for a load of 100lb. per square foot on the 40ft. between railroad tracks, besides a weight of 280,000lb. at each end from the stiffening truss. Under these conditions the strain in extreme fibres of gross section is 12,938lb. Each floor beam is really a box girder with two webs, and weighs 179,000lb. The total weight of the metallic floor system is therefore as follows:

	Per Panel.	Per Foot.
Floor beams	179,000lb.	5,370lb.
Railroad stringers	50,400	1,512
Rapid transit stringers	20,320	610
Lower laterals and connections	24,880	746
Total	274,600	8,238

The upper laterals and transverse bracing together weigh 48,000lb. per panel, making the total weight suspended, exclusive of the weight of the stiffening trusses themselves, 322,600lb. per panel, or 9,678lb. per lineal foot of bridge. Each chord of the stiffening truss has, as has been already stated, a gross section of 600sq.in., and the weight of each chord per lineal foot, including splices and connections, is estimated at 11,100lb. Each of these chords is made with four webs, the details being as shown in Fig. 17. The arrangement of the webs of the stiffening truss is also shown in Fig. 17. The webs are made uniform for the entire suspended portion of the stiffening truss. Each web member has a total gross section of 53sq.in., and a net section of 41sq.in., and under the extreme conditions which have been specified above—namely, a moving load of 8,325lb. per foot of bridge, exclusive of that which is distributed by the distortion of the cable, these members are subjected to a strain of 7,855lb. per square inch of net section, and 6,373lb. per square inch of gross section, these strains occurring in the same member in both directions. The web as so designed weighs 3,240lb. per lineal foot.

(To be continued.)

FIREPROOFING IRON COLUMNS.

MANY plans have been devised for protecting columns of iron and wood, and the importance of this protection, especially in high buildings, is obvious. Our Chicago brethren have taken a lead in this matter, as the building ordinance there in force is explicit in its demands, and is, at least, of interest to all architects who have the erection of lofty structures in which columns are largely used. Section 108 provides as follows: "In the case of buildings of Class 1, the coverings for columns shall be, if of brick, not less than 8in. thick; if of hollow tile, these coverings shall be in two consecutive layers, each not less than 2½in. thick. If the fireproof covering is made of porous terracotta, it shall consist of at least two layers not less than 2in. thick each. Whether hollow tile or porous terracotta is used, the two consecutive layers shall be so applied that neither the vertical nor the horizontal joints in the same shall be opposite each other, and each course shall be so anchored and bonded within itself as to form an independent and stable structure." These rules seem to contain the requirements of a good protecting casing for iron columns, which we presume are meant, though the covering may equally apply to columns of wood or stone. Shells of hard terracotta, the tiles being clamped or hooked together but free from the column, have been used. An air space between the tiles and the column is necessary; but the use of dense terracotta is not found to be so satisfactory under great heat as porous tiles. Porous tiles, solid and 2in. thick, well bedded against the iron column and secured by copper wire wound round the column, are found to be much more resisting. Several forms are used for these tile coverings. One, a square form of casing surrounding four Z irons riveted together (to form a stanchion or column) is used—a hollow dense tile with rounded corners incases the iron in this case. Another section for a circular column is composed of hollow tiles in four segments then coated with concrete. Sometimes the concrete is filled in *in situ*, forming a monolithic shell round the column with an air space of 3in. or more beyond the metal—a mode of protection that is found to be a good one. Metal lathing and plaster are used for incasing iron work, and form excellent casings. We may mention that many of the sections used in America have a space within the fireproof casing for water and gas-pipes, but as these have to pass through the floors, there is a danger of the space forming a flue or connection, and the fireproof protection is impaired.

CHIPS.

Building operations will be started on Tuesday on the police-court which is about to be constructed as an annex to the out-of-date Town-hall at Brighton. The contractors are Messrs. Field and Co., whose tender was accepted at £30,291.

In the case of the application for discharge from bankruptcy of George Arthur, Southampton-road, Kentish Town, N.W., builder, the order of discharge has been suspended for two years, ending Oct 28, 1898. A similar order of suspension of discharge for two years has been made in the case of James Trollope, Bold-court, Walbrook, E.C., and Lower Walmer, Kent, builder and contractor. In the latter case the public examination was concluded Dec. 8, 1891.

The Midlothian County Council have appointed, as district surveyor of suburban roads, Mr. John Robb, late assistant to Mr. Forbes, deceased. The successor to Mr. Forbes in his principal office, that of county surveyor, has not yet been filled up.

Sir Benjamin Baker, C.E., and Mr. George F. Deacon, C.E. (the engineers of the Vyrnwy scheme) have almost completed their investigations on which to found a plan for a water-supply for the Metropolis from Wales. The report will be made to the London County Council about three months hence. The precise region recommended has not yet been disclosed.

A stained-glass memorial window has just been placed in Broughton Free Church to the memory of the widow of the late Rev. Dr. Welsh. It illustrates the subject of "Mary Anointing the Head of our Lord with Precious Ointment." The window is from the studios of Messrs. A. Ballantine and Gardiuer, George-street, Edinburgh.

The contract for the construction of the Sheffield District Railway, which is virtually an extension of the Lancashire, Derbyshire, and East Coast Railway, to Sheffield, has been let to Mr. C. J. Wills, of Manchester and Westminster. The line is about ten miles in length, and the amount of Mr. Wills's contract is £370,000.

LEGAL INTELLIGENCE.

T. DREW-BEAR, TOLPUTT, and BROWN v. THE ST. PANCRAS GUARDIANS AND A. AND C. HARSTON. —The hearing of this important case, the earlier stages of which we reported in our issues of July 17 and 24 last (pp. 98, 133 *ante*), was resumed after the Long Vacation on Monday, the 16th inst., as stated in our last number, pp. 755-6, and continued till Saturday, when a further adjournment was made till January 18. The hearings have taken place at the Old Bankruptcy Court, Portugal-street, W.C., before Mr. Edward Ridley, Q.C., sitting as the Official Referee. It was, it will be remembered, brought by several builders' merchants, suing as trustees of creditors of William Brooks, of Folkestone, builder, against the Guardians of the Poor for St. Pancras, and their architects, Messrs. A. and C. Harston, for a balance of £24,226, or alternatively £24,265, alleged to be due on a building contract for the completion of St. Pancras Workhouse. Mr. Reginald Bray and Mr. A. A. Hudson appeared for the plaintiffs; Mr. English Harrison and Mr. W. Moyes for the defendant guardians; Mr. A. G. McIntyre and Mr. R. W. Turner for the defendant architects. The examination of the principal witness, T. L. Fearon, manager to, and son-in-law of, Brooks, occupied the first nine days of the trial, and he was not finally dismissed until Friday noon. Taking up the threads of our story where dropped last week, we continue the report of Fearon's cross-examination by Mr. McIntyre (on behalf of Messrs. Harston). The Witness stated that the York stone used for staircases on the workhouse was laminated—no York stone was free from lamination. Mr. McIntyre said the specification stipulated that the York stone to be used was to be of the best description, and free from lamination and other defects. Witness replied that he got the stone from Armitage and Co., near Wakefield. Nearly all the York stone supplied for block B was rejected. Mr. Harston passed the stone, but Poole subsequently, after it had been fixed, condemned it. Mr. Harston was again appealed to, and decided that, as Poole had condemned the stone, it must be taken out. Some of this condemned stone was still in London, and could be seen. The stone was constantly being complained of, like everything else. The York stone used for hearths came from John Knight. A large block of Portland stone was objected to, but witness insisted upon using it. Drew-Bear, Perks, and Co. supplied all the galvanised tanks, and all but three were complained of. In the B block, five of the tanks went to be regalvanised, and came back in much the same state. The tanks in A block were also regalvanised by Poole's orders, but were in very good condition. Poole also complained as to the plaster. All the details were supplied not by Mr. Harston, but by Poole, and a plan for striking certain arches was impossible to work to—it was an ellipse struck from seven centres. The plasterers worked as near to Poole's plan as it was possible by making the angles less acute. The sole cause of the trouble was the plan provided by Poole. As to the roadway, Poole objected that the flints had too much hoggin in them; but witness considered that Walker, the sub-contractor, had supplied proper material. Confronted with a letter from the foreman of works to Walker stating that "the flints which were found fault with are a very bad sample," witness rejoined that he did not hold himself answerable for the foreman's letter; the proof of the quality of the roads was the fact that they were still there. Witness was then examined as to the cast-iron sashes in K Block; he admitted that some were bad and were sent back. Witness asked Mr. Harston to allow him to use wrought-iron sashes, as there was some difficulty in fitting cast-iron sashes; but Mr. Harston replied that he should insist on the use of cast-iron sashes. In fact, so much objection was made to the introduction of wrought-iron sashes that he gave up the attempt. As to Poole's complaint that certain lintels were too high, witness allowed that there might have been a space of 3in. between the top of the door-jamb and the lintel. Poole demanded that the lintels should go right down on the door-jamb, but that was not a proper mode of work, witness held. All the brickwork was taken out by Poole's orders, and the lintels were cut away. Poole gave the order in June, 1893, but the work was not done till the following October, when Mr. Harston refused to give a certificate till it was completed. Poole also objected to the mode in which witness plastered the walls and ceilings.—Re-examined by Mr. Hudson: All the work had to be carried out under the direction of the clerk of works, and this often caused delay. He tried to please Poole as much as he could, and pushed on with the work as fast as he possibly could. He never ignored the instructions of Poole. Witness could point out the stock facing bricks condemned by Poole which were still to be seen in A, B, C, H, and K blocks. They scrubbed off his marks with water; but in some cases they cut out and replaced portions. The foreman to Mr. Holland (contractor for another job) under Mr. Harston, named Smith, came and examined the work on B and C when half-way up in

November and December, 1892, and in August, 1893, a clerk of works from the Levensden Schools came to examine them. The bricks cost from 43s. to 47s. for stocks, and for malm facings as much as 63s. a thousand.—To Mr. McIntyre: Only 3,000 bricks were bought at 63s. for chimney shafts; 45s. for stock facings was a high price. The laminated York landings condemned by Poole were large, 12ft. to 14ft. by 6ft. to 7ft. across, and all were 4in. thick. As to the ironwork, witness did not know why Poole wanted him to get it of Matthew T. Shaw: he objected to his going to Drew-Bear, Perks, and Co. on the grounds that they were never any good, and he had had trouble with them before. If witness could have had possession of the entire site, he would have put a foreman on each block, and carried on all at once. One cause of delay was that for more than a twelvemonth he could not get an entrance from King's-road, and the side road had a rise in it. As to the tie-beam timber, witness had to order twelve beams when only six were wanted; that was because Poole had condemned so much, and he determined to provide enough so that it might pass. As to the gutters, these were supplied by Macfarlane according to specification. [Specimens of the ones specified, with the socket inside, and those shown on the drawings with the socket outside, were produced in court.]—Tom Drew-Bear, senior partner in the firm of Drew-Bear, Perks, and Co., engineers, Queen Victoria-street, E.C., formerly, and for many years, partner in the firm of Rowson, Drew, and Co., of Upper Thames-street, was next put in the witness-box. In the latter firm witness had done business for many years with Brooks, whose credit was then excellent. When this contract was undertaken Fearon called on witness, who quoted prices for ironwork. Afterwards Brooks accepted his prices. The columns were cast from the patterns in wood supplied by the guardians—probably left by Kirk and Randall. Seventeen columns were rejected in all. They had been cast by Goddard and Massey, of Nottingham, a well-known firm. Massey, with his representative, Shardlow, went on October 3rd, 1892, with witness to the workhouse, and examined the eight columns then rejected, and they demanded of Poole why they were condemned. Poole declined to see them, referring them to Fearon. Witness could not see any defect in the columns, except that some brackets were 3in. askew, a detail which would make no difference to strength. The castings were of fair quality. Massey then declined to replace the eight columns, and witness had them recast by Massey at a cost of £18. [Invoice produced.] To the Referee: Witness depended on Fearon to point out the rejected columns, and those he showed were the ones sent back. When witness found that nothing he sent would suit, he wrote at the end of October, 1892, asking to be relieved of the sub-contract, and Fearon wrote back saying he could not allow him to withdraw on account of the delay. The absence of lugs from other columns at a late date was due to the fact that they were not on the patterns. Witness proposed to make the lugs in wrought iron and tap them on, when the column would have been as strong as cast work, and, of course, of equal appearance. The columns were fixed by Stephen Hunt and his son, in witness's employ, and were put up in usual way roughly in position, but before the work was bolted up they were put absolutely in line. Witness often went up to the job, on account of complaints as to ironwork, and could say that no undue force was used in putting them in line. The rejected rolled iron joists were of ordinary stock from usual mills of H section, and when they were sent back witness could see no fault in them, and when Poole's attention was called to this, they were taken back. Certain B2 girders were rejected as under specified weight, but on testing them they proved to be 1½lb. per foot under weight, but it was impossible to avoid slight variations in rolled joists. The specification stated 61lb. per foot run, whereas Dawney's list gave 67lb. as the proper weight for the section, so that witness had to select light girders to keep within the limit of weight. The specification was based on Dawney's list, and the number of the girder (B2) was taken from that list. Two other girders sent in replacement were objected to as over weight, but the variations were so slight as not to make any difference. The makers of rolled joists asked a margin of 2 per cent. over and 2 per cent. under, and some makers asked 5 per cent. margin. Witness's men had finished the iron staircase railing before Poole objected to it on the ground that the top rail was, as usual, half-round, and not oval as specified. Witness refused to remove it, and saw the committee of the guardians and Mr. Harston in April, 1894; the chairman of the Board said the clerk of works was unreasonable, and supported witness. In most cases the complaints were not made till the greater part of the labour had been done, and this was an instance in point. The galvanised tanks were complained of six months after delivery; witness had the half dozen back and cleaned at a cost of 50s., and after being returned and hoisted, they were again condemned and regalvanised at a further cost of

45 Ss. 6d.; three were retested at a further cost, and a fourth time they came back to be regalvanised at a further cost of ten guineas, and finally some were again cleaned. They were good galvanised tanks, and were only discoloured from being stored in the open. These alterations occupied till December 14, 1893, the original delivery having been in January of that year. As to the straps to girders, Poole objected because he could get his penknife-blade between the strap and column, demanding engine-fitting. That was an unusual requirement. It was not true that Poole could get his fingers in. In the rods, 3in. in diameter, the requirements Poole wanted made it impossible to fix them, and he objected to them being welded, whereas they ran to 30ft. in length, and could not be got in one piece. In consequence of the complaints as to the holes in which the rods were fitted, witness had to make a special punch, and as the walls were then built, the cost of fixing them was six times as much as usual. Witness was supplying the ironwork to another workhouse from Messrs. Harston's designs, that of Lewisham, and not a single complaint was made there. At St. Pancras workhouse, one long girder came painted as usual, and as at Lewisham, and by Poole's orders, witness had to burn the paint off. He never was treated like this before. The Official Referee: I never heard complaints of a girder being painted, as it tends to protect it; but I remember many complaints of their being unpainted. Cross-examined by Mr. McIntyre: Witness decided in 1893 to carry on the work as creditors after examination of the work by a practical surveyor with witness and Mr. Brown, brick merchant, another plaintiff. Witness adhered to his statement that 17 columns were rejected and replaced. There was a constant stream of complaints from beginning to end of the contract. The condemned columns were free from flaws or defects, and the rejection was unjust. Witness only took back the girders rejected as too light; but he would not replace them when rejected for being 1½lb. per foot too heavy, and so far as he knew they were used. The girders in which it was said that the joists were not equal in size were perfect. The learned Referee: If the variations were not material, you are fighting the air in your cross-examination of Fearon and Drew-Bear, for rolled joists must vary. The architect's letter rejecting the girder as 1½lb. too light per foot is fatal to your case, Mr. McIntyre, so far as the objection to the rolled work is concerned. There is nothing in the rejection of that girder whatever, and it is necessary for me, after this, to speak out. Mr. McIntyre proceeded to cross-examine the witness as to the staircase railing, when the learned Referee intimated that it would be better to call the architect and the chairman of the guardians' building committee as to why the sections as carried out were eventually passed. The variation in section from oval to half-round seemed to him immaterial. Witness was cross-examined at considerable length as to the treatment of the galvanised tanks, but adhered to all his statements, and produced his receipts for the sums said to have been expended on meeting Poole's wishes. The objections were ridiculous, and all the work of cleaning and regalvanising could have been done on the workhouse site if it were thought necessary. There was no necessity for rods 30ft. in length; if Mr. Harston said they were not specified of such a length, they must have been so ordered by Poole. By Mr. Moyses: Witness supplied rolled joists, but no columns, to Kirk and Randall when building this workhouse. He had no written contract with Brooks, but supplied ironwork as ordered according to a schedule. That was the customary way of conducting business. Witness had supplied ironwork to Lewisham workhouse, for which Johnson was the contractor, at about the same time, Messrs. Harston being the architects, and received no complaints at any time. There were about as many complaints during Brooks' control, and afterwards while witness acted as trustee. Witness did not supply one riveted girder out of a thousand unpainted. The learned Referee, intervening in further cross-examination, observed that the clerk of works' duty was to prevent scamping, but he must not use his undoubted powers so as to tyrannise. Whether this occurred in this instance was a question of fact and evidence. Stephen Hunt, the erector who carried out the ironwork construction for Messrs. Drew-Bear, Perks, and Co. and their predecessors for thirty years past, said that he received complaints as to the brackets on certain columns. He considered the columns to be good castings, and told Poole that the stability of the work was not affected by the brackets—the shafts did the work. Poole replied that that was his business. The work was done all through in the ordinary way, and as accurately as possible; but there were complaints about every point. The straps fitted the columns well. The B2 girders were rejected as too light, and were replaced by others which were said to be unequally rolled; but for their own credit the engineers would not have sent in wrong sizes. Work ought to be exact in size; but the witness never heard the weight to a pound or two questioned. The straps fitted the columns well. The 3in. rods were only used to strengthen the concrete, and

would have done the work as well, if only 6ft., instead of 20ft. to 30ft. long. The tanks were all right for their purpose. The complaints were daily, and considerably increased the time necessary for erection. In cross-examination, witness gave details of the alleged delays by Poole. In reply to counsel, witness said he worked on the pavilion on Southend pier, where Poole was foreman.—Mr. Moyses: And Mr. Poole carried his duties there satisfactorily? Witness: On Southend Pier? Why, it was the worst pier I ever saw. (Great laughter, in which the Referee and Poole joined.) Stephen Hunt, jun., a fixer, corroborated his father, whom he helped all through. Cross-examined: All the holes punched and drilled fitted closely, and he proved this to Poole when he complained. George Howard, who fixed the staircase handrail in A Block, for Messrs. Drew-Bear, Perks, and Co., explained that he altered the bends in the handrailing to meet Poole's wishes, and left it ready for leading-in. Then for the first time Poole complained of the section, which he wanted tire-iron form, and not half-round. Then Poole changed his mind, and demanded a special section, which witness had never seen used.—On the resumption of the hearing on Saturday, James Brown was examined by Mr. Hudson. He said he was a builder of 40 years' experience, and a brickmaker owning several brickfields; he was a member of the Metropolitan Asylums Board and chairman of the Whitechapel Board of Guardians. Before Brooks came on the scene, witness supplied red facing bricks to the previous contractors for the reconstruction of the St. Pancras Workhouse, Kirk and Randall, of Woolwich, and in 1892, continued the supply of bricks to their successor, Brooks. Almost the first deliveries to Brooks were seriously complained of. Witness and his son inspected the bricks in the barges in London, and found the bricks in very perfect state. Witness then examined the brickwork on the job. The bricks had been, he saw, to some slight extent chipped in conveyance. All bricks were liable to that, but as witness saw them those on the works were in fair condition. The question was not so much one of loss on bricks unfairly objected to, but more the delay thus caused to the job. The rejected bricks were used for inside work, of course at considerable loss to the contractor. Witness had a long interview with Mr. Harston, in which he explained to the architect that there was absolutely no justification for complaint, and Mr. Harston promised to see the clerk of works on the subject. Witness had a correspondence with Messrs. Harston, and in the result part of the consignment of bricks was used as facings and part were condemned, and were used inside. On April 21st, 1893, there was a meeting of creditors of Brooks, and three days afterwards, on the 24th, before the creditors decided to carry on the work, witness saw Mr. Christopher Harston at his office, and consulted with him as to the work remaining to be done. Mr. Harston made no complaint against Brooks as a contractor, nor of Fearon as a manager, although the witness questioned him on the point, but pointed out that the job was too big financially for Brooks. After witness and his partner had spent two days in examining the quantities, witness was so satisfied with the prices, that he recommended the creditors to go on; in fact, he was prepared to go on himself. Witness thought one important item—the brickwork—was priced too low, but two-thirds of that work—on which there could have been no profit—was done. The creditors all felt the percentage of retention money, 20 per cent., was too high. The committee of inspection, Drew-Bear and Tolpuit, with witness, then decided to go on, and the Guardians accepted the creditors' offer, and the condition that the amount of retention money should be reduced. Fearon was continued as manager. As a whole, from beginning to end, witness never saw work more honestly done, nor did he detect any attempt to scamp. Witness's instructions to Fearon were that no neglect or scamping must occur. Witness saw Mr. Harston on the point that each floor had to be plastered before the floor below was allowed to be laid. They could not work in the floor below till the room above was completed, and protested strongly against the order. Mr. Harston said he had no other means of keeping the boards clean. Witness replied that his 40 years' experience as a builder told him the boards could be covered up. That order was a great hindrance to the work. Another cause of delay was the long waiting for salt-glazed bricks of a special colour, the second consignment being of slightly different shade to those already used. A third cause of delay was the drainage of Block H; first from an old drain which leaked into the trenches, and which Poole would not allow to be stopped up; and secondly, the pipes, when tested, leaked, and Poole refused to allow the work to be covered up. It was ultimately found that a special joint to a patent pipe, supplied as specified, was faulty, after weeks of delay. Mr. Harston was called in, and allowed the pipes to be protected by outside cement-joints, as Fearon suggested, and passed the work. About Christmas, 1893, Mr. Harston wrote that unless two or three matters were done, no more

money would be forthcoming. Witness went up to the works and investigated the complaints. Some plaster arches in the centre block were not at all satisfactory, and had twice been worked and condemned. There were two reasons—one was that the drawings showed a rise of 2ft. in height, whereas it was actually 3ft. rise. The second was as to the setting-out of the ellipse. The arches were worked to a drawing by Poole [produced] which was self-contradictory in the draughtsmanship and scaling of the ellipse, which was struck from five centres. [Mr. Moyses: Fearon swore that this was struck from seven centres. The Official Referee: That is so. I must take the evidence as tendered.] To strike a plaster work of 7ft. to 8ft. in width from five centres would be impracticable, as the flow of lines would be crippled. Witness sent to his works for a trammel, and with that the arches were satisfactorily worked. At that time the work in B, or the official Block, was finished, and ready to be inhabited, and all was waiting for this plastering. Two Ampthill 8in. traps, which Brooks used in a laundry, and which were rejected by Poole, were good enough, and just as specified. They cost 7s. 6d. each, but the ultimate cost of the work was between £20 and £30. Witness confirmed the evidence of the Hunts on the previous day as to the rejection by Poole of the staircase railing after the work was completed. Witness was afterwards present at a meeting of the Building Committee with Mr. Robinson as chairman of the whole board. After hearing the complaints as to the staircase railing, Mr. Robinson asked Mr. Christopher Harston if these points were as stated. Mr. Harston admitted that it was so, and Mr. Robinson added: If this is true, it is the most extraordinary thing I ever heard in my life. Witness suggested to Mr. Harston at the meeting that if the edges of the iron railing were filed it would make a good job, and he agreed to that course being adopted. As to the bricks, the fair price for picked stock facings was then from 30s. to 35s. a thousand on the river; 43s. to 45s. per thousand was outrageous. The brick produced, and marked "S," from Smeed and Dean, of Sittingbourne, ought not, if a fair sample, to be condemned; that one firm made seventy millions of those bricks yearly. Witness saw the bricks condemned by Poole, including some of his own reds, and the small pencil-marks made by him were still to be seen. The rejection was unfair. As to the girder complained of for being painted, it could have been tested without burning the paint off; and the treatment of the galvanised tanks was unnecessary, and injured the iron. There was enormous delay at the latter part of the contract. Of two sample flooring boards [in court] condemned, and said by Fearon to have been transferred by Kirk and Randall to Brooks, and to have been condemned by Poole, one contained 1in. of sap, the other was perfect. Witness saw certain boards on the site, and thought they ought not to have been condemned. Witness complained that after Fearon had taken up a few boards pointed out as bad, he was called on, as witness said, to take out other tongued flooring a second and a third time. Letter from witness to Messrs. Harston in July, 1894, was put in, suggesting that they could not be aware of the serious delays caused by Poole's objections to work, which witness believed to be good. Messrs. Harston replied that Brooks had had every consideration short of being given the contract money without doing the work, and explaining the objections in each of the three instances of which he complained—the leakage into the drain in Block H from old sewer, a drain in Block K, and the Ampthill trap complained of as too small. In order to prevent friction between Poole and Fearon, the work was placed in charge of a foreman of works, one Gilling, and it went on a little more smoothly.—Cross-examined: Had not seen Fearon till witness met him at St. Pancras Workhouse. The friction between Fearon and Poole existed from the first, and grew more acute, and at last Fearon threatened to throw himself into the river. Mr. Moyses: Whose duty is it to draw the line when the points become acute?—The architect's, certainly. The Official Referee: That is right, is it not, Mr. Moyses? Mr. Moyses: Quite right, sir, I think. The Official Referee: He ought to have done it in this case. Mr. Moyses: Yes. I think Fearon ought to have gone to the architect. The Official Referee: I am afraid whatever happens to the Guardians in this case, Mr. Harston will be the gentleman to pay for it. He is liable if anyone is in a case like this. I do not quite see myself how the Guardians are represented in this case, or what they are doing in the matter. The friction has arisen through the action of the architect and the clerk of works, if it has arisen. I understand the legal position to be that the architect was responsible for the clerk of works. If matters are referred to him, and he does not properly exercise his discretion in the matter, he is answerable, and he must pay damages if damages result from the want of execution of his duty; but he is answerable to the Guardians, and therefore is answerable to you. He certainly is answerable to the Guardians if there is anything wrong. Mr. McIntyre: There is no question at present between the Guardians and the

architect. The Official Referee: But there may be. If this sort of evidence turns out to be correct there certainly will be, and of a very serious character, so you are not in the same interest at all. Mr. McIntyre: No. Mr. Moyses: Mr. English Harrison and myself felt some difficulty in knowing the exact status we occupied here. The Official Referee: Yes; but I know what Mr. Harston's position is if these facts are correct. You tell me you have a different case on the facts, and I must say I am rather glad to hear it. I hope it may prove so; but if the facts are correct, the Guardians have a case against you. Mr. Moyses: The Guardians say that they, in employing Messrs. Harston, employed gentlemen of the highest respectability in their profession. The Official Referee: But if Mr. Harston has made a mistake he must pay for it. It is not merely a mistake in the sense of exercising his judgment wrongly, but one of those things that I think will make the plaintiffs right. Mr. Moyses: I am quite prepared to cross-examine on all those points; but this gentleman's evidence is largely an attack upon Mr. Harston and Mr. Poole. The Official Referee: It is. Although the defendants, the Guardians, are answerable if Mr. Bray is right in his contention, they have a right of action against Mr. Harston; and if he had not been made a defendant by the plaintiffs, he could have been brought in as a third party by the Guardians. They could have said that it is Mr. Harston's default. That is the position, I am sure of it. Mr. Moyses: I think, sir, it is very likely that that is the correct position. Mr. McIntyre: There is no question whatever as between the guardians and Mr. Harston. There is no claim for damages or negligence. The Official Referee: No; but if these facts are correct there must be, because Mr. Harston is the architect, and it is not likely that the Guardians, being a public body, will let him go free. Mr. McIntyre: But that is not raised in this action, nor could it be dealt with in this action, nor would the decision as between the plaintiffs and the Guardians be an estoppel on Mr. Harston if an action were subsequently brought against him by the Guardians. The Official Referee: Perhaps not. Mr. McIntyre: That is not what they are here to fight. In this action the question is whether the architect has been guilty of fraud. The Official Referee: No. I beg your pardon. If it were a question of fraud—nobody can doubt that if he had been guilty of fraud he would be answerable for the damages; but this is a different question. It is one which has not been made precisely in this shape on the record; but it is an equally good one against him—namely, that he has not performed his duty, and has been negligent. Mr. McIntyre: When my time comes to open the defendants' case, I shall submit that as between the builder and the architect, nothing less than fraud can give an action. The Official Referee: That may be right—of course, I shall hear you on that point; but he is answerable to the Guardians, I suggest. Mr. McIntyre: That may be. I am not here to discuss his position as between the Guardians and himself. The Official Referee: If the facts are against you, and establish a breach of duty on behalf of the architect, he certainly would be liable to the Guardians. Mr. McIntyre: If the architect has been guilty of breach of duty, no doubt the Guardians would have their remedy against him; but you, sir, are not trying this as between the Guardians and the architect, whether he is guilty of a breach of duty; we have only come here to try a question of fraud. The Official Referee: I do not think it is fraud. In the case of a gentleman like an architect, you may put it in all sorts of ways. It is fraud if you choose to call it so, but it is not fraud in the strict sense of the word. Collusion is not alleged. Mr. McIntyre: Yes, that is what is alleged in the pleadings. The Official Referee: No, that is not the point which we are upon here. It is whether or not the architect was fair or whether he was not. Mr. Bray: Whether he gave decisions which he knew to be wrong. The Official Referee: Yes; which he must have known were wrong, or ought to have known were wrong. I quite see on the correspondence, from my own knowledge, that some of the things were wrong. Mr. Bray: There is a separate case against the Guardians as to the delay in giving possession. That is a matter between us and the Guardians alone. The architect is not responsible for not giving possession. The Guardians are responsible. Mr. Moyses: That is comprised in the whole case. The Official Referee: I do not quite understand how Mr. Moyses stands here. You do not want to cross-examine, do you, Mr. Moyses? Mr. Moyses: I do not think I do. The Official Referee: You are going to say for the Guardians that all this evidence is entirely incorrect. The architect may say so; but I do not think the Guardians can say that. Mr. Moyses: Except to this extent—up to the present time, for all they knew, and after the most searching investigation as to what had taken place, they had no reason to alter their belief that in employing Messrs. Harston they employed men of the very best of their class to do the work which was carried out. The Official Referee: That is no answer at all. Mr. Moyses: They still believe it

will turn out that all they could do to have the work properly done was being done while it was to be done. The Official Referee: It is not my business to say a word, and I do not say more than that the evidence before me at present clearly shows that he did not do his duty. Mr. Moyses: I will leave that out for a moment. I quite agree, sir, with your suggestion that my position is somewhat anomalous. If I were to go into the daily occurrences between the clerk of works, the architect, and the foreman, I quite agree my position would be anomalous; but after such a body as a board of guardians employs an architect, I do not think they ought to usurp their own architect's or clerk of works' functions, and, therefore, I feel that it does not devolve upon me to go into these minutiae of materials. The Official Referee: Mr. English Harrison has done it once. Mr. Moyses: Yes; up to a certain point. He could not say: "I deliberately came here and throw these gentlemen overboard." The Official Referee: I think Mr. English Harrison was right. I had a great deal of difficulty in keeping my patience while it was going on, but I think he was right in going through the details. It was a very elaborate task; but it left on me a strong impression that, except for one or two rash assertions that Fearon has made, the correspondence was right, and represents the facts, and that there is no question the architect has not done his duty. If the architect wants to succeed in this case, and if the Guardians want to succeed in this case, they must produce a body of evidence which contradicts what I have heard already. If what I have heard is true, certainly the Guardians are responsible on *quantum meruit* to this builder, and equally certain the architect is responsible to them. Mr. Moyses: That is a very strong observation, sir. The Official Referee: I want to save the trouble and expense of people coming here. If you have somebody who can put a different complexion on the case let him come here and have it out and we shall see who is telling the truth. It seems to me you must alter the facts if you want to succeed. It is impossible to prevent this case from being long and somewhat wearisome. You must take it in detail, and it is by detail they make the serious case against you, putting one thing with the other. Witness, in reply to Mr. Moyses, then continued, that the trustees, on account of the great friction which had arisen between Fearon and Poole, decided to employ a first-rate man, one Gilling, and after the change was made the work went on fairly well to the end—that was, until the trustees wrote to Gilling instructing him to do the few things which must be finished and then to leave. While Gilling acted as foreman, Fearon still remained as manager. Witness never appealed to Poole when the grave charges were made against him by Fearon, but always went direct to Mr. Harston. Witness was only sorry afterwards he had not more frequently appealed to Mr. Harston, as then the work would have been more quickly done. As to the facing-bricks, 45s. was an enormous price—30s. to 35s. was at that time the market rate per thousand. As to his own red bricks, he quite admitted they were not handled as carefully by the men, and especially by the carmen, as they ought to have been. When the trustees took over the work in April, 1893, the buildings were well up—one block was roofed, and another was being slated, while the centre block was half or two-thirds up. The chief things left were the A, or entrance block and the boundary-wall, while the laundry block was just started. Witness was always very fairly met by the Guardians. Witness knew Messrs. Harston very well as a firm of architects who had designed some of the largest buildings of this class, and had also carried out three or four jobs for the Metropolitan Asylums Board. Witness complained to Messrs. Harston during the progress of the works that the system adopted to protect the floor-boards from being damaged by the plasterers greatly delayed the work, and that if the boards had been covered up by loose plaster or scaffolding or sawdust, the men could have got on; but as the boards had to be reversed during the plastering, there was delay. The system specified by Messrs. Harston would have been perfect for buildings of one floor, but was inconvenient with from three to five floors in each block. Witness was next cross-examined as to salt-glazed bricks rejected on account of varieties in colour, specimens being produced. Witness saw the second consignment of the brown salt-glazed bricks, which were rejected as differing in colour, and although there was a difference in the shade, they were quite nearly enough alike to have been used in the work. Witness was not, in saying this, setting up his judgment against that of the architect. These were by no means the best quality of salt-glazed bricks. If they had been white glazed bricks at £12 a thousand, he should have understood the request for exact colour; but these were as specified of common manufacture, in which they were never all uniform. They were quite good enough for an asylums board hospital or similar building, and, in fact, as in plain church window glass, he thought a little variation rather an advantage. Mr. Moyses: Then you preferred variety, like the red, blue, and green in a

church window? The witness: Not in a stained but a plain glass window. The Official Referee: Do you say anyone would have been a bit worse off if the colours on these bricks [produced] differed a little? Mr. Moyes: If you let one thing go, where are you to stop? The Official Referee: At what is reasonable. Witness: The bricks were to be used in areas and around kitchen areas, and were eventually used up in retaining walls. Another cause of delay was the leaving of a trench, from 10ft. to 15ft. deep, open for a fortnight; but when Mr. Harston's attention was called to the matter, he ordered the faulty pipe to be put right with cement, and the work went on. The pipes used were those named in the specification. As to the plastered arch in the central block, he never knew that Poole made the drawing out of pure kindness; if he did, he made it wrong.—At this stage the hearing of the case was adjourned to Monday, Jan. 18th, at 10.30 a.m.

CLAIM BY SURVEYOR AGAINST ARCHITECT.—At Morpeth County Court on Nov. 16th, Mr. William Dixon, architect and surveyor, Newcastle, sued Mr. W. E. L. Thompson, architect, Blyth, for the sum of £46 9s. 2d. Plaintiff was an architect and surveyor in Newcastle, and the defendant, Mr. Thompson, was an architect at Blyth. Early in 1895 Mr. Thompson was engaged to erect a large building in Blyth for a contract. He applied to Mr. Dixon to act as surveyor of quantities, and when Mr. Dixon came to Blyth he found that there were no plans suitable for taking out the quantities, and he had to make out a rough plan for himself. Mr. Thompson requested him to make up the plans for the contractors and other plans for the construction of the building, and he was to be paid at the rate of £4 per week. He worked up to the 15th September, and was paid his money after some correspondence, and plaintiff was engaged to continue his work with the plans. Mr. William Dixon, the plaintiff, gave evidence in support of his claim. Cross-examined, he said he received £94 in respect to the work of quantities, and he sought £46 more for preparing the plans. Lawrence McHugh, architect, Newcastle, said he was employed by Mr. Dixon as assistant in September and October. He was engaged on the plans for Hedley and Co., Blyth. They were employed about four weeks. It was not true that the plans were completed and merely inked over. The plans were partly inked over, and there were some new plans made. Mr. John Stewart, 13, Dean-street, Newcastle, stated that his firm, Dodds and Co., accepted a tender for girders and cast-iron work. Witness saw Mr. Dixon had worked at the plans and tracings. Mr. Thompson, the defendant, stated that in May of last year Mr. Dixon was engaged to prepare quantities. He saw the plans, which he said were not sufficient. That, witness agreed, was correct. Mr. Dixon and witness worked at the plans in the office belonging to witness. Mr. Dixon did all the ironwork plans with the exception of the roof. The arrangement for payment of quantities was one per cent., and when Mr. Dixon charged 1½ per cent. in his bill witness paid it out of consideration of the trouble he had had with the plans. Witness considered that the extra pay for quantities was sufficient. Mr. W. L. Newcome, architect, Newcastle, stated that he had 26 years' experience in his profession. He had gone through the plans. He was informed that the most of the work done was merely inking over, which would not cost more than about £8 14s. 5d. for the whole of the plans. £3 10s. per week was a fair wage for skilled assistants. But skilled assistants would not be required for inking over plans—30s. or £2 per week would be sufficient for that work. Mr. E. Bowman, architect, Newcastle, agreed with the evidence of Mr. Newcome. He did not consider £4 per week too much for Mr. Dixon. His Honour stated that, after reading Mr. Thompson's letter of March 26, and hearing Mr. Dixon's evidence, it seemed that Mr. Thompson had got skilled assistance. Judgment would be given for the full amount, with costs.

DAMAGES RECOVERED FROM AN ARCHITECT.—**BAZZONE v. NOTLEY.**—In the Queen's Bench Division on Monday, before Mr. Justice Cave and a special jury, the action was heard in which it was sought to recover damages for expenses incurred, and inconvenience suffered, from the alleged wilful misrepresentation as to the sanitary condition of a house of which the plaintiff was the tenant and the defendant the landlord. The plaintiff, a widow lady, called in January, 1895, upon Mr. Robert Pledge Notley, an architect and surveyor, with a view of renting a house belonging to him, Warwick Lodge, Clapham Park. At that interview she alleged that Mr. Notley, in reply to a direct question as to the condition of the drains, told her that he had within the last few years had new drains put in the house, and that they were in every way satisfactory. She pointed out that there was no air-shaft to the main drain, and he replied that one was not necessary when the drains were constructed on the particular system those in question were. Mrs. Bazzone accepted his statement as correct on account of his practical knowledge, and, therefore, did not go to the expense of

employing a surveyor to inspect the house before she moved in at the half-quarter. In the agreement there was an express covenant that, in the event of the drainage being condemned or anything going wrong during the tenancy, the landlord, and not the tenant, should execute the necessary repairs. In March two of the servants became ill with bad throats, and had to leave the plaintiff's service. Subsequently Mrs. Bazzone, a sister, her three daughters, and also the servants, all suffered more or less severely in the same way. The drains were then suspected of being faulty, and a builder was called in, who suggested small alterations. The defendant was written to, and the work was done. The bad smells continued, however, and the sanitary inspector was sent for, who ordered certain alterations to be made in the drainage system. There was a delay in this being done, and the out-of-pocket expenses Mrs. Bazzone had thus been put to at various times, and her doctors' bills, she estimated at £75. Plaintiff's counsel stated that some few months before Mrs. Bazzone made an offer for the house the sanitary inspector had served a notice upon the defendant to abate a nuisance on these premises caused from defective drains, so that at the very time Mr. Notley was representing to Mrs. Bazzone that the drains were in a perfect condition he was fully aware that, according to the opinion of the sanitary inspector at any rate, the drains were not so. Whatever his own views on the matter might have been, he had not complied with this notice, and therefore he was keeping back from the plaintiff material facts. For the defendant it was denied that the facts were as stated by the plaintiff. The lady and her family moved into the house during the continuance of the severe frost of 1894-95, when the water mains were frozen. It was contended that the bad smells were entirely caused from insufficient flushing, and that as soon as the water supply became normal the continuance of the nuisance complained of by the plaintiff was purely imaginary. Mr. Notley, in his evidence, further denied that any complaint at all had been received by him until August, when on inspecting the drains he found a stoppage, and had the matter at once put right. In 1891 he had relaid the whole of the drains on the "Norman Shaw" system. That was a system well known, and was still working, he believed, satisfactorily at Scotland Yard, Burlington House, and several other public buildings. He was using it in his own house, and found it excellent. The then district inspector saw the work from day to day as it was done, and passed it. Under recent by-laws, which came into operation in the Metropolitan area in 1893, this system was insufficient in various details, and could no longer be employed either when new drains were constructed or old ones relaid. It was a notice to that effect that was served upon him prior to the date when Mrs. Bazzone signed the agreement to take the house, and not, as contended by her counsel, a notice to abate a nuisance. A landlord was not obliged to act upon such a notice so long as the drains worked well. He honestly believed that the Norman Shaw system was a thoroughly good one, and stated his opinion to the lady. The outgoing tenant was called, and said the drains had worked well during the time he occupied the house, and that he left solely because of additions to his family, which rendered it imperative for him to take a larger house. The jury returned a verdict for the plaintiff, and assessed the damages at £40. Judgment accordingly, with costs on the High Court scale.

IN RE JAS. MASTERS, OF CARDIFF.—The creditors of James Masters, builder, 85, Portmaunoor-road, Cardiff, held their first meeting at the Official Receiver's office, Queen-street, Cardiff, on Wednesday week. A rough statement of the debtor's affairs was presented, which showed that the gross liabilities amounted to £7,029 5s. 7d., of which amount £6,602 12s. was fully secured, leaving £426 13s. 7d. to rank for dividend. Bankrupt estimated his assets, after the payment in full of the above secured liabilities, at £147 8s., leaving a deficiency of £279 5s. No resolution was passed, and the Official Receiver remains trustee.

A DEVONPORT BUILDING DISPUTE.—In the Queen's Bench Division, on Saturday, Mr. Justice Cave, sitting without a jury, had before him the case of Perkins v. Coombs, which was an action originally commenced at the Exeter Assizes. At the Devon Assizes in January, after some evidence had been given, it was agreed to send all the questions in dispute to a gentleman to be agreed upon by the parties. Plaintiff had been instructed to do certain work by the defendant, and the amount claimed was £103 16s. The dispute went to an arbitrator, Mr. Snell, architect, of Plymouth, who found that plaintiff was entitled to £73 16s., being exactly £30 less than the claim. Plaintiff admitted that he owed defendant £12 19s. 6d. for goods sold and delivered, and the architect had no doubt taken that into consideration. Judgment was, therefore, asked for the amount and costs. Mr. Duke, for defendant, said plaintiff was not entitled to the costs of the action, because he had claimed to appropriate to another contract money paid generally in respect of other

works. Mr. Justice Cave agreed with Mr. Duke, and said the defendant would have the costs of the action, but would pay the costs of the reference, and the award to be set off against the other. The order would be no costs for the present application.

BREACH OF WARRANTY FOR FURNISHED HOUSE.—**MACKINNON v. PATERSON.**—In the Queen's Bench Division, on Wednesday, before Mr. Justice Cave and a special jury, an action was tried, "Mackinnon v. Paterson," in which the plaintiff, a brigadesurgeon, claimed damages for breach of warranty in respect of a furnished house let to him by the defendant, which, he alleged, at the time of such letting, was in a filthy condition, and not reasonably fit for occupation. The defendant denied the allegation, and counterclaimed for damages for expenses he had been put to in consequence of the house having been left unoccupied by the plaintiff for a number of weeks. There was a conflict of evidence as to the condition of the house, but ultimately the jury found for the plaintiff for £27 2s. 6d., which included a sum he had paid in advance for rent. Judgment was entered for the plaintiff on the claim and counter-claim, with costs.

CHIPS.

In our report, p. 730 last week, of the lecture by Mr. R. Phend Spiers, F.S.A., on the Great Mosque of the Omeiyades at Damascus, given before the R.I.B.A. on the 16th inst., it should have been stated that Mr. Spiers was, at the time of his visit in 1866, the travelling student of the Royal Academy; his companion, M. Emanuel Brune, was the holder of the Grand Prix de Rome.

The annual dinner of the Royal Scottish Society of Painters in Water-Colours was held on Monday night in Glasgow, under the presidency of Sir Francis Powell.

At Norwich, on Friday, J. H. Snelling, Brandford-road, was summoned on the information of the city engineer for erecting two houses in Silver-road without sufficient ash-pits furnished with proper doors and coverings. The town clerk supported the information, and evidence was given by Henry Phillips, building inspector. The magistrates fined the defendant 20s. in each case, with 14s. costs in each case.

Messrs. E. H. Shorland and Brother, of Manchester, have just supplied some more of their patent Manchester stoves to the asylum, Ballinasloe, Ireland, those previously supplied having proved very satisfactory.

A bust of the late Professor Jowett, Master of Balliol, has been presented to the University of Oxford by Viscount Peel on behalf of the subscribers to the Jowett Memorial Fund, and has been placed in the gallery of the Bodleian Library. The bust, which is of life-size, is of white Italian marble, and is a replica by Mr. Hope Pinker of the head which he executed for Mr. Walker, the High Master of St. Paul's School. The pedestal, also designed by the sculptor, is of Siena marble. The monument of the Master, which is to be placed in Balliol College chapel, is still in Mr. Ford Onslow's hands.

Hundreds of people assembled on points of vantage not far from the Bedworth Railway Station, near Birmingham, on Monday, to witness the felling of a large chimney-stack, which had stood there for a quarter of a century. The work was carried out without mishap by Mr. Downing, for many years engineer to the adjoining Charity Colliery.

The Grand Committee of the Manchester Royal Infirmary Trustees appointed to consider the best method of obtaining the necessary increased accommodation, have resolved by a large majority to recommend that the Infirmary should be rebuilt on the present site. A general meeting of trustees will be held to receive the committee's report.

A new bakery and stables adjoining the Co-operative Society's branch stores in Cauldwell Hall-road, Ipswich, were opened last week. The site is twenty-three rods in extent. The bake-office is 20ft. by 28ft., and 11ft. 6in. in height, and the ovens cover a floor space of 170ft. One oven will bake 70 stone of bread at a time. It is a double decker, by the engineering firm of W. F. Mason, Limited, Manchester, and space has been left for a similar double decker to be added. The walls of the bakery are of white glazed bricks, with band of coloured glazed bricks. The furnace opens into a covered yard, 56ft. by 30ft., which will accommodate vans, &c., and adjoining it is the coal store. Above the bakery is a flour loft, 33ft. by 28ft., with doors opening on to the road. The floor is fireproof, having been constructed by Messrs. Homan and Rodgers. The stables accommodate 13 horses; the fittings were supplied by McDowall, Steven and Co., Limited, London. The buildings were designed by Messrs. Eade and Johns, architects, Ipswich, and the work has been carried out by Mr. Edgar Catchpole, builder, Ipswich, whose tender of £2,145 was the lowest of the eleven sent in. This does not include the ovens, for which an additional £150 was set aside.

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PORTAL OF THE SCUOLA OF ST. JOHN THE EVANGELIST, VENICE.—DETAILS OF DITTO.—COUNTY COUNCIL BUILDINGS, STAFFORD: INTERIOR OF COUNCIL CHAMBER.—PLANS OF DITTO.—SCULPTURE IN COUNCIL HALL, STAFFORD.—PROPOSED HOSPITAL FOR INFECTIOUS DISEASES, KIRKCALDY.—STUDY FOR ORGAN CASE AT ST. CUTHBERT'S, KENSINGTON.—HOUSE IN KENSINGTON TERRACE, NEWCASTLE-ON-TYNE.

Our Illustrations.

PORTAL OF THE SCUOLA OF ST. JOHN THE EVANGELIST, VENICE.

THE lovely screen and portal to the courtyard of the Scuola di S. Giovanni Evangelista is undoubtedly, as Mr. Ruskin says, "the most characteristic example in Venice of the architecture that Carpaccio, Cima, and John Bellini loved." Beautiful as the court and buildings are, even in their squalid misery, this Scuola has long been neglected, and thus more than likely has obtained the good fortune of being left alone, so that the exquisite detail of its shafts and caps and delicately-carved enrichments may be studied unrenovated and unspoiled by so-called restoration. The screen, of which we give a photographic view, was erected in 1481 in grey and white marble and black slate-stone, with an eagle on a rock surmounting the portal within the tympanum of the semi-circular pediment. This work, and also the delightful staircase from the hall leading to the church, are attributed to Pietro Lombardi; the pictures decorating the walls of the church are by Dom. Tintoretto. The Urn of Giannandrea Badoer over the side entrance is of much later date, in memory of a member of the family, who first founded a hospice here for twelve poor persons. It is by Danese Cattaneo, 1561. The winter chapel is enriched with paintings from the brush of Palma Giovane. The Scuola itself is reached out of the Calle del Tabacco after crossing the Campo di S. Stin. Besides the photographic view and plan of the screen, we also give a sheet of details of the frieze, pilasters, jamb, and plinth of the central opening, together with corresponding particulars of the smaller side openings or windows. We have chosen these illustrations, with permission, from Herr Otto Raschdorff's "Palast-Architektur von Overitalien und Toscana," issued by that indefatigable publisher of works of architectural art, Herr Von Ernst Wasmuth, of Markgrafen Strasse, Berlin. The second part of this admirable publication, only recently produced, is devoted to typical Venetian buildings, and several plates are well occupied by detail photographs from the Ducal Palace, such as the upper portion of the Porta della Casta, so called as this spot was the place where the secretaries wrote. This exquisite work is inscribed by the name of its architect, Bartolommeo Bon, who built it between 1440 and 1443. Another detail of like clearness is from the famous Scala dei Giganti, built by the great architect, Antonio Rizzo, about 1485, and besides a large camera study of the fenestration in elevation, a view of the grand staircase itself is taken in full front from immediately

under the archway of the Porta della Casta, and showing the colossal figures of Mars and Neptune, by Jacopo Sansovino, to great advantage. The Palace Vendramin Calerghi, with its snowy-white façade and gardens on either hand, is another familiar building admirably depicted, and, besides, some drawings to scale are given, in a reliable and useful manner, both of the lower and upper features of the front. The Gothic Palazzo Cozzi is a most typical specimen of the pointed style of the early 15th century: while of the more elaborated and magnificent, if overdone, palatial architecture of the luxurious Renaissance, the Pesaro Palace is given well as a representative example. This singularly picturesque piece of design was built by Baldassare Lorigheisa, architect of the Church of the Salute, in 1679. Most careful steel-like engravings display the profiles of the mouldings with the utmost precision, and are fully figured. The Palazzo Rezzonico is similarly illustrated, and may be mentioned as a more sturdy building by the same architect. The concluding plate is a double-page sheet in colour, illustrating the painted ceiling of the Scuola dei Carmini, executed by Tiepolo, Zanchi, and Lazzarini in 18th-century style. The tints in this plate are capriciously rendered and blended, displaying the pictures as nearly, probably, as any chromo-lithograph can do, the effect of a decorated building. When seen in the round in its actual position and local lighting, of course the decoration of any interior must always look so different actually to the best lithographic coloured detail. These in the folio before us are, however, much above the average, and the whole work is deserving of the repute of its originator, who has furnished his volume with excellent collotypes to a large scale, the plates measuring 21in. by 14in.

STAFFORD COUNTY COUNCIL BUILDINGS.

(See description and sketch plans on page 793.)

KIRKCALDY HOSPITAL.

AMONGST our illustrations will be found a bird's-eye view of the new Infectious Diseases Hospital at Kirkcaldy, with a block plan, showing general arrangement of buildings. The ground extends to about four acres, and, besides what is now contracted for, there is provision for additional extension of two extra pavilions. The buildings are of brick, with hollow walls, and all modern features, recognised as the best in a first-class hospital, will be embraced in this work. Accommodation is provided for 20 beds for adults, with day-rooms sufficient for three additional beds on emergency. The cost of the buildings, with all fittings, will be about £7,500. Messrs. Campbell Douglas and Morrison are the architects.

PROPOSED NEW ORGAN CASE, ST. CUTHBERT'S CHURCH, SOUTH KENSINGTON.

THIS illustration, from Mr. Cyril E. Power's Royal Academy drawing, shows the organ designed to be placed on the north side of the choir and bracketed out from the wall, all the heavier parts of the instrument, such as the blowing apparatus, &c., being placed in a chamber built at the back for their reception. The console is located in the small minstrels' gallery, placed below the organ proper. The carving is to be chiefly executed by the carving guild in connection with the church. Like the proposed high altar piece designed by the same architect, the woodwork is to be dark oak, and picked out in gold and colours. The pipes to be left perfectly plain.

HOUSE IN KENSINGTON TERRACE, NEWCASTLE-ON-TYNE.

THIS house will contain ground-floor, dining-room, breakfast-room, study, kitchen, scullery, and usual conveniences, and, on first floor, large drawing-room, four bedrooms, and spacious landing, to be used as picture gallery. The mezzanine floor will contain bedroom, bath-room, and conveniences, and on attic floor large bedroom, box-room, and stores. The elevations will be faced with the best local pressed bricks, with stone dressings from a local quarry. The window sashes throughout will be of teak. The whole of boundary railing, rail over bays, and ornamental grilles to entrance to be wrought iron—the last named will be gilded. The main elevation faces south. The roofs are to be covered with Westmoreland green slates. A wine-cellar is provided in the basement. The architects are Messrs. Watson and Curry, of Newcastle-on-Tyne.

OBITUARY.

MR. GEORGE PERRY, for over 40 years the surveyor to the Charterhouse Estate and Buildings, died on Wednesday, the 18th inst., at his residence, Shaftesbury Lodge, Brandenburgh-road, Gunnersbury, aged 79 years.

MR. WILLIAM DENTY, of the firm of Heber, Denty, and Co., timber merchants, of Canons' Marsh, died on Sunday, from congestion of the lungs, at his residence, Leigh-road South, Clifton, Bristol. The deceased, who was 44 years of age, had been ill for a few days only. He was a member of the Bristol Channel Timber Importers' Association, and attended a meeting of that body in Gloucester on Friday last, returning in time to be present at the Grateful Society's dinner at the Royal Hotel. He visited the Commercial Rooms in Bristol on Saturday.

CHIPS.

A new operating theatre is being added to Poplar Hospital, the ventilation of which will be carried out on the Boyle system.

An inquest was held at Warminster on Friday on the body of Mr. H. Poulton, master builder, of that town, who died suddenly the previous day. The medical evidence showed that death resulted from pneumonia and diabetes, and the jury returned a verdict accordingly.

Mr. John Day, architect, of Guelph, Ont., shot himself with a revolver while standing before a looking-glass in his bedroom a fortnight since.

The Doddridge Congregational Church at Northampton, has been restored in commemoration of its centenary, and a new church has been erected in the St. James's End. The total cost has been £3,047.

A new Liberal Club was opened by Sir James Kitson, Bart., M.P., the member for the division, at Meltham on Saturday afternoon. The building, which has been erected at a cost of over £1,600, stands in the Mill Moor-road, Meltham. There is a lecture-room, providing accommodation for 300 persons; billiard, reading, smoke, committee, and other rooms. The building has been erected from designs by Mr. Wm. Carter.

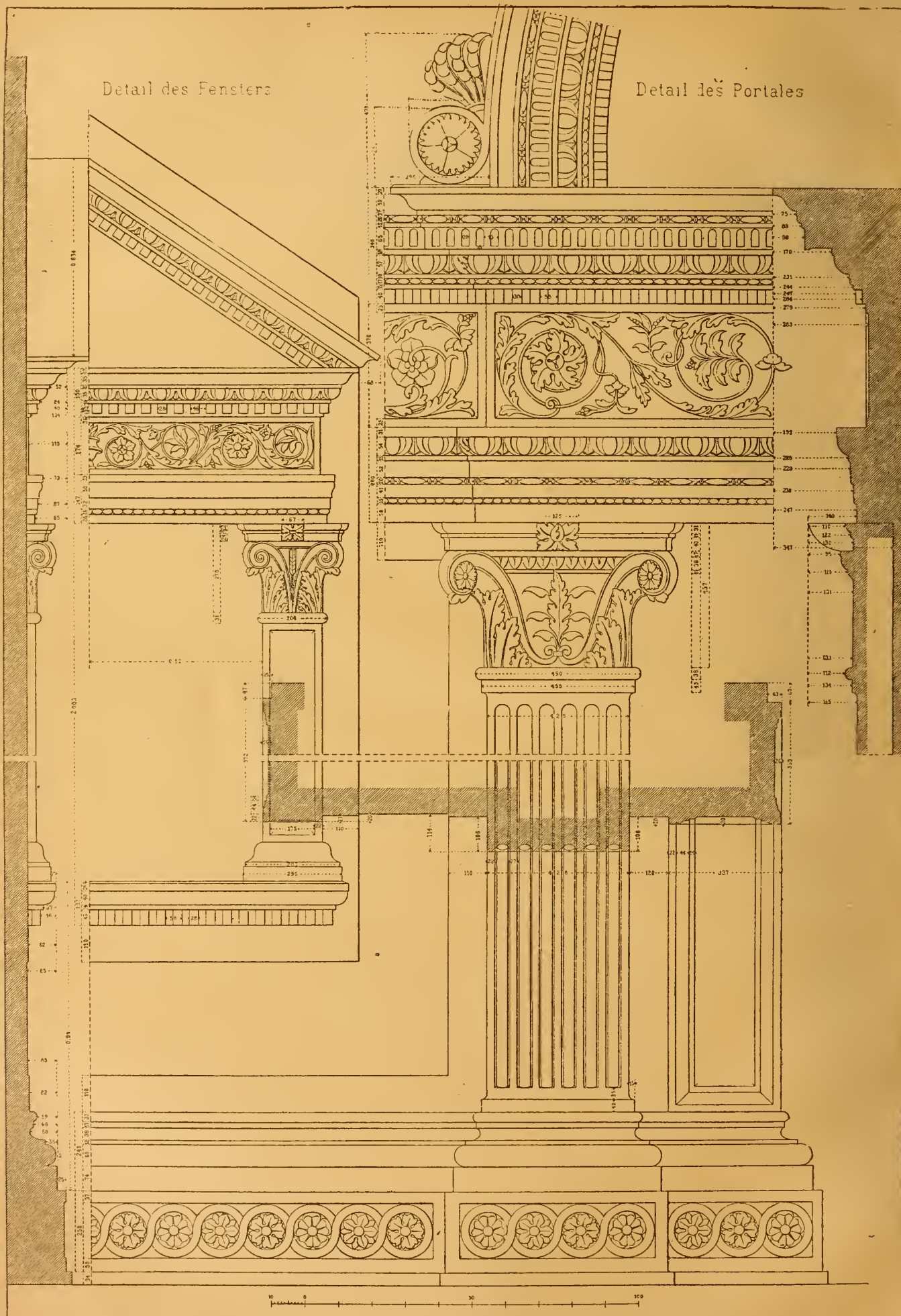
Mr. Ferris, the inventor of the famous wheel at the Chicago Exposition, died on Sunday, at Pittsburg, from typhoid fever.

From beneath the Peel statue which has just been removed from the bottom of Park-row, Leeds, a box containing a number of interesting relics has been found. It has been opened at a meeting of the Leeds Corporate Property Committee. Amongst the articles it contained was a penny, two sixpences, and a large roll of paper about 100ft. in length, made up of sheets of foolscap gummed together, and containing names of subscribers towards the £1,500, which the monument cost. The statue, after being repaired, will be re-erected in Victoria-square, Leeds.

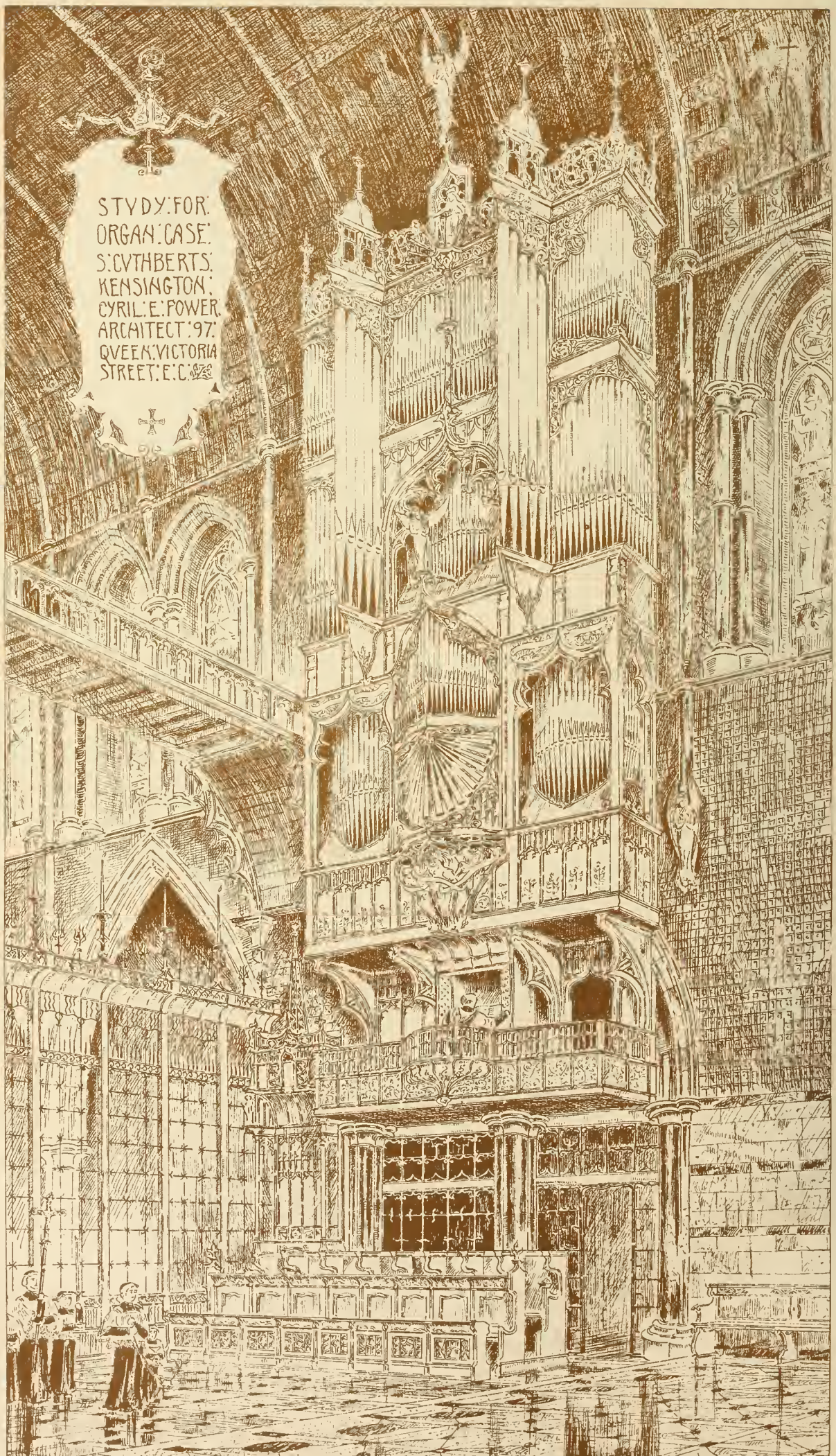
St. Michael's Church boys' schools, Bristol, have been rebuilt so as to accommodate 168 boys at a cost of £1,400, some of the old materials of the former buildings having been utilised for the work. The architect was Mr. W. V. Gough, of Bristol, who also designed the new girls' and infants' schools adjoining, and the builder Mr. C. A. Hayes, of the same city.

An agitation exists for the widening of the historic old bridge which crosses the Tweed at Berwick, and links England to Scotland. The bridge, which occupied over 24 years in erection, was completed in 1634. It is 1,164ft. long and 17ft. broad, and is composed of 15 arches. Messrs. Sandeman and Moncrieff, of Newcastle, have prepared a report stating that they could not recommend that anything be done to alter the present bridge. They recommend, therefore, that a new footbridge be erected near the present bridge at a cost of between £6,000 and £7,000. The Bridge Committee have drawn up a report to present to the Berwick Town Council, suggesting that a plebiscite of the borough be taken anent the scheme proposed by Messrs. Sandeman and Moncrieff.

Mr. Justice Charles being on Wednesday the hearing of an action by which Mr. Leonard G. Stileman-Gibbard sought to restrain the Chancellor of the Diocese of Ely from hearing a petition for a faculty for the erection of choir stalls on a site in Sharnbrook Church, Bedfordshire, formerly occupied by two pews, one on each side of the chancel, to which the plaintiff claimed both a freehold and a prescriptive right. Mr. Stileman-Gibbard is the owner of the ancient mansion house of the parish, and he traced his claim back to 1792. The rector and churchwardens disputed this claim, and contended that, if he had ever possessed that right, he had abandoned it through not using the pews in question. The hearing was continued yesterday, and has been adjourned.

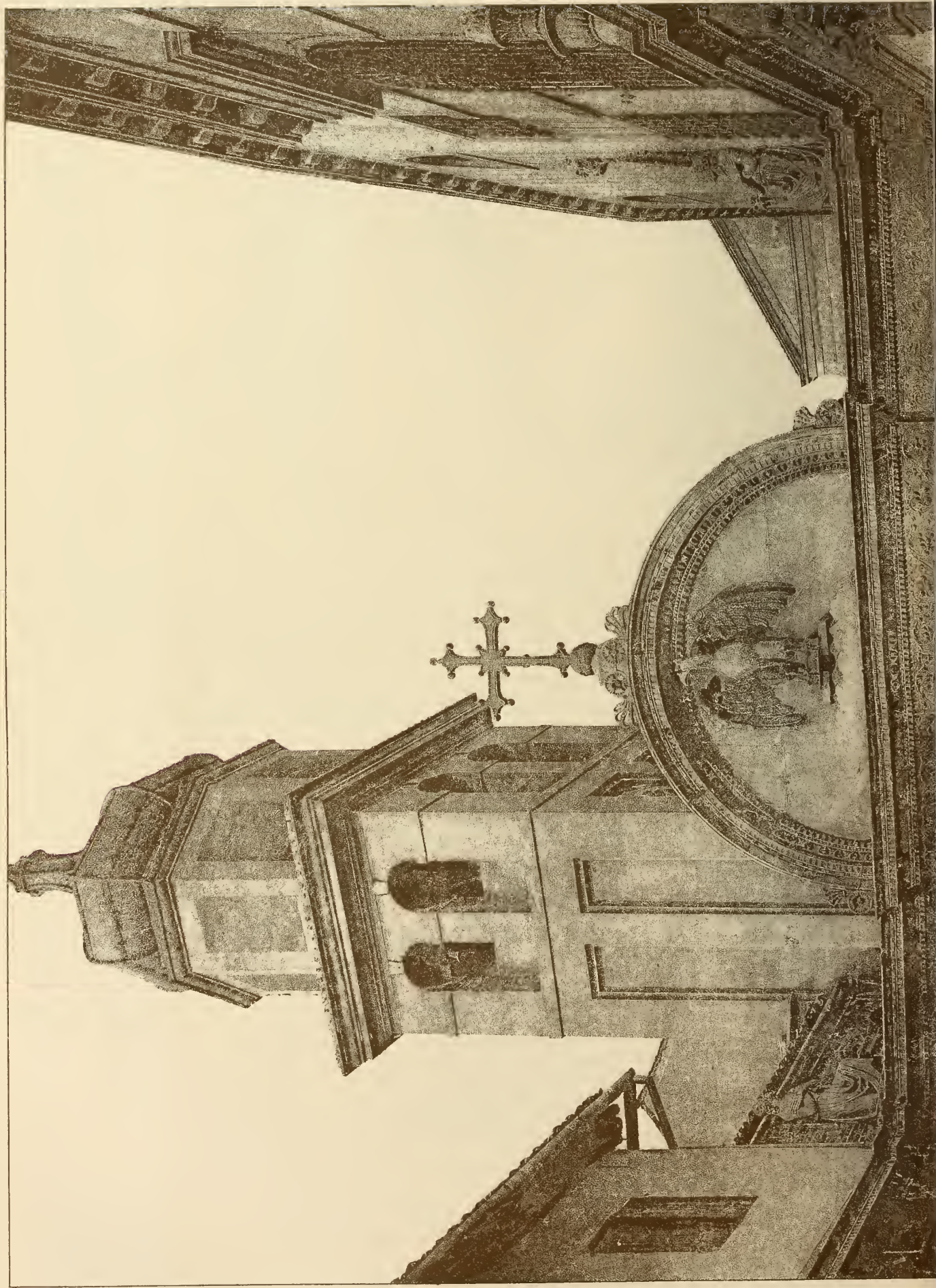


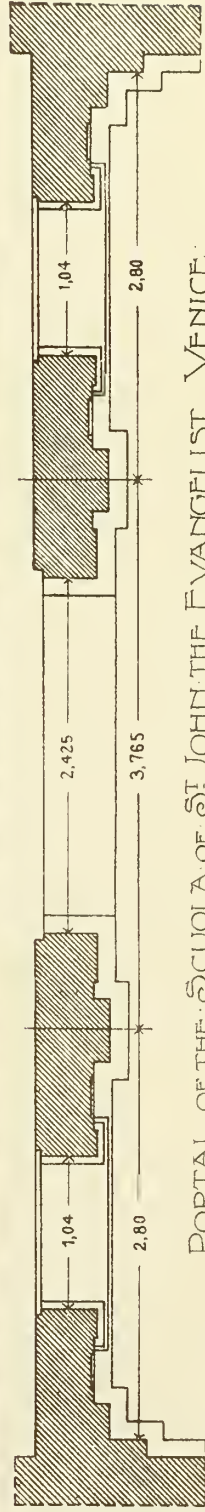
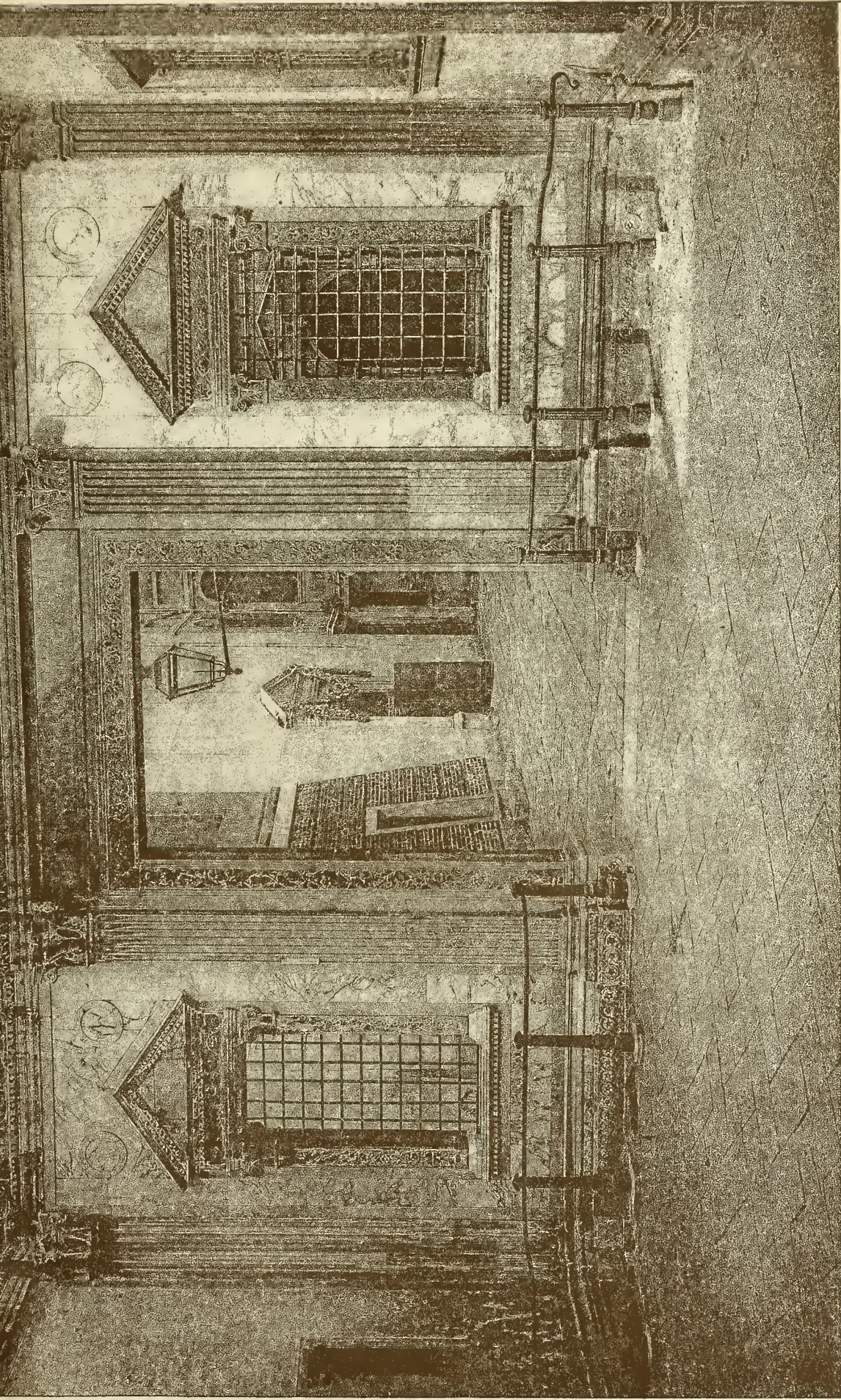
DETAILS OF THE SCUOLA OF ST. JOHN THE EVANGELIST, VENICE.



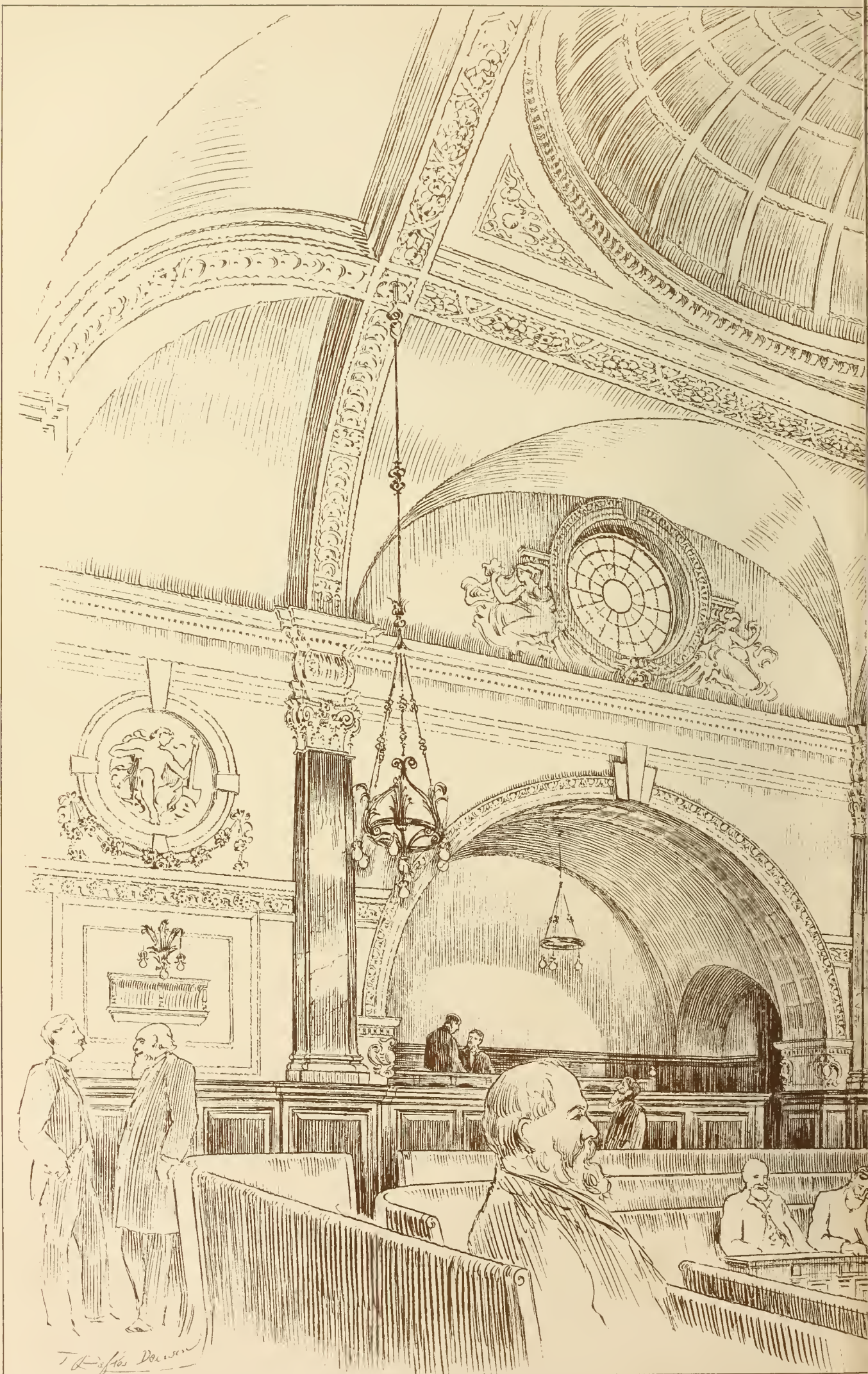
STUDY FOR:
ORGAN CASE:
S. CYTHBERTS:
KENSINGTON:
CYRIL E. POWER:
ARCHT. 97:
QUEEN VICTORIA
STREET E.C. 4

THE BUILDING DEWS, NOV^R 27, 1896.





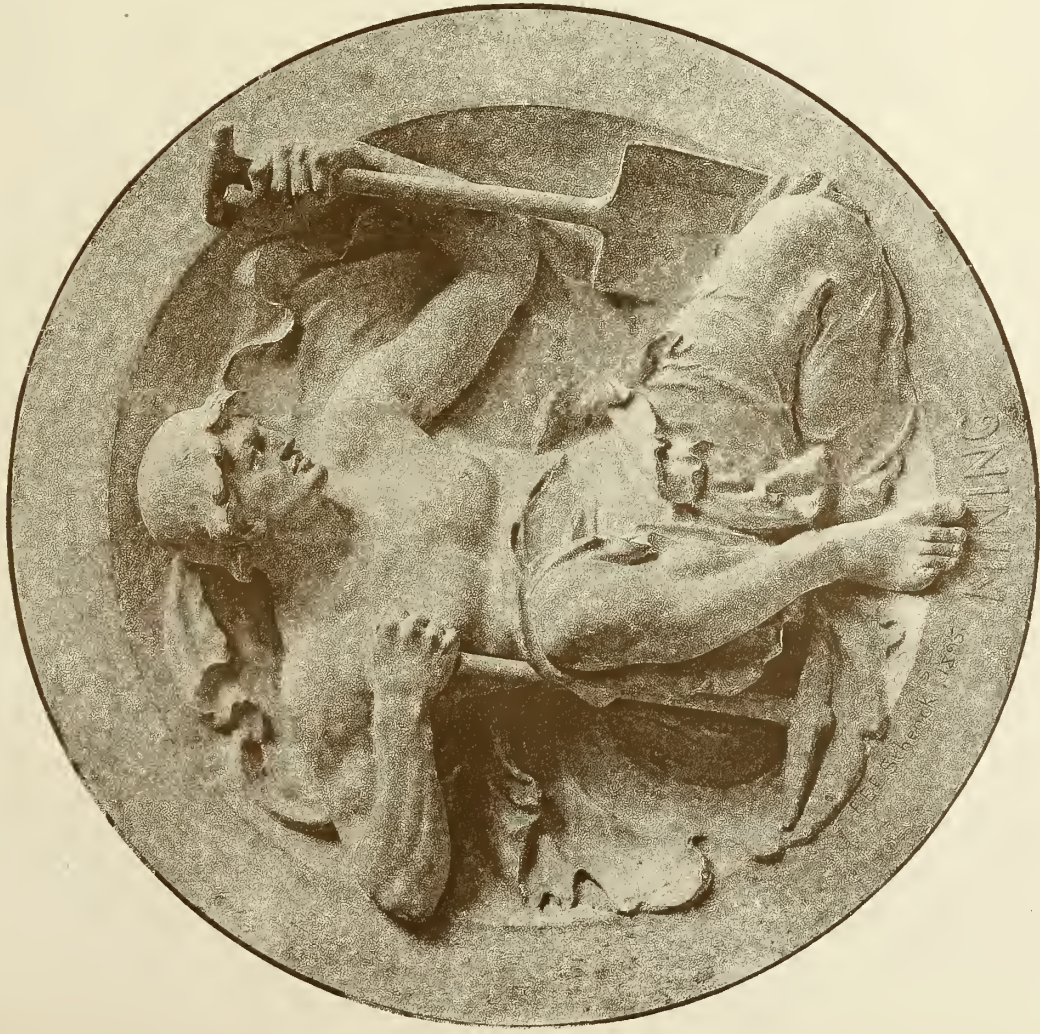
PORTAL OF THE SCUOLA OF ST JOHN THE EVANGELIST VENICE





The Council Chamber



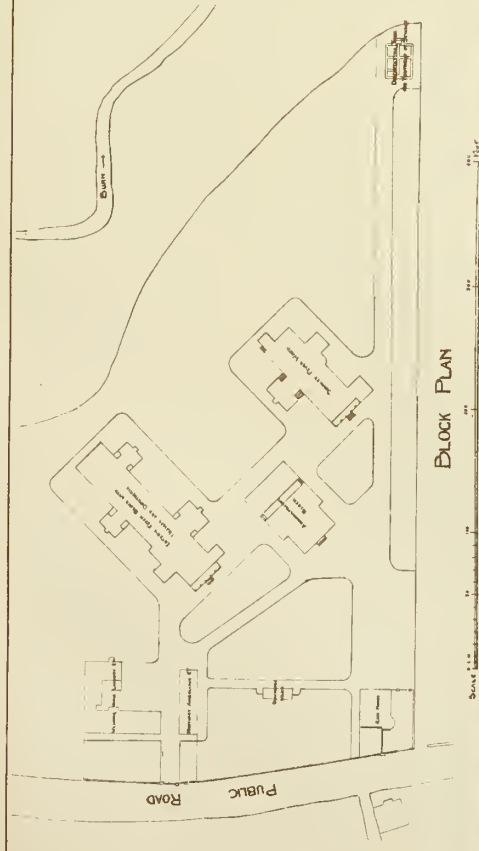


"Photo-Tint," by James Akerman, 6, Queen Square London, W.C.

Hospital for Infectious Diseases.

— Birnie View of Site & Buildings.

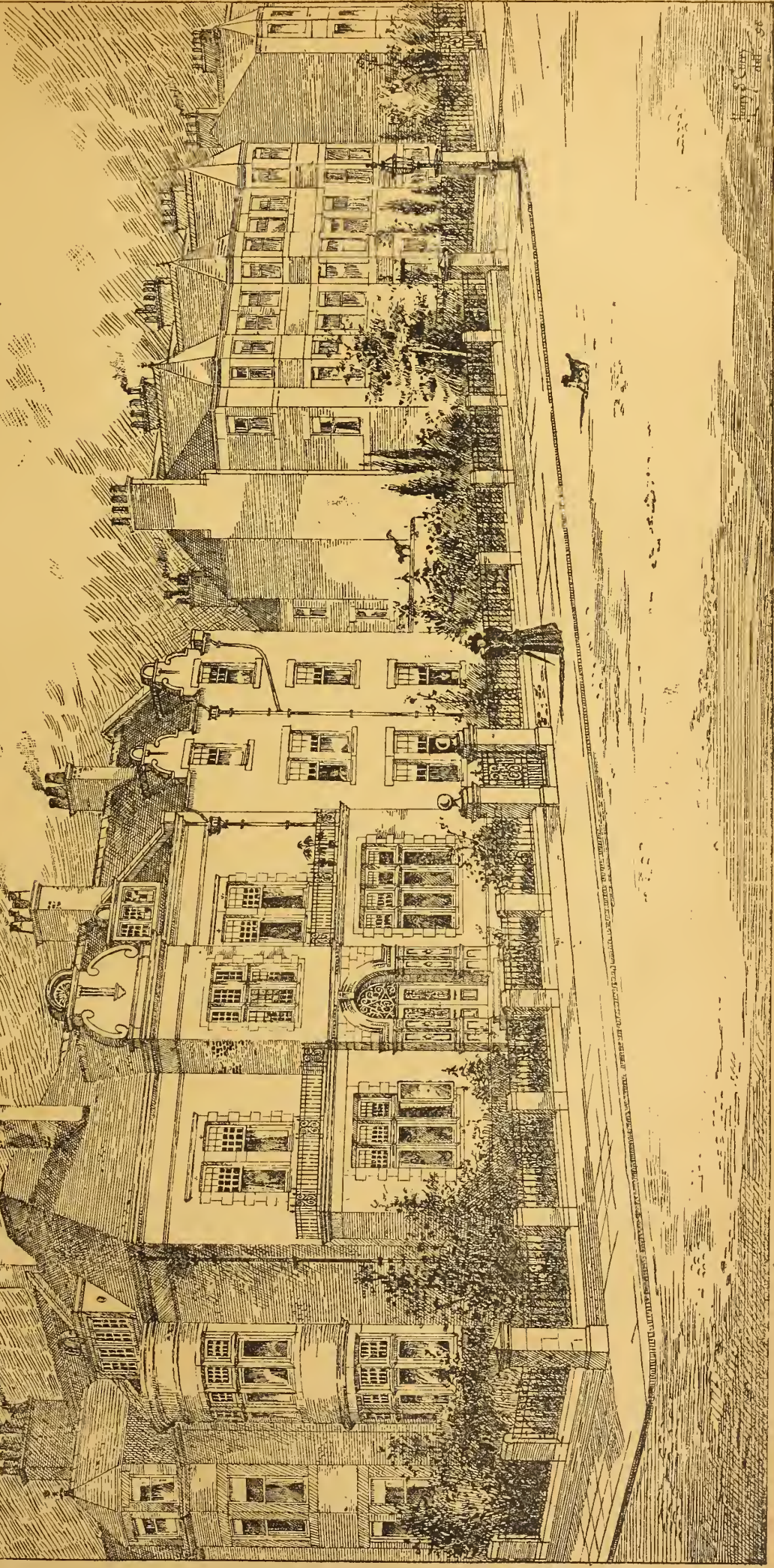
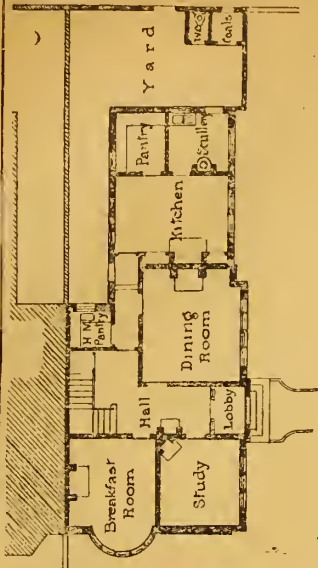
MESSRS CAMPBELL DOUGLAS & MORRISON ARCHT'S



Campbell Douglas & Morrison
Architects, 1895.

THE BUILDING NEWS, Nov. 27, 1896.

HOUSE DEVONSHIRE TERRACE · NEWCASTLE-ON-TYNE.
MESSRS WATSON & CURRY ARCHTS



Building Intelligence.

EDINBURGH.—The new Evangelical Union Church in Montgomery-street was opened on Saturday. It is designed in a phase of the Perpendicular period. It is cruciform in plan, and comprises nave, with transeptal projections and choir recess with organ chamber. A substructure to the church is arranged as hall, managers' room, vestry, kitchen, lavatories, and cloak accommodation. The main gable bears in the centre a wide, traceried window, flanked by buttress projections, which are terminated with carved pinnacles. Similar buttresses with pinnacles are carried up at the outer angles of the gable. The church accommodates nearly 400 persons, and the hall upwards of 200. The interior of the church is constructed with open-timber roof, with infilling of plaster in a series of panelled spaces, the length of the nave being subdivided by heavy frames set on the walls and strutted up from moulded stone corbels. The church is built of Binny stone. It is heated by low-pressure hot water. The architect is Mr. Hippolyte J. Blanc, R.S.A., of Edinburgh.

HANLEY.—A Grand Hotel is about to be built opposite Hanley Railway Station, at the junction of Trinity-street and the railway approach, from plans by Messrs. Maxwell and Tuke, of Manchester. The building is to be a five-storied erection, and constructed with red Ruabon brick and terracotta frontages, and will stand on a site of about 1,710 superficial yards. On the lower ground floor are a restaurant, 60ft. by 30ft., and café 30ft. by 30ft., with a smoking and billiard-room 40ft. by 30ft. The remainder of this level is to be occupied by the kitchen offices, laundry, beer-cellars, and luggage-lift. Wine and bottling cellars are provided in a sub-basement. The hotel entrance is in Trinity-street, and through a mosaic-floor vestibule one reaches the hall, 30ft. by 30ft. square, containing a lift surrounded by a wide staircase to all floors. The banqueting-hall is 90ft. by 30ft., and 18ft. high. There will be nine stock-rooms, and a series of arbitration rooms *en suite* with the hall. The mezzanine floor will contain a smoking-room 40ft. by 30ft., a set of private residential apartments, and 14 bedrooms. Each room will be provided with a fireplace, and the main apartments, hall and corridors, will be warmed on a patent water-service of pipes and coils. The first floor will contain the coffee-room, 50ft. by 30ft., the writing-room, the drawing-room, and a smoke-room, 40ft. by 30ft., with a billiard-room, 30ft. by 30ft. There is also to be a suite of private dining-rooms for parties of from 20 to 40 guests, with a number of bedrooms, &c. The second floor will contain bed and sitting-rooms, making a total on all floors of 70 bedrooms and 12 private sitting-rooms. The male and female staff will have dormitories and cubicles, approached by separate staircases on the third floor, where also are to be situated the spirit-rooms and wine-rooms, with their special lift. In connection with the hotel a livery stable, with accommodation for 20 horses, with coach and carriage-houses, &c., will be built.

The new theatre which it is proposed to build in the New Cross-road, London, is to be called "The Regent," and will accommodate about 2,000 people. A limited company has been registered to build a theatre at Lewisham, and the plans are now in course of preparation.

The last week at the Auction Mart was a very satisfactory one. Apart from an important sale of freehold ground-rents, the substantial aggregate of £140,308 was compiled. The tone of the market was firm all round, and with the exception of West-end residences, few of the properties offered lacked support.

A long discussion in the London County Council on Tuesday, on the irregularities recently discovered in the accounts of the Works Committee, ended in the adoption of a resolution, moved by Lord Onslow, for the appointment of a special committee. This committee is to inquire into the management and financial position of the Works Department since its formation and into its future prospects. The members of the special committee were nominated, and they were instructed by a large majority to publish the shorthand notes of the evidence given before them. An amendment proposing the addition of a clause requiring the special committee to compare the work done by direct employment, as regards cost and quality, with the work done by contractors was rejected by 56 to 51 votes.

ARCHITECTURAL & ARCHÆOLOGICAL SOCIETIES.

BIRMINGHAM MASTER BUILDERS' ASSOCIATION.—The annual meeting of this association was held on Tuesday evening, at the Grand Hotel, Colmore-row, Mr. R. Bulley (the retiring president) presiding. The report stated that, at the commencement of the year, the notices which had been received from the carpenters and labourers were dealt with. The carpenters met the representatives of the association in conciliation, and the points at issue were promptly settled. The negotiations with the labourers were not so satisfactory, demands being made by the men which could not be acceded to, and the meetings ended without any settlement being arrived at. Ultimately, as the result of correspondence, rules were signed, and they had been in force since April 1. The standing committee had been the means of clearing up several minor disputes, though in one case no settlement was arrived at, two branches of the trade claiming the right to do the same work—namely, tile-laying. Notices of alteration in the working rules had been received from the carpenters, stonemasons, bricklayers, plasterers, plumbers, and labourers. The balance-sheet showed the receipts for the year to be £125 10s. 10d., which, with the balance from the previous year, made a total of £222 2s. 4d. The expenditure amounted to £82 3s. 3d., leaving a balance in hand of £139 19s. 1d. The report was adopted, on the motion of the chairman. Mr. B. Whitehouse was elected president for the ensuing year, Mr. W. E. Lee vice-president, Mr. G. Twigg treasurer, Messrs. J. S. Surman and T. Johnson auditors, and Mr. E. J. Bigwood secretary. The committee were also elected. The annual dinner was subsequently held, under the presidency of Mr. B. Whitehouse. Alderman Bowen gave "The City and Trade of Birmingham," remarking that trade was flourishing at the present time. Councillor A. Baker responded, expressing the opinion that for the next ten years the prosperity in trade would be such as had rarely been enjoyed before in this country. Councillor Parkes, M.P., proposed "Success to the Birmingham Builders' Association." He said that in a town like Birmingham it was their duty to erect buildings, and especially municipal buildings, not only of an artistic type, but of such a character that they would stand the test of time. The present prosperity of Birmingham was at the high-water mark, and in fact Birmingham was now more prosperous than at any previous period in its history. With the exception of the town-hall, nearly all her important buildings had been erected during the last thirty years. Most of them were of a very artistic type, and some of them were very durable. Mr. A. S. Smith responded. The other toasts were: "The Architects and Surveyors," "The National Association of Master Builders of Great Britain," "The President," "The Vice-President and Officers," and "The Visitors."

GLASGOW ARCHITECTURAL ASSOCIATION.—At a meeting of the Glasgow Architectural Association held on Tuesday, Nov. 17th, Mr. Andrew R. Scott, President of the Edinburgh Architectural Society, delivered a lecture entitled "The Grammar of English Gothic Architecture." The lecturer opened his subject by pointing out that, notwithstanding the mutilations of time and the hand of man, we had in our Mediæval architecture an inexhaustible store of that which was beautiful and impressive, but how in modern times, and with all these advantages, excepting a few men like Scott, Bodley, Pearson, and Bentley, the modern architect had shown himself incapable of grasping the spirit of artistic and constructional truth which animated the Mediæval artist. Mr. Scott then impressed on his audience the necessity for close and systematic study of the development of mouldings as a key to their comprehension, and the age of buildings they adorned. Referring to the measuring of old work, he mentioned the different modes for getting the profile of moulded surfaces, such as the cymagraph and the use of thin strips of lead, but considered preferable the simple foot rule, plumb-line, and calipers, always plotting-out details full size on the spot when practicable. The eye would then get trained to recognise the profile of a moulding from a distance. The lecturer then proceeded with a most exhaustive analysis of the developments of Gothic mouldings, especially illustrated by full-size drawings, and closing his remarks by condemning in modern design the use of compasses for drawing Gothic forms, instead of a

trained eye, as contrary to the usages of the Mediæval artists, and as productive of that stiff cast-iron look which was the result of all mechanical precision, and the bane of modern Gothic. A discussion followed, at the end of which Mr. Scott was accorded a hearty vote of thanks.

NORTHERN ARCHITECTURAL ASSOCIATION.—The opening meeting of the session was held in the Art Gallery, Newcastle, on Wednesday week, when the president, Mr. Archibald Dunn, J.P., delivered an admirable address on "The Ideal Architect," in which he pointed out that the architect needed to be at once a skilled engineer, constructor, and artist, as well as acquainted with all the developments of building and sanitary invention. In his concluding remarks he asked why should not architects sign their works, as did painters, sculptors, and engineers. At the close a hearty vote of thanks was accorded the president on the motion of Mr. Taylor.

CHIPS.

Col. J. T. Marsh, R.E., has held a Local Government Board inquiry at Plymouth, into an application by the corporation for sanction to borrow £5,760 for works of sewerage and street improvement.

A block of public buildings, with fire-engine station and caretaker's residence, is about to be built at Baldock, Herts, from designs by Messrs. Talbot Brown and Fisher, of Wellesborough.

Mr. H. Dearden, of Batley, has been appointed borough surveyor of Dewsbury.

The new organ which has been erected in the West Parish Church, Galashiels, was inaugurated on Friday. The organ was built by Messrs. Brindley and Foster, Sheffield.

Penzance Town Council, having spent £10,000 on a substantial sea-wall for the western end of the Promenade, and placed on it a massive preventive iron rail, have resolved to lay down a durable surface at a cost of £1,500. Mr. W. O. E. Meade-King, M.Inst.C.E., held an inquiry into the application for the fresh loan, on Friday. He elicited that the sea-wall was first built in 1843, and in February 1895, a considerable portion of it was washed away, necessitating its rebuilding. The proposed surface will be of concrete, to be placed on a foundation of clay and sandbags. The concrete will be laid in blocks 3½ in. thick. New curbing will be laid, and channelling 6 in. in thickness will be carried out.

The opening took place on Friday of the new organ which has just been placed in St. Paul's Church, Widnes, by Messrs. Farritt and Son, Leicester. At the same time, formal recognition was also made of the addition which has just been made to the church in the form of the lower portion of a tower, which has been built by Mr. J. Beech, Widnes, from plans by Mr. H. Sheldermine, of Liverpool, who gave his services. The total cost of this work has been £1,800.

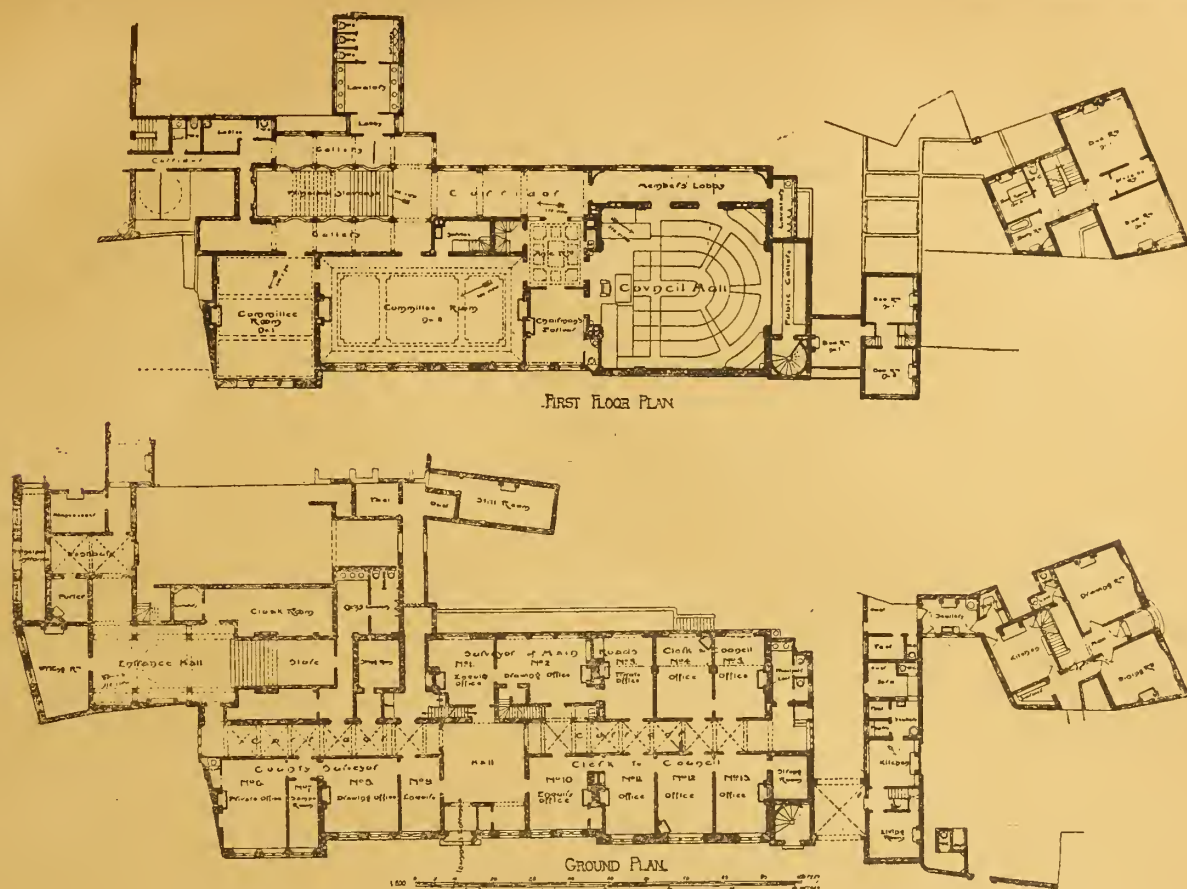
A new ring of five bells has been dedicated in the parish church at Stansfield, Suffolk. The old bells, which were all originally made by Miles Granger, of Colchester, in 1632, had been for many years unringable, and the belfry had fallen into a dilapidated condition. An effort was therefore made to restore the noble old tower and bells, and the work has now been brought to completion under the superintendence of Mr. J. W. Little, of Tonbridge. The bells have all been recast by Messrs. Mears and Stainbank, of Whitechapel. The tenor, weighing 10½ cwt., is in the key of F sharp.

A memorial window has been placed in the church of Cranborne St. Peter, Windsor Forest. The subject (St. Peter and Cornelius) has been designed by Mr. Selwyn Image, and executed under his supervision by Messrs. Powell, Whitefriars, London.

The ensuing Winter Exhibition of the Royal Academy will consist exclusively of works by the late Lord Leighton, P.R.A.

The Hon. W. F. D. Smith, M.P., laid, on Tuesday, the foundation stone of new Church schools at Tile Kiln-lane, in the parish of St. Michael's, Bowes Park, Wood-green.

The last great beam required in the nave roof of Winchester Cathedral was hoisted last week into position, under the eye of Mr. Russell, Mr. Thompson's foreman. This beam was No. 19 on the plan, and replaces a much-decayed one of the ancient roof. No other beam will be required of this size, and the roof now approaches completion, and money has been promised, and partly paid, sufficient for the repair of the nave timbers. Next will follow the roof and lead of the north transept, and those of the chancel, the nave aisles, &c. About £1,000 is required for improvements to the organ, so that another £7,000 or £8,000 will be required to complete the restorations.



COUNTY COUNCIL BUILDINGS, STAFFORD.—HENRY T. HARE, F.R.I.B.A., Architect.

COUNTY COUNCIL BUILDINGS,
STAFFORD.

THESE buildings, the council-chamber of which we herewith illustrate, with a plan, were opened about a year ago. They are constructed with small sand-faced bricks, working six courses to 14in. The dressings are of Hollington stone, and the roofs are covered with stone slates. The whole of the construction, including the roofs, is fireproof. The main staircase, corridor, and large committee-room are finished in wainscot, and the council chamber and chairman's parlour in dark Spanish mahogany. The external stone carving was executed by Mr. W. Ammonica, the modelled plaster-work by Mr. Schenck, some of whose work we illustrate to-day. Mr. Henry Lovatt, of Wolverhampton, was the general contractor, and Mr. James Trill the clerk of works. Mr. H. T. Hare was the architect. Our illustration of the interior was shown at the Royal Academy last summer.

WATER PURIFICATION.

AT the Institution of Civil Engineers, on Tuesday evening, the President, Mr. J. Wolfe Barry, C.B., in the chair, a paper by Dr. Percy F. Frankland, F.R.S., on "The Bacterial Purification of Water," was read. Eleven years ago the author applied Koch's bacteriological methods to the numerical estimation of the microbes present in the water supplied to London before and after filtration. The importance of that departure in enabling an estimate to be formed for the first time of the value attaching to the processes of purification carried out by the water companies was quickly appreciated, and Dr. Frankland was requested to supply monthly reports to the Local Government Board on the bacterial quality of the water supplied to London. During the past ten years water-bacteriology had advanced by leaps and bounds, and much work had been done since Dr. Frankland communicated his original results to the Institution of Civil Engineers in the year 1886. The purification of water was dealt with under two heads—natural and artificial purification. Under natural purification processes it was pointed out how the so-called self-purification of river water was not, as many chemists would have us believe, illusory; but that during a river's flow a most substantial

diminution in its bacterial contents might and did take place. The action of sunshine in the destruction of water bacteria was also enlarged upon, and it was pointed out how comparatively insignificant a purifying factor that must be regarded, inasmuch as it could only operate in the upper layers of water, and that even there its power was hampered by the turbidity of the water. Of great importance, however, was the storage of water before filtration, for not only did the coarser particles in suspension become deposited, but a large proportion of the bacteria present also disappeared in consequence of sedimentation. Dr. Frankland demonstrated what an important effect sedimentation had in the removal of bacteria at the storage reservoirs of the London water companies. The effect of temperature, algae, and chemical oxidation, as well as the influence of movement on the vitality of bacteria, were also dwelt upon. By far the most potent purifying process was, however, the filtration of water through porous strata, some conception of which might be derived from the fact that in his examinations of the water derived from the Kent Company's deep wells sunk into the chalk, Dr. Frankland frequently found fewer than ten bacteria in one cubic centimetre of water, whereas in the same volume of water taken from the Thames at Hampton, he found from 1,000 to 120,000 microbes. Under the second heading the important question of sand filtration was discussed at great length. The advent of bacteriology had removed the filtration of water from the region of pure empiricism to the domain of scientific practice. There had been a growing tendency to reduce the rate of filtration, and to render it more uniform. The character of the sand employed had also to be considered, and Dr. Frankland gave a table showing the mechanical analysis of sands used in waterworks all over Europe. The depth of fine sand was another important factor; the German Imperial Board of Health had fixed 12in. as the very lowest limit to which that layer of sand might be diminished—a considerably greater depth being recommended. Considerable attention was devoted to the action of the surface slime which formed on sand filters, and it was pointed out that, although it played a very important part in the retention of bacteria, and that every opportunity should be offered for its formation, yet it was not by any means wholly responsible for the removal of bacteria by sand

filtration. Some experiments made by Dr. Reinsch at the Altona waterworks were quoted in support of that view. Dr. Frankland pointed out that it was precisely in the winter months, when the bacterial quality of the raw river water was worst, that the greatest danger threatened the efficient working of the sand filters, and by means of a diagram it was shown how periods of frost interfered with the quality of the bacterial filtrate, that when the temperature was lowest the bacterial contents of the effluent were highest. As we did not indulge in the luxury of covered filter beds, the whole energy of the water engineer must be directed to guard against frost. In conclusion, it was pointed out that if we had been before our neighbours in the evolution of the practice of water purification, and even in the general investigation of the processes involved by the use of modern bacteriological methods, we seemed in danger of allowing ourselves to be overtaken by them in making use of the systematic control of water filtration which those methods had placed at our disposal.

CHIPS.

The Duke of Wellington's letters and despatches to General Lord Hill were put up to auction on Wednesday at Shrewsbury, and bought by the authorities of the British Museum for 600 guineas.

Sir Robert Hunter and Canon Rawnsley have been nominated to represent the National Trust for Places of Historic Interest or Natural Beauty upon the committee elected by the London County Council to consider the possibility of scheduling and preserving the historic buildings of London.

Mr. D. W. M'Innes, who since 1879 has been in the service of the Carron Company, and who, during the past twelve years, has acted as their London manager at 15, Upper Thames-street, has now become part proprietor and director of Messrs. Hayward Brothers and Eckstein, Limited, of 187, Union-street, Borough, S.E. He will be actively engaged in the management of the business jointly with Mr. W. Eckstein and Mr. F. A. Willmore.

At a meeting of the Edinburgh Architectural Society, held in Dowell's Rooms on Thursday night in last week—the President in the chair—Mr. A. M'Rae delivered a paper on "Hospital Planning," confining himself to hints on important principles, and on portions of the buildings. A discussion followed.

COMPETITIONS.

ABERGELE.—In the competition for the county Intermediate School building the plans of Mr. Frank Bellis (of the firm of Messrs. Gricson and Bellis, Bangor and Mold) have been selected. This is the third intermediate school he has been selected to build within the past 18 months, two out of the three being gained in competition.

DOUGLAS, I.M.—A special committee of the Douglas Town Council on Monday had under consideration a large number of plans for the erection of new municipal buildings for the borough. The present buildings are in a back street, and the accommodation provided is utterly inadequate in every respect. Recently the principal Manx architects protested that the premiums offered by the Corporation, the highest of which was £40, for designs were altogether insufficient, and refused to enter the competition. The result is that nearly all the plans sent in are from English architects. The plans have been referred to an expert sub-committee for a report. The proposed buildings will cost over £10,000.

LLANFAIR.—The result of the competition for the best set of plans for the new schools has come to hand. Six competed, and the plans adjudged the best were those designed by Mr. Frank H. Shayler, of Oswestry and Welshpool, who is the architect also for the Welshpool Intermediate Schools. The school is designed to accommodate 100 scholars. The plan provides an assembly-hall and schoolroom, classrooms, kitchen, and laundry cloak-rooms, &c. The style selected is a free treatment of Late Renaissance, entirely devoid of mouldings and externally applied ornament, depending solely for effect upon picturesque grouping. A central wing in half-timber work, flanked by two low square turrets with pyramidal roofs and figure finials, are the main features of the front elevation.

NOTTINGHAM.—The limited competition for the new workhouse at Nottingham has been decided, and the plans are on view this week. The competitors were limited to architects practising in the town, and a few London specialists were invited. The cost is to be about £200,000. The premiums have been thus awarded: Messrs. Marshall and Turner first, Mr. R. C. Sutton second, and Messrs. Brewill and Baily third; all of Nottingham. We believe Mr. Ward, of Birmingham, was the professional referee.

SHEFFIELD.—At the last meeting of the school board a report was received from a committee on the seven sets of plans, submitted by Sheffield architects, for the proposed new pupil teachers' centre and peripatetic science department. In accordance with the recommendation of Mr. E. R. Robson, F.S.A., of London, the assessor, they advised that the plans marked "Spes" be accepted and adopted, subject to the conditions, and to any modifications which may be deemed necessary, and that the premiums of £15 and £10 offered to architects other than the author of the accepted plans, whose plans may be considered second and third in the order of merit, be awarded to the authors of the plans marked "Tressure Fleury" and "1896." A long discussion ensued on an amendment that the plans marked "1896" be selected. The chairman of the board said personally he preferred "1896" to "Spes" as a plan, but he was not prepared to reject the advice of the assessor, as neither he nor any other member of the board was an expert. The report was then adopted by nine votes to six. The successful plans were found to be those of Mr. H. W. Lockwood, of Pinstone-street; second in order of merit, and taking the premium of £15, were those of Messrs. Holmes and Watson, St. James's-row; and third came those of Mr. J. Norton, of Alliance Chambers, George-street, gaining the premium of £10.

LLANIDLOES.—At the last meeting of the town council, the report was read of Mr. Radford, the assessor appointed by the council to adjudicate on the different schemes for a water supply sent in, and to award the premium of 50 guineas to the successful competitor. The assessor recommended that the premium be divided between "Verax" and "Aquarius." "Verax" recommended the pumping of water from the alluvial deposit at the juncture of the Severn and Dulas, near Dolcnog, across the river into an open reservoir capable of storing 3,173,000 gallons, the total cost being £9,021, which, on the recommendation of Mr. Radford, could be reduced to £4,600. "Aquarius" provided for an impoundage

reservoir on land belonging to Nantygeifr Farm, capable of holding $7\frac{1}{2}$ million gallons, the estimated cost being £5,656. After some discussion the matter was referred to a committee.

CHIPS.

The Hull Technical Instruction Committee appointed, on Monday, Mr. C. L. Heath, at present lecturer on engineering subjects at the Central Science Schools, Sheffield, their chief lecturer on engineering at a salary of £250 per annum.

At a Local Government inquiry on Friday at Charnock Heath, Lancashire, into a proposal to borrow £500 to build a parish hall, it was stated that although there was a population of 1,100 and a rateable value of £8,000, there was neither church, chapel, nor school in the parish, the only public structure being a pillar letter-box. The inspector said it was the funniest thing he had ever heard of.

The Harrogate Town Council have confirmed a resolution to acquire the Spa Estate. A provisional agreement has been made for the purchase of the property for £22,000.

It has been decided to remove to the Leeds Art Gallery the series of panels which the late Sir John Millais painted for the judges' lodgings in that town. The panels were executed when he was a student.

A memorial portrait of the late Professor Robertson Smith, of Cambridge University, painted by Sir George Reid, P.R.S.A., was presented on Monday to Aberdeen Free Church College, in which Mr. Robertson Smith was a professor when libelled for heresy.

Mr. Thomas Taylor, quarry owner, Parbold, near Wigan, was superintending the removal of some blocks of stone in the quarry on Thursday in last week, when a large piece fell over the face of the cutting, killing him instantly.

Some months ago the City Corporation determined to dispose of certain land near the Metropolitan Cattle Market, at Islington, and surveyors were appointed to value the property, which was subsequently ascertained to be worth £24,000. In the mean time the Vestry of Islington approached the corporation with a view to acquiring the land, and maintaining it as an open space. The vestry decline to entertain the purchase of the property at what they considered to be an exorbitant price. The Cattle Markets Committee have just issued a recommendation to the Court of Common Council, to the effect that the purchase price should be reduced to £16,000.

The Bishop of Marlborough on Saturday laid the memorial stone of the new church of St. Gabriel, Willesden-green. The new church, which is to take the place of an iron building that has been twice enlarged since 1891, will, when completed, be Early Decorated in style, and capable of seating 950 people. The joint architects are Mr. R. Phillip Day, and Messrs. W. and C. A. Bassett-Smith; the builder is Mr. John Bantley, of Waltham Abbey. The portion of the church first to be built will seat 600 persons, and will cost about £7,000, of which sum £4,000 has been already promised.

In the ensuing session of Parliament application will be made for an Act to authorise the Commissioners of her Majesty's Works and Public Buildings to acquire, by compulsory purchase or otherwise, for the erection thereon of public offices, "all the lands, houses, buildings, and premises situate within an area bounded on the north by Whitehall-place, on the east by Whitehall-avenue, on the south by Horse Guards-avenue, and on the west by Whitehall." The Act will empower the Commissioners to stop up and acquire the site of Middle Scotland-yard.

The members of the Wolverhampton Board of Guardians further discussed on Friday the proposal to build a new workhouse, when a fresh development of the controversy was revealed. The solicitors to the owners of the Perry Hall Estate, Wednesfield (recommended as a site by Mr. W. H. Ward, architect, of Birmingham, whom the guardians had consulted on the whole question), wrote withdrawing their offer to sell the property. It was decided to refer the subject to a committee consisting of the whole board.

The Keut County Council received, at their quarterly meeting last week, a report from the Finance Committee, recommending that in lieu of commission an additional salary should be paid to the county surveyor, Mr. F. W. Ruck, of Maidstone, representing approximately the yearly average of the sums hitherto paid as commission, and that in future all fees paid for specifications and forms of tender should be repaid after the tenders have been dealt with, and fees received from persons who did not tender should be paid over to the County Treasurer. The committee therefore recommended that the surveyor's salary be increased by £70. The report was unanimously adopted.

TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. All communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondents.]

It is particularly requested that all drawings and all communications respecting illustrations or literary matter should be addressed to the EDITOR of the BUILDING NEWS, 332, Strand, W.C., and not to members of the staff by name. Delay is not unfrequently otherwise caused. All drawings and other communications are sent at contributors' risks, and the Editor will not undertake to pay for, or be liable for, unsought contributions.

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NOTICE.

Bound copies of Vol. LXIX. are now ready, and should be ordered early (price Twelve Shillings each), as only a limited number are done up. A few bound volumes of Vols. XXXIX., XL., XLI., XLVI., XLIX., LI., LIII., LIV., LVIII., LIX., LX., LXI., LXII., LXIII., LXIV., LXV., LXVI., LXVII., LXVIII. may still be had, price Twelve Shillings; all the other bound volumes are out of print. Most of the back numbers of former volumes are, however, to be had singly. Subscribers requiring any back numbers to complete volume just ended should order at once, as many of them soon run out of print.

RECEIVED.—G. R. and Co.—J. Webber.—Renaissance.—C. W. B.—E. R. (Chester).—F. S. W. Co.

Correspondence.

WOOD-CARVING AT THE CARPENTERS' HALL EXHIBITION.

To the Editor of the BUILDING NEWS.

SIR,—I hope I may be allowed not only to endorse Mr. Harry Hems' critical letter on the Gothic wood-carving lately exhibited at the Carpenters' Hall, but, in addition, to offer some suggestions.

I fully agree with what Mr. Hems has said as to the poverty in quantity and quality of the modern work shown. The reason is, no doubt, as he suggests—because we have not a single Gothic carving school in England. We have plenty of Renaissance schools and classes, one or two of which make some faint attempt to teach Mediaeval design at intervals; but as far as my own knowledge goes, there is no technical school or class (with perhaps the exception of one in Cheshire and I think, one in Cumberland) that does not confine itself in the main to Renaissance pure and simple. If, then, we have no place where carvers can be properly taught, how can we possibly hope for a better result than that produced at the recent exhibition?

I had occasion to pay nine visits to Carpenters' Hall during the recent show, in order to make accurate full-sized drawings of some of the old Gothic work in the loan collection, and while there I noticed that, although hundreds of people looked at the examples with evident interest and wonder, and spoke of the work in terms of admiration, not a single person, as far as I could judge, gave evidence of even the slightest elementary knowledge of the subject. Is this to be wondered at, so long as it is practically

impossible for any carver to learn this style without spending his life in a Gothic shop? Is not this widespread ignorance of the subject also the reason why some of our architects either send their designs to Belgium or employ foreigners here?

In manual skill we yield to none; but how to properly use or restrain that skill are qualities that will never assert themselves in a country where such vital points are left to chance alone.

May I add that, should any of your readers interested in this fascinating subject care to see my own collection of actual specimens and full-sized drawings taken from ordinary Gothic wood-carving of the 14th and 15th centuries, I shall always be glad to show them.—I am, &c.,

FRANKLYN A. CRALLAN.

162, Oakley-street, Chelsea, S.W.

WOOD-CARVING IN DEVONSHIRE.

SIR,—I connection with what Mr. Hems has to say about the woodcarving at the Carpenters' Hall, London Wall, E.C., Modern Gothic and old Devonshire work, it may not be out of place to mention an interesting work of restoration which I once came across in Devonshire, and not mentioned by Mr. Hems in his recent papers.

About the year 1886 I was fixing some alabaster wall facings in the chancel of the parish church of Down St. Mary, Devon. It was there I saw some remarkable results from the efforts of a local ambitious carpenter engaged in restoring what seemed originally a very handsome chancel screen. I remember the rector, in showing me the various works he had completed and had then in progress, referred with pride to this partly-restored screen, the work on which, he considered, was being done in a reverent and truly Gothic spirit, "measure for measure," in locally-grown oak, and, unlike the restoration of the neighbouring bench-ends in the nave, had not been the subject of modern commercial wrangling in matters of art and craftsmanship.

London, Nov. 23.

J. DAY.

Intercommunication.

QUESTIONS.

[11590].—**Solomon's Temple.**—Would any reader kindly give the name of the book that contains the best description, with plans, &c., of Solomon's Temple, and down to its final destruction?—*STUDENT.*

[11591].—**Contractors' Extras.**—Where, at the outset of a contract, material reductions are made to bring the amount of work left within a given sum, and at or about the completion of the work first let it is determined to carry out the whole of the work as first contemplated, the contractor doing same without any question being raised as to price, is he bound to carry out the work as per schedule of prices deposited in the first instance, which, as the state of the market proved, were not remunerative when called upon to do the work some twelve months after taking it, or has he a right to an advance? And is the architect justified in allowing him same, taking into consideration it would have been much cheaper to have done the work as a whole and together, the additional items being of the least profitable nature?—*EQUIT.*

On Wednesday week Mr. R. H. Bicknell, a Local Government Board inspector, held an inquiry at Wrexham in respect of an application by the town council for sanction to borrow £650 for altering and extending the Smithfield. The Smithfield was constructed in 1876, at a cost of £4,000, and £1,400 was spent in its rearrangement, with the object of obtaining more accommodation, in 1892. The accommodation is still not sufficient.

Mr. Chancellor Dibdin held a Consistory Court at Exeter Cathedral on Saturday to consider an application for a faculty to erect a monument over the grave of Mrs. Mody in Westleigh Churchyard, North Devon. The applicant was the deceased's husband, a Parsee clergyman, now in England. The vicar of Westleigh opposed the granting of the faculty, objecting to the words of the inscription, "Born again at High Barnet, June 21, 1863," such not being the date of the deceased lady's baptism. After hearing a lengthy argument on points of doctrine and ecclesiastical law, the Chancellor said his veto was never intended to be arbitrarily employed, and he accordingly granted the faculty asked for.

At Messrs. Hilton, Anderson, and Co.'s Portland Cement Works, Halling, near Rochester, on Tuesday, one of the kilns partially collapsed, and two workmen, named Butler and Wood, were buried under a huge mass of wreckage. When this had been cleared away, both men were found to be dead. Several other men were so badly injured as to necessitate their removal to hospital.

Our Office Table.

THE disclosures of the irregularities in the profit-and-loss accounts of the Works Department of the London County Council have, as a matter of course, provoked a long and desultory correspondence in the *Times* columns. Mr. L. C. Riddett, A.R.I.B.A., points out that the London County Council has attempted two impossible things—viz., an accurate estimate of what every job ought to cost and an accurate statement of what it had cost. He says:—"I have spent the best years of my life chiefly in making estimates of probable cost of builders' work. Builders, too, devote much of their time to the same operation. If I got within 5 per cent. of the truth I always took credit for accuracy, and if six builders tendering did not differ more than twice 5 per cent. it was generally considered normal. How can the solitary expert employed by the Works Department hope to do better?" If the Works Department believes that it can make a profit on building operations, Mr. Riddett says it must go to work as builders do. Give it, he observes, a fixed capital, and let it trade with that capital and with its credit, turning the capital over as many times as possible in the year, and ascertaining, as it is quite easy to do, at the end of the year, the profit or loss on all its transactions taken together. As he remarks, the public has but little idea of the small percentage of profit which a cutting but respectable builder tendering in competition anticipates.

ANOTHER letter appeared in Thursday's issue from "A Firm of Building Contractors," who allege that the Works Department was called into existence because few of the leading contractors found it worth their while to take work under the unjust and onerous conditions imposed by the Council in their form of contract. "Building contracts are often," the writers add, "and in the case of public works, invariably, of a notoriously one-sided character, and the Master Builders' Association has, after years of endeavour, succeeded in obtaining from the Royal Institute of British Architects a building contract on something like fair and equitable terms. This form is now being adopted by most of the better-class architects and engineers, and until its adoption by the London County Council and other public bodies, few self-respecting contractors will have anything to do with their work. At present, contractors have to take the *obiter dictum* of the architect or engineer on all points of difference arising, and accept without appeal his idea of what is a fair value for the work they have done. No man can be a just judge in his own cause."

A MEETING of the trustees of the Soane Museum was held on Tuesday, when the last of the boxes left sealed in 1837 by Sir John Soane, the eccentric founder of the museum, was opened. By his directions these boxes or receptacles were to be opened at stated intervals, but the contents have not hitherto revealed anything of special interest, and the operations of Tuesday last do not seem likely to lead to discoveries of importance. The box, a large mahogany one, on being opened was found to contain a mass of papers mainly relating to specifications and architectural matters, some account-books, and a few odd volumes. They will be carefully examined by the curator, Mr. George H. Birch, A.R.I.B.A.

It is satisfactory to learn that the appeal issued by the National Trust for Places of Historic Interest or Natural Beauty, for a sum of £505, with which to acquire Barras Head, the bold Cornish promontory overlooking and affording the best view of the famous ruins of King Arthur's Castle at Tintagel, has now proved successful. All the money having been contributed, it only remains for the property to be legally conveyed to the Trust, the expense of which transfer it is hoped, will likewise be defrayed by popular subscription. The National Trust was induced to move in the matter in consequence of a project for building a large hotel from Mr. Silvanus Trevail's designs on the cliff; but, on passing into the possession of the Trust, the headland, which is about 14 acres in extent, will become inalienable from the public.

THE first of the Cantor Lectures of the session at the Society of Arts, Adelphi, was given on Monday night by Professor Vivian B. Lewes. The subject of the course is the use of gas for domestic lighting. The lecture was illustrated

by a number of diagrams and different kinds of burners and lamps. Professor Lewes, after referring to the principles of illumination, devoted a large part of his discourse to an explanation of the improvements which have been made or suggested in the measurement of light during the last fifty or sixty years, and showed how very different illuminating power was from illuminating effect, the latter depending upon a good many factors. The photometer now in use gave very fair results. Spem candles, however, as the standard of illumination, had very grave defects; but though they had been the butt of all committees which had been appointed upon the subject, they were still with us. As far as the comfortable illumination of a room went, the regenerative lamps, if properly used, were the best.—In his second lecture, to be delivered on Monday next, Prof. Vivian B. Lewes will deal with incandescent mantles and burners, and the effect of globes in diffusing and absorbing light. In the third lecture (Dec. 7) he will take up acetylene as one of his subjects.

AT the last meeting of the Taunton Town Council a report on the best sizes for house-drains was submitted by Mr. J. H. Smith, the borough surveyor. Mr. Smith remarked that there had lately been a desire by some architects in the borough to use 4in. pipes for main drains; experience demonstrated, he remarked, that with the careless way in which rubbish is thrown down the w.c.'s that that size of pipe was not sufficiently large. During the last quarter 6in. pipes had been taken up and relaid owing to their being choked. The streets and highways committee had therefore decided not to pass any plans where there were 4in. pipes shown for the main drains from the closets to the sewer. Mr. Smith referred to the series of experiments described in the *BUILDING NEWS* for Sept. 11 last (p. 369, current Vol.), in which Mr. Arthur B. Plummer, of Newcastle-on-Tyne, endeavoured to prove that a smaller pipe was preferable to the larger, as the effect of the flush of water was greater; this probably was so, but in practical working, he added, the 4in. pipe was found to be too small, and led to much trouble and expense.

SEVERAL years ago the North British Association of Gas Managers took steps to commemorate the life and work of William Murdoch, the eminent Scottish engineer, whose best known achievement was the application of gas for illuminating purposes. A considerable sum was raised by a committee, and four years ago a statue was erected at Stirling and unveiled by Lord Kelvin. Another suitable memorial was inaugurated on Monday, when an "Otto" gas engine was presented to the engineering laboratory of Glasgow University. The remainder of the funds will be devoted to the preparation and publication of a biography of Murdoch. The engine, which has been built by Messrs. Crossley Brothers, has been placed in the laboratory pending erection of the contemplated new laboratory, for which £25,000 has been raised, half of which has been gifted by the Bellahouston trustees. The engine is of four nominal and nine indicated horse-power, and will be used for driving the various tools in the workshop, and for supplying power to the dynamo which generates electric light for the laboratory and the Bute and Randolph Halls.

A FRENCH journal gives a few statistics showing the rapid development of electric tramways during the past year, the number of lines in working order having increased from 70 to 111, while the total length of lines has gone up from 437½ miles to 564. Germany heads the list with a total length of 235 miles and 857 vehicles, France being second with 82½ miles and 223 vehicles, while England is third with 67 miles and 168 vehicles, Switzerland coming fourth with 29½ miles and 86 vehicles. Bulgaria and Denmark are the only countries which have no line with electric traction. Of the 111 lines now being worked, 91 are driven by wires overhead, while nine have a central rail, eight are worked by accumulators, and three by an underground current. It is suggested in some quarters that it will be necessary to introduce the electrical tramways into the busy parts of London, where they may possibly pay better than they have done in the suburbs; but the overhead wires, which disfigure so many of the principal streets of some cities in America, will scarcely be tolerated, say, in Cheapside and Cornhill.

THE new bridge over the East River, the second that will unite New York and Brooklyn, will soon be started, as the preparations for building

the caissons have already been begun. These will be four in number, each 76ft. long by 60ft. wide, and will be constructed of yellow pine as well as iron and steel. The two which are to be placed in position on the New York side of the river will, it is calculated, require about 1,000,000ft. of timber and 200 tons of metal. They are to be massive structures, and will be filled with tons of Portland cement, on which will be erected large blocks of granite and limestone. On the top of this masonry, which will rise to a height of 20ft. above high water mark, will be placed the bases for the legs of the towers. These will be 336ft. above the water-level, and on the top of them will be the cradles for two of the four steel cables, whose function will be to support the bridge structure. It is expected that the present caissons will be ready to be sunk into position early in the new year, while the plans for the others on the Brooklyn side have been prepared, and tenders for their construction will be offered at a very early date, in order that the building may go on simultaneously from both sides of the river.

MEETINGS FOR THE ENSUING WEEK.

MONDAY.—Society of Arts. "The Use of Gas-Lighting," Cantor Lecture No. 2, by Professor Vivian B. Lewes. 8 p.m.
Royal Institute of British Architects. Business Meeting. 8 p.m.
Liverpool Architectural Society. "Architecture During Queen Victoria's Reign," by Professor F. M. Simpson. 6.30 p.m.
Leeds and Yorkshire Architectural Association. "The Use of Practical Geometry in Designing Buildings," by W. R. Corson. 7.30 p.m.

TUESDAY.—Institution of Civil Engineers. Discussion on "The Bacterial Purification of Water." 8 p.m.

WEDNESDAY.—Royal Archaeological Institute. "The Queen's Coronation Ring," by Dr. J. Wickham Legg; and "The Buried Cities of Yucatan," by Christopher Turner. 4 p.m.
Society of Arts. "The Teaching of Economics," by W. A. S. Hewins, M.A. 8 p.m.
Carpenters' Hall Lectures. "Sanitary Construction," by Professor Banister Fletcher, F.R.I.B.A., M.S.A. 8 p.m.
Northern Architectural Association. "Slates and Slating," by W. E. Beck, Art Gallery, Newcastle-on-Tyne. 7.30 p.m.

THURSDAY.—Arts and Crafts Exhibition, the New Gallery, Regent-street. "Colour in Architecture," by Halsey Ricardo. 8.30 p.m.

FRIDAY.—Architectural Association. "Street Architecture," by H. H. Statham. 8 p.m.

SATURDAY (TO-MORROW).—Architectural and Building Trades Classes, Regent-street Polytechnic. Visit to Claridge's Hotel, Brook-street, W. 2.30 p.m.

BUILDERS' CLERKS' BENEVOLENT

INSTITUTION.—Notice is hereby given that a SPECIAL GENERAL MEETING of the Donors and Subscribers will be held at the Offices, 21, New Bridge-street, E.C., on WEDNESDAY, Dec. 16, 1896, at 7.30 p.m., for the ELECTION of ONE PENSIONER. B. E. NIGHTINGALE, Esq., President, in the Chair. H. J. WHEATLEY, Sec.

CHIPS.

A fire, which did damage to the extent of over £2,000, occurred on Monday night at the Wesleyan Chapel in Patrick-street, Cork. The chapel was an old one, but had been improved and renovated. During the last week men had been engaged in fitting up an electric installation in it.

New public offices are being erected at Merthyr from plans prepared by Mr. E. A. Johnson, M.S.A., architect, Abergavenny. The building is being ventilated by means of Messrs. Cousland and Mackay's "Climax" patent direct acting turret ventilators, of special ornamental design.

Notification is given of an intended application to the Light Railway Commissioners for an order authorising the construction of a light railway from the Midland Station, Cheltenham, to the village of Winchcombe, Gloucester, the proposed terminus being near St. Peter's Church, opposite the site of St. Mary's Abbey.

After a long discussion, the St. Giles-in-the-Fields Board of Works resolved, on Tuesday, to widen that part of Portsmouth-street lying between Portugal-street and Sheffield-street, in the immediate neighbourhood of the Law Courts. The board also agreed to make a contribution of £400 and consent to the closing up of Black Jack-alley, if the Strand Board of Works, who are the owners of several adjoining houses in Portugal-street, should agree to the widening of Portsmouth-street to 35ft. through its entire length, its present width being 22ft.

The partnership hitherto subsisting between R. Horsfall, W. C. Williams, and R. E. Horsfall, under the style of Horsfall and Williams, Halifax, architects and surveyors, has been dissolved.

Trade News.

WAGES MOVEMENTS.

BLYTH, NORTHUMBERLAND.—The bricklayers connected with the building trade at Blyth have received notice from the Master Builders' Association for a reduction in the current rate of wages of 1d. per day. The men have decided to resist the demand, and a strike seems likely to take place.

DOUGLAS, ISLE OF MAN.—On Wednesday in last week, the joiners of Douglas massed in Bourne Hill to discuss the best steps to secure an increase of wages, the standard at present being 23s. for a week of 55 hours, and 6d. per hour overtime. After a lengthy discussion, it was decided that the masters should be asked to pay 32s. per week and the same hours, and overtime according to a sliding scale, which a committee was appointed to draw up, together with general rules. These were submitted to an adjourned meeting on Wednesday last, and were adopted.

ENGLISH JOINERS AND THE STRIKE IN BELGIUM.—At a meeting of members of the Manchester Amalgamated Society of Joiners held on Friday evening at Walkden, it was decided to pay a levy of 6d. per member towards the sum of £1,000, which it is proposed to forward to the Belgian joiners, who are on strike for an advance of 1 1/2d. per hour. All the members of the English Amalgamated Society of Joiners, which numbers 45,000, will contribute towards the grant.

LEIGH, LANCOS.—Yesterday the Leigh, Atherton, and Tyldesley United Operative Bricklayers' Association gave notice to the master builders of the district of their intention to demand that on and after May 1, 1897, the wages of bricklayers shall be advanced from 9d. to 9 1/2d. per hour.

NEWCASTLE-ON-TYNE.—Mr. Burnett, the chief labour correspondent of the Board of Trade, has lately been in Newcastle with the object of bringing about a settlement of the dispute between the bricklayers and plasterers, the outcome being that the Board of Trade have, on their own initiative, submitted the following draft proposal to the disputants as a basis of settlement:—"That the dispute at present existing between the members of the Operative Society of Bricklayers and of the National Association of Operative Plasterers be referred for settlement to a board of arbitration, consisting of an equal number of representatives of each society, presided over by an independent umpire, appointed by mutual consent of such representatives, or, failing such consent, nominated by the Board of Trade. Failing agreement by the representatives of the disputants as to the matters in dispute, the umpire to have power to make an award prescribing the respective rights of the members of each society in relation to the execution of cement work, such award to be binding on the parties to the arbitration." The Board have now received replies from the parties interested in the proposal, the plasterers assenting to arbitration, and the bricklayers rejecting it.

NORTH STAFFORDSHIRE.—A meeting of the North Staffordshire Builders Association has been held at the Saracen's Head Hotel, Hanley, to consider the dispute between the builders and the Brickmakers' Association in reference to the price and cartage of bricks. Mr. J. Gallimore presided over a crowded meeting, about fifty being present. After discussion it was resolved: "That the members of this association, as far as practicable, obtain what bricks they require only from those brickyards where a legitimate charge is made for carting and a net price is charged for common and other bricks upon the bank."

WINSFORD.—The joiners lock-out was concluded on Monday, after a nine weeks' struggle. A large number of joiners came out because the employers decided to reduce the wages by 1d. per hour, but all the men were reinstated on Monday at the old rate of pay, which is 7 1/2d. an hour per week of 55 1/2 hours in the summer and 47 hours in the winter.

The death is recorded of Richard Beavis, landscape painter, a popular and well-known member of the Royal Society of Painters in Water-Colours. He was born at Exeter in 1824, and became a student in the Government School of Design, Somerset House. From 1851 to 1893 he contributed 331 works to the old Water-Colour Society, the Royal Academy the defunct Grosvenor Gallery, and all the principal Metropolitan exhibitions.

The Blackpool Town Council decided, on Monday, to spend £300,000 upon the widening of the promenade. The plans submitted show an addition of over 40ft. to the present promenade. The necessity for improvement was unanimously admitted, and the discussion was as to the ways and means of carrying it out. At the same time, the pier at Blackpool, which was built thirty years ago, is being widened from 28ft. to 46ft.

LATEST PRICES.

IRON, &c.

	Per ton.	Per ton.
Rolled-Iron Joists, Belgian	£5 5 0 to	—
Rolled-Steel Joists, English	6 0 0 "	—
Wrought-Iron Girder Plates	6 15 0 "	—
Bar Iron, good Stuffs	7 0 0 "	£7 5 0
Do., Lowmoor, Flat, Round, or Square	17 0 0 "	17 10 0
Do., Welsh	5 15 0 "	5 17 6

Boiler Plates, Iron—

South Staffs.	7 10 0 "	7 16 0
Best Snedshill	9 0 0 "	—

Angles 10s., Tees 20s. per ton extra.

Builders' Hoop Iron, for bonding, &c., £6 10s. 0d. per ton.
Builders' Hoop Iron, galvanised, £13 10s. 0d. per ton.
Galvanised Corrugated Sheet Iron—

	No. 18 to 20.	No. 22 to 24.
6ft. to 8ft. long, inclusive gauge	£10 15 0	£11 0 0
Best ditto	11 5 0	11 10 0
Cast-Iron Columns	£5 10 0	£8 10 0
Cast-Iron Stanchions	5 10 0 "	8 10 0
Cast-Iron Sash Weights	—	4 2 6
Cast-Iron Socket Pipes—		
3in. diameter	4 10 0 "	4 15 0
4in. to 6in.	4 5 0 "	4 10 6
7in. to 24in. (all sizes)	4 0 0 "	4 2 6
[Coated with composition, 2s. 6d. per ton extra; turned and bored joints, 5s. per ton extra.]		

Pig Iron—

Cold Blast, Lilleshall	105s. to 110s.
Hot Blast, ditto	57s. 6d. to 62s. 6d.

Wrought-Iron Tubes—Discount off Standard Lists f.o.b.		
Gas-Tubes	75p.c. Fittings	77 1/2 p.c.
Water-Tubes	70	72 1/2
Steam-Tubes	62 1/2	65
Galvanised Gas-Tubes	60	62 1/2
Galvanised Water-Tubes	55	57 1/2
Galvanised Steam-Tubes	45	47 1/2

	10cwt. casks.	5cwt. casks.
Sheet Zinc, for roofing and working up	£20 0 0 to	—
Sheet Lead, 3lb. per sq. ft. super.	12 2 6 "	12 5 0
Pig Lead, in 1cwt. pigs	11 0 0 "	—
Lead Shot, in 28lb. bags	15 0 0 "	—
Copper Sheets, sheathing and rods	55 0 0 "	—
Copper, British Cake and Ingot	49 0 0 "	50 12 9
Tin, Straits	59 17 6 "	60 0 0
Do., English Ingots	63 10 0 "	65 0 0
Spelter, Silesian	16 12 6 "	16 15 0

Cut Clasp Nails, 3in. to 6in.	8 5 0 "	—
Cut Floor Brads	8 0 0 "	—

Wire Nails (Points de Paris)—

0 to 7 8 9 10 11 12 13 14 15	B.W.G.
8 6 9 0 9 6 10 3 11 0 12 0 13 0 14 3 16 3	per cwt.

TIMBER.

Teak	per load £11 0 0 to	£16 0 0
Quebec pine, red	2 5 0 "	4 5 0
" yellow	—	—
" pitch	5 0 0 "	6 10 0
" Oak	3 5 0 "	5 0 0
" Birch	3 10 0 "	4 15 0
" Elm	2 15 0 "	4 0 0
" Ash	2 10 0 "	3 10 0
Danitic and Memel Oak	1 15 0 "	3 15 0
Fir	2 0 0 "	4 5 0
Wainscot, Riga p. log	4 10 0 "	5 10 0
Lath, Danitic, p.f.	5 0 0 "	6 10 0
St. Petersburg	8 5 0 "	8 15 0

Deals, per St. Petersburg Standard, 120—12ft. by 1 1/2 in. by 1 1/2 in. —

Quebec, Pine, 1st	£21 10 0	to £24 0 0
" 2nd	15 0 0	17 0 0
" 3rd	7 0 0	10 10 0
Canada Spruce, 1st	8 10 0	10 0 0
" 2nd and 3rd	7 5 0	8 10 0
New Brunswick	7 0 0	8 10 0
Riga	6 10 6	7 10 0
St. Petersburg	8 0 0	13 0 0
Swedish	8 0 0	16 0 0
Finland	8 0 0	9 0 0
White Sea	9 10 0	16 0 0
Battens, all sorts	5 0 0	20 0 0

Flooring Boards, per square of 1in. —

1st prepared	0 9 0 "	0 15 0
2nd ditto	0 8 0 "	0 12 6
Other qualities	0 4 6 "	0 7 6

Staves, per standard M:—

Quebec pipe	—	—
U.S. ditto	35 0 0	42 10 0
Memel, cr. pipe	225 0 0	240 0 0
Memel, brack	200 0 0	210 0 0

OILS.

Linseed	per ton £16 15 0	to £17 10 0
Rapeseed, English pale	25 10 0	28 0 0
Do., brown	24 0 0	24 10 0
Cottonseed ref.	15 10 0	16 10 0
Olive, Spanish	29 0 0	29 10 0
Seal, pale	23 0 0	24 0 0
Cocunut, Cochiti	27 0 0	—
Do., Ceylon	24 0 0	—
Palm, Lagos	23 10 0	—
Oleine	19 0 0	20 0 0
Lubricating U.S.	per gal. 0 6 0	0 7 3
Do., black	0 4 9	0 6 6
Tar, Stockholm	per barrel 0 19 6	—
Archangel	0 12 6	—
Turpentine, American	per ton 18 15 0	19 10 0

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THE USEFUL AND THE ORNAMENTAL.

VERY few people are able to take in more than one aspect or view of things. When they look upon a picture or a piece of sculpture, it is not its drawing, composition, anatomy, or colour that impresses them so much as the subject, or the interest the artist awakens in his work. Critical faculty is absent altogether: they do not look at motives or subtle thoughts so much as the direct appeal made by the incident recorded. And it seems very much the same with architecture. One impression only, and that of the most superficial kind, is made. Mr. Jones is attracted by the latest new shop-front in Regent-street or Oxford-street, by the extent of its plate-glass windows, by the marble columns or gilded metal-work in its front; but he does not take the slightest trouble to see whether the premises above rest on the glass, or whether the marble columns really support anything, or are only ornamental; if he goes to the latest of the Metropolitan theatres, it is the upholstery of the stalls and boxes, the display of incandescent lamps, or the decoration which he admires—not any new arrangement of plan or entrances. To him plan and constructive features have no interest or meaning whatever. It is this cursory view of the architect's work that generally prevails outside the ranks of the profession. And there are a class of men in the profession who are willing to encourage this view. To them it is "pounds, shillings, and pence" architecture, the turning-out of shops, hotels, and theatres on the percentage system, upholstered and decorated to suit the public taste. Structural meaning and architectural arrangements are nothing to them, because the visitors to such places are quite ignorant of the A B C of architecture, and are too much interested in what they buy, see, or hear in these places to think of anything else. Things like columns, doors, and windows are such commonplace affairs, that unless they actually interrupt our sight or give us stiff necks and neuralgic pains, they are not regarded at all. Perhaps in such trying circumstances a person may actually confess to some interest and give a thought to such a commonplace thing as a column, and swear at the architect who could have put such an obstacle in front of him, or wonder why doors and windows cannot be made less draughty. He may then, perchance, be compelled to admit there is more science in disposing these things than he had originally thought, that there is something more than pleasing decoration.

There is a practical side to this view which has an interest to the profession. To take two or three of those factors which make up our architecture, we shall see how their original intention has been lost, and what was once regarded in the twofold aspect of construction and decoration is now only looked upon in one of those senses only. The column is no longer considered, as it once was, an architectural feature, as the Egyptians, the Persians, and Greeks understood it—a support as well as an ornament. The modern Philistine only sees it in one of these aspects. If he decorates his column it is generally to hide its intention as a support, and to regard it only as an ornament; at other times he puts it out of sight altogether behind a sash-bar or door-jamb, or places a bale of goods before it. At any rate, it is often thrust out of sight

whenever it can be, and when it cannot it is tried to be made decorative, so impossible is it for the modern builder to see it under both aspects at the same time, or as a feature at once useful and decorative. What would the builders of the Hall of Karnak, the Hall of Xerxes, the Parthenon, or the Temple of the Olympian Zeus at Athens have thought of such an ignoring of an honoured feature? The fact seems to be that the modern builder—and the architect, too, for the matter of that—is unable to understand that both functions—the useful and the decorative—are inseparable, or unable to discard from his mind that what serves a use is something to be ashamed of, and must either be hidden out of sight, or made to appear something else. We have taken the column because it appears more than any other thing in our buildings to illustrate this tendency of seeing things only in one sense: while it is despised as a support, it is honoured as a decorative adjunct. The tendency had its beginning when the artists of the Renaissance began to use the column as an ornament, and applied it in a number of doubtful as well as decorative ways as pilasters, balusters, and colonnettes on the façade of their buildings, as mullions, and in balustrades. The 19th century builder has gone "one more." He couples together four angle-irons by plates and rivets and calls this the support, and then cases it round with slabs of marble or terracotta as a piece of decoration. The outer covering need not at all correspond with the iron column; it is totally unlike it. Strictly economic in its results is this combination, the iron to bear the weight, the marble or terracotta casing to represent a solid column of a more pleasing material. The two functions of support and ornament are in this way separately considered, though combined—a confession that they are not one and the same. It would be honest to find a section in iron that might be made ornamental than to cover an inferior and ugly stanchion over by a piece of decorated slab-work of another material. Unity, at least, is sacrificed by the combination. The popular modern idea of the column is therefore that of engineer and decorator combined; each seems to exclude that of the other. Not so the original conception of Persian and Greek artists. With them the column fulfilled an honourable function in architecture, and was treated accordingly. They were not ashamed, as we are, of making it massive, of affording it its due proportions to carry the required weight, and of giving it a profile or decorated form as part of the architecture. The modern mode is to make the real column thin and spindling, and then to bring out its bulk by clothing it ornamentally. How different to the motive of the Egyptian builder, who gloried in the bulk of their lotus and palm columns! The modern column designer might do worse than take those types of treatment—the plain bell or lotus capital as seen at Karnak, the inverted bell or campaniform capital, and the clustered lotus arrangement; and he might even try to emulate the rich colour-decoration, the palm-leaf decoration, the flutings and surface ornament of these types of ancient art. Or take the noted Persepolitan example, with its unique bull-capital of bracket-shape, and its voluted scrolls interposed between the bracket-head and the shaft. These are proofs of the manner the ancient architect dealt with the support: it is solid, and shaped to its purpose. Like the Egyptians, the Persians made the column an ornament and an internal feature. In the great hypostyle hall it was used with telling effect—a very different way to the modern plan of squeezing it into corners and out-of-sight places. As a part of the architecture, the column was made a prominent and dignified feature in the halls and porches. And so the Greek used it in his prostyle and peripteral arrangements as a

feature to be proud of; indeed, the great temples of Zeus and of the Parthenon were triumphs of columnar architecture. How different when we look at the modern building; how it has fallen from its original estate! Subordinate and decorative, it has entirely lost its original significance.

The same defection has marked other features. Take the roof or the vault, both of which have fallen on evil days. It is true we have our roofs of iron and timber, of which we may be proud—our iron roofs covering our great nineteenth-century halls and railway-stations; but do they convey to us anything beyond engineering feats? The old roof, whether of timber or stone, flat or vaulted, was at once structural and decorative. The great domical vaults of the Roman Pantheon, of the Byzantine Sancta Sophia, of St. Mark, Venice, and the vaults and roofs of the Middle Ages show that the twofold function was ever maintained. The modern can only see one—utility or ornament. If he designs a large and scientifically arranged iron truss over a railway terminus, or a big exhibition hall, he does not pretend it to be artistic or decorative; if it is of timber over a church or a hall, it is ornamental mainly. It is a work for an architect. But the way the modern architect or engineer sets to work is significant of this distinction. If the roof is for a church or chapel, or a hall to a municipal building, he takes some model to guide him—a St. Stephen's, Norwich, Westminster Hall, or Hampton Court. It is the ornamental quality which is mainly thought of; but if the span is great, and more than ordinary skill is required in trussing, he employs an expert in roofs, an engineer, to make the necessary calculations and detail drawings, and the construction is governed by another motive altogether. Would the old architect have proceeded in either of these ways? No; he would have designed his framed timbers to meet the actual requirements upon lines which would be agreeable; nor could he imagine a roof designed for its purpose and well constructed that was not also ornamental. The two things could not be separated in his mind. What was true was beautiful. Many of our large roofs are nothing better than clever pieces of carpentry, and are ceiled below as if they were not intended to be looked at; others of an ambitious and decorative kind ought to be covered, as they were never intended to exclude rain or draught. Yes, the roof is in these latter days either constructed as something to exclude the weather and to be hidden, or as a piece of decoration to be seen. We can understand a timber roof constructed over a stone vault, like those of our cathedral churches. The vault forms an inner ceiling or roof, protected by an outer roof of timber; but a roof which fulfils both purposes ought to be at once constructive and ornamental. The open-timber roof has been revived; our architects have done something of late to lift it out of mere archaeology, to give us something more honest than a copy of one of Brandon's "Open Timber Roofs of the Middle Ages." At the same time we cannot always look upon it as a genuine development of the art. Two phases of roof construction, or two types based on the same principle which admit of a decorative treatment, may be referred to here—we mean the Indian bracket system of roofing and the cantilever system. The latter has been lately advocated by an American writer as a possible basis for a new style, in which the cantilever principle, a balanced half-truss simply resting on the walls without exercising any thrust, can be made to cover large spans. For bridges, this principle has been largely applied of late years, and notably in America and in the Forth Bridge; that it has an architectural future we cannot doubt. By a succession of brackets or by one large bracket cantilevered

down on each side, large areas can be covered with the least expenditure of material, and, as the weights are vertical, architectural repose is insured.

It would be easy to extend our remarks to other features of building. We have taken the column and the roof as two important elements of building construction because they illustrate the argument that there is a tendency nowadays to look at a thing either as a piece of construction or a piece of decoration simply, and thus to lose sight altogether of its true architectural meaning. In most of our wooden structures, as has been pointed out by a correspondent, there is poverty in quantity and quality. Thus, in our roofs and other woodwork, a kind of spurious Gothic carving is seen without any of that restraint which distinguishes the work of the old Mediæval or Renaissance carver. One cause is the want of a Gothic carving-school, as has been suggested, where structure and carving are taught together; but the main reason is the separate and one-sided manner in which architects and the public look upon features of this kind. Between the builder on one side and the ornamentalist on the other, the responsibility of the architect is often compromised, and it seems impossible to obtain that due recognition of his design in its completeness which he claims for it.

ROYAL SOCIETY OF PAINTERS IN WATER-COLOURS.

THE Winter Exhibition of this Society, now on view in Pall Mall East, contains many works, studies, and sketches in water-colour which show that the prestige of this old institution is still maintained, despite the loss it has sustained by the death of some of its members. During the past year the Society has lost Lord Leighton, Alfred W. Hunt, George Fripp, E. K. Johnson, and George du Maurier—men of considerable influence in art, though the two former were not water-colour painters in the true sense of the term. George Arthur Fripp was an old and appreciated contributor, often sending many pictures of high finish, if not of that robust quality which just now obtains a lead. Even at the last exhibition he sent no fewer than seven pictures, all of them showing the same conscientious care and finished rendering—examples rather of technical craftsmanship and drawing than colour. Of the work of E. K. Johnson we can only say not a few admired his old-fashioned gardens; and that of Alfred W. Hunt, many will miss his fidelity and refined taste on the walls as one of the best landscape painters of his day.

A touching incident is C. Gregory's "Stranger's" (1). The scene is outside a pretty country cottage; a blind musician is being led down the garden steps by his little daughter, who carries a violin; the old man has a loaf of bread in his wallet, and the pair are sympathetically watched by the generous donors outside the cottage. The painter has tenderly treated the subject in his own delicate style. A gem of colour is Miss C. Montalba's "Procession Entering La Salute, Venice," a little study of scarlet-caped priests and banners in pearly and amber hues. Close by, Miss Rose Barton sends, in "Trespassers," a delightful study of two little girls in a meadow, with its blossoming apple trees and flowering grass. The quality of this lady's work goes on improving, if we take this and her other charming meadow subject on the screen (329). R. Thorne Waite has several pictures. His "Four Miles from Charing Cross" (14) is a landscape of vigour and admirable colour—a Surrey view with its distant valley, through which a gleaming river meanders, and its undulating foreground enlivened by groups of picnic folks. His "Fresh Morning, Banffshire" (89), "Banff Harbour" (100), and

"Haymaking in Berkshire" (172) are all subjects in which the painter has pictorially mastered the elements of colour, light, and shadow; his latter work is strong and breezy. "Nobody Asked You, Sir, She Said," by L. Alma-Tadema, R.A. (18), is a title that appears inappropriate in a classically-conceived subject. The drawing of the young lady in rose-coloured drapery rising from the couch is faultless, but the composition and treatment are not up to this master's mark. Lionel Smythe's subject, "A Saint's Day" (36), is handled with skill; there is brightness and movement in the fresh-coloured Brittany peasants, with their frilled caps and gay attire, tripping along with their children, but the background landscape and the meagre-looking chapel are feeble. Robert W. Allan's studies near Banff and its bridge are strong in colour and vigorous in the execution; the sunlit landscape, with its road by the sea (23), and the blue sea and cliffs in the latter are pleasing; his "Whitehills, N.B." (59), and the atmosphere and grey sea in "A Pastoral" (80) are charming studies of colour, and of a quality which places them above much else in this class of painting. Of course, it would be ungracious not to mention Mrs. Allingham's cottage and flower studies. These are always painstaking in their minute finish and delicately subtle in the handling of flowers and creepers, as in the "Old House, Gloucestershire." "At the Cottage Door" is a delightful study of honeysuckle and sunflowers, and on the screen are other specimens of her skill. Wilmot Pilsbury sends also several very beautiful and delicate renderings of underwood and ferns. His "Tangled Copse" (29) and "May Blossom" (165) are delightful in the deftly-painted bloom and blossom. The latter shows a may-tree overhanging a brook at the outskirts of a woodland, the blossom of which is most realistically executed. Whether in the charm of autumnal tints, or in highly finished studies of nature, Mr. Pilsbury has few rivals in this phase of painting. Another landscapist whose work seems to improve in quality is Ernest A. Waterlow, whose "Cottage Homes, Hampshire," a very pleasing sunset effect through trees (49), his "Shades of Evening" (83) may be mentioned. Always charming in his delineations of natural scenery, Albert Goodwin sends a few poetically-conceived works. His "Twilight in the Red Sea" is a "symphony in blue," a poetical study of dark sea and peaks and reflected light on the waves. As a study of momentary effects—an impression of darkness and the glare of lamps—his "Portsmouth, War's Alarms" (58) must be noted. His "Engelburg" and "Salisbury Plain" show boldness in grasping the ever-shifting movements of clouds, portentous in suggestion. Very broadly handled, spirited, and sketchy, is J. R. Weguelin's figure-subject, "Dance," a half-draped figure of the legendary daughter of the King of Argos, beloved by Jupiter; but there is little that is mythical or to suggest so important a personage in the very ordinary figure reclining. C. Gregory has two pleasing sketches of "Chartres" (68 and 192), and Saml. J. Hodson a street study (79) with old framed houses. C. Napier Hemy sends two or three freshly-coloured sea-pieces (85 and 90), one representing an abandoned boat, the other "Scillonian Lobstermen" in a boat. The movement and colour of the sea-waves are equally strong. "Land Ho!" is a clever study of sea-ripple and reflected grey light. One of the principal figure-subjects hangs at the end of gallery, and is "Hwfa Môn, the present Arch-Druid of Wales," by Professor Hubert Herkomer, R.A.—a white-robed old man, crowned with a chaplet of oak leaves. Over the white alb hangs a sort of golden collar. The upturned eyes and fine countenance of the Celtic bard are full of expression. Near E. R.

Hughes has a clever little work, "A Pastoral" (94). Subtle and delicate in treatment and colour is W. Eyre Walker's "Misty Morning in October," a true poetic rendering of woodland in its most charming garb. Sunlight gleams through the foliage and the old ivy-covered tree, with its tortuous branches, is most tenderly painted. Mildred A. Butler's "A Kiss" is a delightful study of cows in a sunlit meadow (99), and we cannot pass by David Murray's "On the Dec" (133), a small study of colour contrast—a copper-coloured beech in the midst of a green landscape, a little harsh in its treatment. Other works of interest on this wall are Saml. J. Hodson's "Market place, Halberstadt am Harz" (176); Tom Lloyd's clever *genre* subject "Good Gracious"; Thos. Rooke's "West Doorway of St. Ours, Loches" (183); Miss C. Montalba's "Fishing Boats, Venice," full of pearly tone; Walter Crane's drawing of apse of "Beauvais Cathedral" (189); works by William Callow, and the wild and tempestuous sea of G. H. Andrews, "The Hills and Dales of the Cold North Sea" (210). There is also breadth and fine colour in Tom Lloyd's hill-side, "The Skylark" (146).

Sir E. Burne-Jones's studies and sketches on the end wall will be appreciated even by those who have not fully realised this painter's poetic standpoint. "The Study of a Siren," in pencil, is a fine study of expression: an evil look in the eyes of the otherwise angelic-looking face. The "Designs for Metal Work," in tints of copper and gold on a dark ground, are true in treatment, and show how well the stiff-draped models of the Pre-Raphaelite school adapt themselves to metal. Decorative also are other studies, such as the "Design for a Tapestry" (241). Near these we see some very beautiful pen-and-ink designs by Walter Crane for "Spenser's Faerie Queen," full-page illustrations lately seen at the Arts and Crafts Exhibition. Some of these headings are pleasing, and the borders still more so. We must not omit Henry Wallis's "Study of the Ornamentation of an Athenian Lekythos" (265) and his "Study of a Greek Vase" (271). In the first Mr. Wallis reproduces the motive of a Greek oil-vessel in colour on a white ground, and in the latter the design for a Greek vase, both classical and refined in drawing and colour. Refinement and grace distinguish G. Laurence Bulleid's Greek figure study, "Pets." The red-draped maiden stands against a wall of transparent white marble. As a piece of decorative treatment it is extremely delicate. E. R. Hughes's "Study" (246) is a reclining head in red chalk, intended, no doubt, for a picture or sculpture.

On the screens we notice several sketches and studies. Sir E. J. Poynter, P.R.A., has a small subject, "A Wild Garden in Surrey" (299), in which the foliage is exquisitely painted, though rather airless. Robert W. Allan's "At Syracuse" is bright and sharp; and we notice a few clever sketches by Albert Goodwin, Mrs. Allingham (309), William Callow, Thos. M. Rooke (301), John Parker, H. S. Hopgood, Sir Francis Powell, Miss Rose Barton, and Arthur Hopkins.

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

AT the meeting of the Royal Institute of British Architects, held on Monday evening, Mr. Aston Webb, vice-president, in the chair, a paper was read by Mr. Arthur S. Flower, M.A., F.S.A., on "The Sketches and Designs by the late Secretary, William Henry White," together with some account of his executed works as an architect. A large selection from the books and pencil and water-colour sketches and drawings bequeathed by Mr. White to the Institute was exhibited in the room, together with others lent by their owners. Mr. Flower said he had arranged the drawings as far as possible in chronological order, and found that the earliest was a rough but promising water-colour sketch of a

farm and some elm trees near Lewisham, executed in 1857, when Mr. White was 19 years of age. In 1858, when White was serving his articles with George Morgan, a London architect, he made half-a-dozen holiday sketches at Lewisham, Ravensbourne, and Frinton, Essex, and the next work represented was a sketch of some Norman work at Canterbury, dated 1860. A year later White undertook a Continental tour, and the work of this period was considerably influenced by Prout. Sketches from Antwerp Cathedral, Ghent, the Hôtel de Ville at Louvain, Cologne Cathedral, Strasburg, and others of later date from Rome, Rheims Cathedral, and Mont St. Michel were shown. A few brown ink drawings were made in 1868 at Carcassonne, and in 1869 he sketched the tower of Philippe le Bel at Villeneuve-les-Avignons. White's works as an architect in France chiefly consisted in the rebuilding, on a grander scale, of the Château de Boisy at Vernon, and of large additions to the ancient Château de Martinvast, near Cherbourg. In 1870 he entered into several competitions both in France and in England, and in the former country gained several second and third medals. Of his architectural work in India Mr. Flower showed sketched plans of the Court of Small Causes in Calcutta, the Bengal Presidency College, and the monument to Chief Justice Norman in Calcutta Cathedral. After his return to England, White never had a chance of erecting a building from his own designs, although among the works bequeathed were some competitive designs for a large boys' school. The last drawing shown was a humorous one, illustrating the vagaries of the Queen Anne style, executed to illustrate a paper read before the Architectural Association on January 23rd, 1874, entitled "The Present State of Things Concerning Architecture." The design bore the motto, "De Gustibus Non Disputandum." The paper, if perused now, would show White to have been a true prophet.

A vote of thanks to Mr. Flower was carried on the motion of Mr. H. H. STATHAM, seconded by Mr. J. M. BRYDON, and supported by Mr. HUGH STANNUS, and was acknowledged by the lecturer.

THE SOCIETY OF ARCHITECTS.

THE opening meeting of the Society of Architects for the present session was held on Thursday evening in last week, the President, Mr. Robert Walker, J.P., of Cork, in the chair. Twelve nominations for membership having been read, the following fifteen gentlemen were elected by ballot as members:—H. D. Arnett, Gorleston, Great Yarmouth; W. B. Bassett-Smith, 228, Calle Piedad, Buenos Ayres; C. B. Benson, Yeovil, Somerset; E. Bowman, 62, Grainger-street, Newcastle-on-Tyne; W. Boyer, 10A, Cowgate, Peterborough; J. Cawley, Central Chambers, Northwich; A. W. de R. Galbraith, 73, Above Bar, Southampton; A. G. Hall, 36, Leigh-road, Highbury, N.; R. R. W. Hyde, Eveswell-road, Worthing; R. S. Hyde, Eveswell-road, Worthing; W. H. May, Melford House, Plymouth; J. W. Shenton, Penrith, Whetstone, N.; J. M. Smith, Rokeby House, Stratford, E.; C. F. Stevens, Green-street, Elphinstone Circle, Bombay; and R. Unwin, Woodley, Cross-street, Chesterfield.

On the motion of the PRESIDENT, seconded by Mr. HENRY LOVEGROVE, Vice-President, the annual report of the council (which was published in our issue of the 20th ult., p. 727) was taken as read and adopted.

Mr. ELLIS MARSLAND, hon. secretary, read the report of the accountants, Messrs. Bolton, Pitt, and Breden, 140, Leadenhall-street, E.C., on the Balance Sheet and Revenue Account for the past year. They stated that they had pleasure in reporting that the Revenue Account showed a surplus of £38 5s. 1d. for the year. This they had transferred to the credit of Surplus Account, thereby raising the same to £235 5s. 3d. The books were now, they added, well kept and in good order. The total receipts shown by the balance sheet were £855 6s. 2d. This report was unanimously adopted.

THE PRESIDENT'S ADDRESS: THE ARCHITECTS' REGISTRATION BILL.

The PRESIDENT then delivered his inaugural address. After thanking the members for having elected him for a fourth year to the chair, he referred to the annual report of the council, remarking upon its satisfactory character, and added: While the general work of the Society

continues in the form of lectures and discussions, I hold that to be true to the object of our establishment, and consistent with our past record, we should steadily persevere in the policy of supporting the untiring efforts of the Education and Registration Bill Committee, whose enthusiasm is wakeful, watchful, and patient, because it is based on conviction. It is a sound, unselfish policy. The Bill now "hung up," and awaiting the opening of Parliament, is a measure having for its object the removal of evils which affect the best interests of both the public and the profession. I therefore bespeak for it your continued, persistent, and earnest efforts to place it on the statute-book, as a fitting recognition of the 60th anniversary of our good and gracious Queen's reign, in the hope that that year may be signalled by placing architectural art and practice on a high level of educational distinction, insuring that all aspirants for the profession shall enter upon their pupillage with a thorough equipment calculated to develop genius on the lines of truth, to foster art and promote science—an alliance which will result in the growth of strength, fitness, and beauty as a leading and general characteristic of the designs of the future. The evils arising from incompetency, which are acknowledged by all to exist, will be, meanwhile, gradually eliminated by the gentle hand of Time, without harshness, or what Parliament would designate injustice. If the profession from within does not initiate the necessary reforms, the public from without will be driven to promulgate a measure to remedy the evils, which will be more drastic and less sympathetic in its provisions, and more far-reaching in its scope—and the public will be right. Part of the difficulty of making progress in any good work is the liability to misapprehend and to be misapprehended; you have to face all uncharitableness and the very stupidity of suspicion. It has been asked, "Who are the promoters of this disturbing measure? I don't know them." They are introduced as unknown, and yet they are well known through their devotion and self-sacrificing labours in the interests of their fellows. It is a matter of no moment who they are. If the Bill is good and worthy of support, it is so, irrespective of personalities, either great or small. The Education and Registration Bill has been before architects in practice for some nine or ten years, just a third of the time during which the Medical Act was struggling for existence, and for the same reason which bars the progress of this measure. The Bill has struck a true note, which has rung across the broad waters and has been heard in recurring echoes, now distinct, and again soft and indefinite, and from the distant shores of our antipodes clear and encouraging, like Paddy Blake's echo at Killarney with an addition, showing that the children in the new country are more ready to tread in the path of progress than the fathers in the old, who hug their disabilities and cleave to the evils which disfigure their escutcheon. I have read "Thirteen Men in a Book," which I understand was published for the purpose of removing the Bill from the arena of debate and consigning it to oblivion; if this be so, it has come out of the trial with the withers of the promoters unwrung. As regards the agglomerate book, it is colourless, and points to no joint conclusion, for the reason that the presence of all colours produces white. Sir Walter Scott says: "There is no better antidote against entertaining too high an opinion of others than having an excellent one of ourselves at the very same time." Notwithstanding that the promoters of the Bill are not too highly thought of by "the right men," it is, however, a sturdy sessional, and is most likely to come on again when Parliament assembles. The opponents of the measure believe that many things in the profession are very bad and going to be worse. The supporters believe that many things in the profession are very bad, and going to be better through the passage of the Bill. Query: Are both parties happy in their respective beliefs? I can understand the supporters feeling happy in their belief. The supporters of the Bill may not in the past have felt strong enough, or may or may not have considered it wise, in the hope that all, or nearly all, the professional bodies would hail the Bill as a solution of an acknowledged difficulty. Possibly those members of some professional bodies who favour the proposal have hitherto refrained from giving the measure effective support owing to the bodies in which they are enrolled not having, as corporations, expressed their approval of the Bill. This proceeds from a proper and natural feeling of *esprit de corps*; but this feeling has its

natural limit of duration, which is reached when reason and judgment point out that the scheme is undeniably for the advantage of the public and the profession, and that the lapse of time has increasingly and abundantly proved the necessity for raising the standard of art culture and scientific attainments. There are difficulties, also, to the passage of measures through the House of Commons that arise from the demands made upon the Legislature being in excess of the working power of Parliament within the time at its disposal, from which even Government measures suffer; but measures introduced by private members suffer most. Does it not appear that as regards the opposition to this Bill an eclipse of common sense has taken place; that men in the profession suffer from an obliquity of vision or a lazy agnostic indifference; an apathy which dries up human sympathy, which will not concern itself about the vital interests of our fellows, or of the art and science which they, in common with others, profess to admire; an open mind which will not take the trouble to investigate, but in effect says, "If you can use arguments which are cogent enough to awaken my torpid intellectual faculties, and influence my reluctant will, I shall agree with you, but don't ask me to exert myself in the support of your proposal by any active participation in your work: it can do me no good, don't you know; at best it will endanger my repose; I already belong to a respectable club, under whose wing I enjoy repose which I do not wish to run the risk of disturbing?" And so such men hold themselves aloof from the forward movement which has for its object the raising of the standard of architectural art and practice by the passing of this beneficent educational measure. This apathy and indifference, having a basis of lethargic selfishness, are sapping the vital force and earnest zeal of every good movement having for its object the betterment of men and things. One of the difficulties which retards the success of any such movement as this Bill is the suspicion which haunts some minds that the supporters of it are influenced by personal motives of aggrandisement to stimulate their efforts, and are not set in motion by a desire to advance the general interests of their fellows or that of art or science, and as a last resort the methods used are censured. The opponents of the measure acknowledge that the evils exist which it is proposed to mitigate and ultimately remove, but in a spirit of pessimism say there is no use in trying to provide remedies. They hug the disease and deprecate the efforts which unselfish devotion puts forth for the accomplishment of its cure. False and irrelevant issues are raised from time to time; but a "stream of tendency" to approach the subject is observable. Pigeon-holed, but inadequate, proposals are now and again brought to light for a brief space and put back to oblivion with amendments marking time if not marking progress. The most that has been done seems to be an inflation of the idea of voluntary examinations; this is a delusive idea which will never touch the evil, much less remove from our ranks incompetency. The only means to accomplish this pressing necessity are compulsory education and training, followed by examination to test the results, and those found up to the standard recorded in a register—that is to say, shortly, by an Education and Registration Act; not by a drastic uprooting, but by the slow process of elimination by the hand of time, which method would be just to the men who had acquired, although undeservedly, a practice from a too-confiding public; and it is the only measure to which Parliament will extend its sanction. If in 1886, when this subject was taken up with the approval of large numbers, such a measure had been passed, at the present time we should have had nine or ten years' less growth of the evil to condone. I do not share the opinions held by some practitioners to which reference has been made, and which has found expression in the public Press in bitter condemnation of the indifference of others to our common interests, but I hold that we are all more or less open to the charge of being inconsiderate as regards the well-being of our fellow-workers. The apathy and indifference to the common weal is the leading characteristic of the bulk of our profession. Does it arise from want of confidence in each other or the unworthy rivalry of personal interests? The object of the Education and Registration Committee, and the 1,300 architects who signed the memorial in favour of procuring legal recognition for the profession, is to alter

this state of things, and to secure a recognised status, to raise the standard of attainments, and to insure the due qualification of all who practise in our ranks. Public confidence will be established, and the number of the public who avail of the services of the profession will be greatly increased when legal recognition is secured. It is proposed to accomplish this desirable object without disturbing any of the recognised bodies, whether they exist with or without charters. Their powers will not be impaired in the slightest degree; the Act will deal with their members only by way of recognition, and not with the bodies as such by way of abrogating their functions or curtailing the powers of expansion; on the contrary, it is but reasonable to suppose, and it is a result looked forward to with great confidence, that all existing bodies throughout the kingdom will be greatly increased in membership and efficiency. We are anxious to induce the members of the profession to realise the importance of the proposed Bill and the necessity which exists for their recognising the question as their own, interesting not simply to a few or a section of the members but to the whole profession inside and outside the institutions and societies. I deprecate in the most unqualified manner, and the other members of the committee share the feeling, the sinking of this question to the low level of personal altercation or disputation; such a method is unworthy of the subject. The matter is of the widest interest to the public and to the profession. It is right in itself, and it is a consideration of no moment as to who initiates the movement. Perhaps it has "wisely fallen out" that those who, at the instance of a conference representing the profession, have undertaken, in the common interest, the arduous labours of this work have done so in their capacity as delegates from that conference and not representing any of the several bodies to which the majority of them belong. To my mind this fact removes any possible embarrassment which may have arisen if the initiative had been taken by either of the chartered bodies, or any other body, as to precedence. As the matter now stands no such question can arise. It is a general question affecting all the members of the profession, and public action has been taken by the mass of the members, and the solution of a long-standing difficulty in the way of giving status to the profession has been discovered, not invented—namely, to obtain legal recognition for the members. This condition precedent to promulgating special education and technical training, and establishing examinations and diplomas by a central authority. The solution is not an invention, but its potency to deal with the case in hand is now acknowledged by immense numbers. The wonder is that this Bill was not passed thirty-six years ago, instead of passing impracticable resolutions not binding on anybody. It is not opposition that keeps such a measure off the statute-book; it is apathy and indifference, with a very considerable basis of selfishness. Overworked Parliament says, in effect, "Gentlemen, you wish to reform yourselves; if you approach us with a measure upon the provisions of which you have agreed, we shall have much pleasure in passing your Bill, provided always that the public outside your profession will not be prejudiced by any of its stipulations." We answer, the measure is calculated to raise the standard of artistic excellence and scientific competency in our ranks, and insure to the public at least a minimum of special knowledge, technical training, and fitness for the discharge of the arduous and varied work involved in architectural practice. This is a measure affecting the public, and the House of Commons is the tribunal to consider and decide upon its provisions. There are men in the profession who withhold their approval of the Bill, while acknowledging that the evils exist which it is designed to remedy; and yet they make no alternative proposal, for the obvious reason that there appears to be none to meet the case. There is, therefore, no course open to the Education and Registration Bill Committee but to press the consideration of the Bill in Parliament. It has been drafted with care, having regard to the best interests of the public and the profession; and when it is subjected to the ordeal of the Committee stage of the House, there need be no apprehension of its becoming a useful and just measure. The enthusiasm of conviction, leading to consistent and persistent effort, must wear down mistaken and illogical opposition. The strength of the Bill is its undoubted necessity and wisdom and

the undeniable justness of its provisions, which renders it possible for Parliament to pass it, it being consistent with precedent, and similar to kindred measures already on the statute-book. The supporters of the Bill would, no doubt, be very much pleased to discover unanimity amongst architectural practitioners in this matter; but there appears to be no example inside or outside professional bodies which may serve as a guide in devising a *modus operandi* in this case—the thing seems to be unworkable. The "concert" of the societies and institutions is as problematical of attainment as the "concert" of the Powers. There appears to be only one course open to pursue—that is, to follow all precedent, and submit the Bill to the arbitrament of the House. The opposition and delays which have marked the promotion of this measure are factors in the evolution which will lead ultimately to its passing. The Bill has passed through nine years of uphill effort, but, as was pointed out at the outset, the analogous Medical Act took thirty years to overcome the opposition from within, the same type of opposition which this kindred measure has now to face. In conclusion, permit me to say to the members of this Society that they can have no more worthy objects to devote their earnest endeavour to accomplish than the purposes for which it was established—namely, the advancement of architectural art and practice. To be prepared to make sacrifices for the common good is unselfish and commendable; when the methods proposed, as in this case, are reasonable and just, they should be promulgated with persistence and determination, which qualities, gentlemen, you may be relied upon to exhibit.

Mr. EDWIN J. HAMILTON, ex-president, proposed a hearty vote of thanks to Mr. Walker for his eloquent address, which had dealt chiefly with a subject which had not been so prominently before them during the last year or two, although the principle had always been promulgated by the Society. As the President had said, the chief obstacle to the passing of the Registration Bill had not been active opposition, but the apathy of the profession. During his own year of office, and especially during his attendance at provincial conferences, he (Mr. Hamilton) had been impressed by the indifference shown towards the passing of the Bill by architects who believed in Registration as a principle. He quite admitted that most of those who were supporting the measure were so well established in position that they could not expect to reap any personal advantage from the measure, and therefore their motives in pressing it on were quite disinterested. It was a reform that was demanded not only in the interests of the profession, but of the public at large. He cordially proposed a vote of thanks to Mr. Walker for his address, which was admirable not only for its literary excellence and flow of language, but for the cheery note of optimism by which it was pervaded.

Mr. LOVEGROVE, in seconding the vote of thanks, observed that there was but one objection to Registration, but that was often urged against it—that all men now in practice, even if totally incompetent and untrained, would be registered as recognised architects. He knew that the reply would be, that a beginning must be made some day if registration were to be obtained, and that Parliament would not concede it on other terms; but the objection was very strongly felt by many practitioners.

The PRESIDENT, in reply to the vote, which was carried by acclamation, said that if the Bill had been passed ten years ago, a large proportion of the incompetent and unworthy men whom Mr. Lovegrove rightly disliked to see put upon the register would have passed away by the efflux of time. He urged all members to shake off this apathy, and do their utmost to press the measure forward.

SUSPENSION BRIDGES—A STUDY.

By GEO. S. MORISON, Past-President Am. Soc. C.E.

(Continued from page 769.)

THE dead weight of floor, including ties, rails, and other work, has been assumed at 3,000lb. per lineal foot of bridge, being 500lb. for each railroad track, and 1,000lb. for the intermediate 40ft. The lower laterals act only in tension, and their weight, as estimated, includes a large amount of detail connections. The top laterals and transverse bracing are determined by minimum sections for the most part, instead of by strains. The upper laterals weigh 750lb.

per lineal foot, and the transverse bracing 690lb. The total weight, therefore, of the suspended superstructure per lineal foot may be taken as follows:—

Metallic floor as above	8,238lb.
Stiffening truss chords	11,100 "
Stiffening truss webs	3,240 "
Upper laterals and cross-bracing	1,440 "
Total metal work	24,018 "
Tracks and flooring	3,000 "
Total	27,018 "

The total dead load is therefore as follows:—

Cables and connections	10,900 "
Suspenders and connections	618 "
Suspended superstructure	27,018 "
	38,536 "
Add for telegraph line and sundries	464 "
Total	39,000 "

This leaves 11,000lb. of the total 50,000lb. available for moving load, as already stated, which may fairly be considered a margin of 2,000lb. over anything that is likely ever to occur. The total length of the stiffening truss from out to out, including the 500ft. spans at each end, is 4,100ft. Assuming chords and floor system to be uniform throughout, the weight of this 4,100ft. taken at 24,000lb. per lineal foot, will be 98,400,000lb. This, however, includes the weight of the heavy floor beams within the suspended length, while there are four floor beams entirely omitted at the supporting points and thirty-six floor beams which are themselves suspended from the chords. Neglecting one end floor beam, as the estimate has been made on a basis per lineal foot, and assuming that the floor beams hung from the chords are 30,000lb. lighter than the others, there is a deduction on this account as follows:—

3 floor beams at 179,000lb.	537,000lb.
36 floor beams reduced, at 30,000	1,080,000 "
	1,617,000 "

On the other hand, the webs near the supporting bents will have to be reinforced, which can be done by making the members of greater width than elsewhere. As there are no reverse strains here, it is thought right to fix the limit of stress at 20,000lb. per square inch of net section. On this basis the additional metal required in the webs is 3,418,000lb. To this must be added the weight of four vertical posts over the rocking bents, and four vertical posts and two portals at the ends of the continuous superstructure. The weight of the entire suspended superstructure will then be as follows:—

4,100ft.	98,400,000lb.
Additional metal in web	3,418 00 "
Vertical posts over rocking bents ..	545 00 "
End posts	467 00 "
Portals	140 00 "
Total	102,971 00 "
Deduct for floor beams	1,627 00 "
	101,350,000 "

At the centre of the bridge the cables are so little above the floor beams that the stiffening truss must be considered as fastened to the cables longitudinally at this point, a condition which is assumed in the refined calculations of strains; as it is continuous it must be free to move longitudinally at all other points, and especially at the ends. As the continuous truss is 4,100ft. long, a motion due to the effect of temperature on 2,050ft. must be provided for at each end, this being 0.82ft. for 60° of temperature; a possible motion of 1.64ft. must therefore be provided at each end of the stiffening truss, or 0.82ft. from either side of a mean. This motion is too great to be accommodated by roller bearings of the ordinary kind, and the design places the stiffening truss on rocking bents, which are shown in Figs. 15 and 19. The possible reaction at points 3,100ft. apart is assumed to be 10,736,000lb., and this is taken on vertical posts, the pair of posts under the two trusses being braced together, thus forming a rocking bent which is supported on two of the cylinders which form the tower foundations. These special cylinders have therefore to sustain this weight in addition to the weight received from the tower, and for this purpose their size has been increased, as has already been stated, and the centre of the foundation has been placed at a point between the two bearings, the distance of which from each bearing is inversely proportional to the respective reactions. At each end the stiffening truss rests on a rocking bent of smaller dimensions, which rests on a masonry pier. Each rocking bent at the principal point of support is

estimated to weigh, complete, 1,005,000lb., and each rocking bent at the extreme ends 480,000lb., making, as the total weight of the four rocking bents, 2,970,000lb. If to this is added the weight given above, the total weight of the metal-work in the suspended superstructure and connections becomes 104,320,000lb. This work would all be of structural steel, and in it the strains will nowhere exceed 20,000lb. per square inch of gross section under actions of load alone. The strains in the chords are reversed, and these are further increased by the bending which occurs in the truss under the rise and fall of the cables from the effects of temperature and by the effect of wind. The estimated rise and fall at the centre from changes of temperature is 3.3ft., which, calculated on the same formula as used previously and taking $t = 3,100$, corresponds to a strain of 3,330lb. per square inch. The bending strain due to the deflection of cables under weight has not been considered in this connection; but in the more refined calculations is considered in connection with all other changes of shape caused by weight in determining the moments on the stiffening truss. The strains are subject to reversal, and represent, including the effects of temperature, a possible variation of 40,000lb. per square inch between extreme positive and negative strains, or 20,000lb. in each direction. This is higher than it is deemed wise to place on ordinary structural steel, and requires a material which, while possessing the toughness of the soft steel preferred for structural purposes, has the strength and high elastic limit of the harder steels. Five years ago such a material would have been considered impossible; it may now be found in nickel steel containing about $3\frac{1}{2}$ per cent. of nickel—a material which will have an elastic limit of about 60,000lb. per square inch, and can be subjected to the reverse strains just referred to, and under extreme occasional conditions could be worked to at least 40,000lb. per square inch without injury. As nickel steel is a comparatively new article, made by a few manufacturers, though it has been adopted to a very great extent by the United States Government in its naval work, it is difficult to learn just what the additional cost ought to be; apparently it is worth, on the basis of cost, about three-quarters of a cent more per pound than ordinary structural steel, but it has been estimated as costing 2 cents per pound extra, this representing additional mill and shop work, though the latter is very little. The modulus of elasticity of nickel steel is practically the same as that of ordinary structural steel, and it is proposed to use it only for the principal members of the chords for a length of 2,000ft. at the centre of the bridge, where reversals occur and where wind strains are large. The rivets, splice plates, &c., need not be of nickel steel. The weight of nickel steel in each chord may therefore be taken at 2,000lb. per foot, or 8,000lb. for the four chords, or 16,000,000lb. for the 2,000ft. The work in the stiffening truss is of a very uniform character, and, considering its great weight, ought to be obtained at a very moderate price per pound; it is estimated at 4 cents per pound, with an extra allowance for nickel steel. The total cost of the 4,100ft. stiffening truss, supporting bents, &c., may therefore be taken as follows:—

104,320,000lb. at 4 cents.....	4,172,800dol.
16,000,000lb. nickel steel at 2 cents extra ..	320,000 "
Total.....	4,492,800 "

Shore Piers.—To sustain the ends of the stiffening truss two additional piers will be required. These piers should be founded on rock, but would be piers of ordinary dimensions, and, though large, would present no special difficulties of construction. On the plans, Fig. 1, they are shown with the masonry finishing at an elevation 60ft. above mean high water, which is probably higher than necessary, and the depth to rock is assumed to be 80ft. below mean high water. The piers are assumed to be 20ft. wide and 120ft. long on top, the masonry to start at the water level and to be founded on a caisson and surmounted by a timber crib filled with concrete, the whole foundation being 35ft. wide, 135ft. long, and assumed as 80ft. high. The cost of these piers is estimated as follows:—

6,000-cyd. masonry at 25dol.....	150,000dol.
378,000-cft. foundation at 60 cents ..	226,800 "
Total	376,800 "

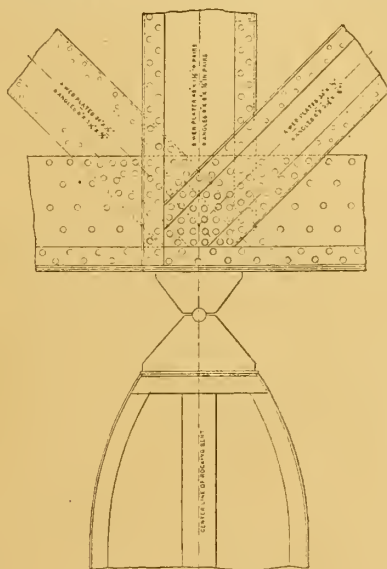
The cost of the two piers, one at each end, would then be 753,600dol.

Wind Pressure.—The wind surface per lineal

foot presented by one-half of one web, the lower chord, and the floor system is 11.35sq.ft., and the wind surface presented by the upper half of the web and the upper chord is 7.77sq.ft. As the trusses are 100ft. apart, the area of the trusses should be doubled; but the floor comes so near to being solid that it need not be doubled. The total surface presented to the wind which must be resisted by the top laterals is therefore 15.54sq.ft. per lineal foot, and the total surface presented to the wind which must be resisted by the bottom laterals is 19.12sq.ft. per lineal foot. To the latter should be added the area of a passing train, which is equivalent to 8ft. above the bottom chord, thus making the total wind surface to be provided for 27.12sq.ft. per lineal foot. On a basis of 30lb. per square foot, the total wind pressure to be resisted is—

Top lateral system.....	466lb.
Bottom lateral system.....	814 "
Total	1,280 "

For the calculations, these figures have been slightly varied, and the top laterals are proportioned to resist a wind pressure of 500lb. per lineal foot, and the bottom laterals a wind pressure of 750lb. per lineal foot. There is no probability that anything like these wind strains will ever be reached over the whole length of the span, though considerably greater pressures may



occur for limited lengths. To reduce these amounts, however, would be a departure from established practice. The wind pressure would be transferred to the towers where the stiffening truss passes the towers by horizontal cables, these cables reaching from each chord to the outer posts of the towers, the cables clearing the inner posts and being long enough to provide for the longitudinal motion of the trusses without overstraining. These horizontal cables would be tightened under strain, so that they would always stiffen the trusses. A portion of the wind strain would undoubtedly be taken by the transverse bracing of the rocking bent. Furthermore, the continuity of the truss beyond the rocking bent would reduce the equivalent length of the central span. In calculations this reduction has been assumed to be about 50ft. at each end, though this is undoubtedly much less than it would really be. On this basis the bending strain produced by wind in the bottom chords will be—

$$\frac{3,000^2 \times 750}{8 \times 100} = 8,437,500$$

This corresponds to about 14,000lb. per square inch on the 600sq.in. of the bottom chord, and gives a deflection calculated as above of 8.75ft. Should this occur when there is a maximum strain in the chords from the passage of trains, a condition which would probably not take place more than once in a century, the chords might possibly be strained to 34,000lb. per square inch. With nickel steel this is perfectly safe. In these calculations it is assumed that the chords of the stiffening truss are the only longitudinal members, which is by no means correct, as the sixteen stringers will act as auxiliary chords in the wind system. There is also another element which materially reduces the effect of wind. To pro-

duce the above-mentioned strains in the chords, the whole suspended superstructure must move laterally 8.75ft. This involves swinging the main cradled cables and raising the centre of gravity of the suspended superstructure, a lateral movement of 8.75ft. corresponding to a lift of 0.075ft., or 1 vertical to 117 horizontal. As the suspended superstructure weighs 27,000lb. per lineal foot, this will require a horizontal force of 230lb., so that before this deflection can occur the actual wind pressure must be about 1,000lb. per lineal foot on the bottom chord.

Rivet Strains.—While plans showing the details of riveting have only been prepared as a study, it has been necessary to form some basis on which they should be proportioned, especially as, owing to the magnitude of the structure and the large relative dead loads, the unit strains vary from those ordinarily used. The simple rule has been followed that the bearing stress on each rivet should be considered equal to the stress allowed in the gross section of the member, and the shearing stress should be limited to one-half the stress allowed in the gross section of the member. This may be expressed differently by stating that the bearing surface of the rivets should not be less than the gross section of the member, and the shearing section of the rivets should be double the section of the member. Where nickel steel is used, the number of rivets is increased one-half, the bearing surface of the rivets being made 50 per cent. greater than the gross section of the member and the shearing section of the rivet three times the gross section of the member.

Erection.—The erection of the stiffening truss and suspended superstructure is a comparatively simple thing. The back spans, 500ft. each, would be erected on falsework in the usual manner, which could be put in without difficulty, as it is in a protected position back of the pier-head lines. The projections from the rocking bents to the suspenders would be built out as cantilevers, all of which could be done without trouble. The suspended superstructure proper would be handled in a different way. The floor-beams would be put in position first; they would be brought to the bridge site on barges and raised into position, each beam being hung from the suspenders as fast as raised. The stringers would be put in and riveted up as the floor-beams are erected, so that when all the floor-beams are up a reasonably stiff floor would be ready to work on. This portion of the work could be done very rapidly, as each of the 84 floor-beams could be handled independently. When the floor-beams are in place and the floor system riveted up, it could be covered with planks and form a working platform. The bottom chords of the stiffening truss would then be put in place and riveted up, the horizontal rivets being driven by power, and the vertical rivets, which are of less importance, by hand. The only matter which would require special attention would be to see that a uniform distribution of weight was kept at all times, and this is a matter of discipline rather than of difficulty. As soon as the bottom chord is riveted, the lower half of the webs would be erected, and this would be followed with the upper half, after which the top chords would be put on and the top lateral system erected. The broad floor would form a platform on which any desirable system of travellers could be run, and the opportunities for work would be as good as in a shop, except that there would be no roof. The total weight of suspended superstructure which must be erected in suspension is about 34,000 tons. The speed with which it could be handled would depend entirely on the number of men and the amount of plant employed.

Estimate.—The work has been described in the manner in which the design has taken shape, and the cost of each separate portion has been estimated in connection with this description. In execution the work would necessarily be differently divided, and may properly be grouped under the respective heads of substructure and superstructure. Under these heads the cost may be stated as follows:—

Tower foundations	5,456,000dol.
Anchorage	2,642,800 "
Shore piers	753,600 "
Substructure	8,852,400dol.
Metallic steel towers	1,912,000 "
Wire-work, &c.,	4,866,140 "
Suspended superstructure, &c. ..	4,492,800 "
Superstructure	11,270,940 "
Total	20,123,340 "

For purposes of inspection, an elevator ought to be placed in each of the four towers, and two of these elevators ought to be of sufficient size to accommodate passengers. 100,000dols. should be reserved for these elevators, and the various appliances in connection with them. The ornamental work on top of the towers, with provisions for lighting, &c., would cost another 100,000dol. The structure, with a 10 per cent. allowance for contingencies and engineering, would cost about 22,500,000dol., or somewhat less than 5,500dol. a foot for the 4,100ft. of suspended superstructure. By making some modifications in the plan, among which may be mentioned allowing a greater flexibility under extreme conditions and reducing the depth of the stiffening truss, the cost could probably be reduced to about 20,000,000dol.

Time.—The time it would require to construct such a bridge would depend largely on the resources of the company building it. If everything were in readiness, both legally and financially, it ought to be built in five years. The foundations for the towers could be conducted simultaneously, and completed in two years. The steel towers could be erected in another year. The anchorages and shore piers could be completed before the towers are done. The cables, being already manufactured, could be erected in one year. The back spans and projecting cantilevers could be raised while the cables were being put in position. The suspended portion of the superstructure, 2,800ft., could be erected in one year. This allows two years for the erection of the metallic towers and the placing of the cables, which could probably be materially reduced. Five years would, therefore, appear to be enough for the construction of this bridge.

APPENDIX A.—TEST OF WIRE ROPES, MADE AT U.S. ARSENAL, WATERTOWN, MASS., MAY 2-4, 1895.

In the straight wire ropes the elongation was measured on 100in.; in the coiled wire ropes, on 200in. In all instances, except Nos. 8,269 and 8,279, the method of testing was, after putting on 50,000lb. per square inch, to measure the elongation, then reduce the strain 10,000lb., then increase it successively by 10,000lb. amounts until it was 10,000lb. more than it had been before, measuring the elongation at each change of strain. The elongation given in this table is the last elongation measured before the strain was increased more than 10,000lb. above that for which the elongation had been previously taken. Test No. 8,275 was left under a strain of 60,000lb. per square inch for 16½ hours, at the end of which time this strain was reduced by about 330lb. per square inch when the tests were resumed; the elongations given were all measured subsequently to this rest. Test No. 8,280 was left under a strain of 60,000lb. per square inch for 39 hours, during which time the strain was reduced about 5,000lb. per square inch, when the tests were resumed; the elongations given were all measured subsequently to this rest. Each of the round wire ropes was formed of 37 No. 8 wires. Each of the locked ropes was formed of 62 wires, of which the central one was round, the intermediate wires square, and the outer layer of special lock section. The straight wire ropes were wrapped with fine soft wire. In the cases of the two ropes which were left under strain, one over night and the other over two nights and an intermediate Sunday, the strains were reversed back and forth between 50,000lb. and 60,000lb. several times when testing was resumed, and the observations under these conditions were specially interesting and valuable. They were as follows—

Strain per Sq. In.	ELONGATION IN 200IN.	
	No. of Test, 8,275.	No. of Test, 8,280.
60,000lb.	0.5510	0.5852
50,000 "	0.4711	0.5051
40,000 "	0.5511	0.5853
30,000 "	0.4711	0.5051
20,000 "	0.5513	0.5851
10,000 "	0.4711	0.5051
60,000 "	0.5512	0.5852

These show an extraordinarily uniform modulus of elasticity of 25,000,000lb., and show how uniformly this rope may be depended upon for action in a structure, even though there be a material difference in the quality of the wires. Five wires were taken from two of the straight wire cables, one being of special steel and the

TEST OF STEEL WIRE ROPES.

CHARACTER OF ROPE.	STRAIGHT WIRE.				COILED ROUND WIRE.				PATENT LOCKED WIRE.			
	Special Steel.		Plough Steel.		Special Steel.		Plough Steel.		Special Steel.		Plough Steel.	
Character of wire	Special Steel.	Plough Steel.	Special Steel.	Plough Steel.	Special Steel.	Plough Steel.	Special Steel.	Plough Steel.	Special Steel.	Plough Steel.	Special Steel.	Plough Steel.
Number of test	8,269	8,279	8,271	8,274	8,270	8,273	8,273	8,275	8,272	8,290	8,276	8,277
STRAIN PER SQ. IN.	PERCENTAGE OF ELONGATION ABOVE THAT PRODUCED BY INITIAL STRAIN OF 10,000LB. PER SQ. IN.											
50,000lb.	0.1525	0.1834	0.1803	0.2588	0.2752	0.2257	0.2355	0.2735	0.2525	0.2742	0.2710	0.2710
60,000 "	0.1994	0.2255	0.2195	0.3190	0.3353	0.2794	0.2817	0.3274	0.2973	0.3296	0.3259	0.3259
70,000 "	0.2405	0.2651	0.2604	0.3968	0.4059	0.3351	0.3345	0.3862	0.3553	0.3937	0.3877	0.3877
80,000 "	0.2889	0.3070	0.3032	0.4674	0.4811	0.3980	0.3937	0.4573	0.4229	0.4673	0.4611	0.4611
90,000 "	0.3332	0.3478	0.3476	0.5509	0.5637	0.4676	0.4575	0.5424	0.5207	0.5537	0.5479	0.5479
100,000 "	0.4409	0.3890	0.3930	0.5930	0.6724	0.5345	0.5209	0.5862	0.6007	0.5496	0.6555	0.6555
Ultimate strength	150,000	146,640	188,980	187,360	148,120	140,000	187,230	177,690	133,180	131,970	142,220	176,850

other of plough steel. The samples taken from the special steel showed an average strength of 172,588lb. per square inch, and an average reduction of 44.2 per cent.; the plough steel showed an average strength of 226,504lb. per square inch, and an average reduction of 45.7 per cent. In the case of the plough steel one wire was nicked before testing; its strength was fully up to the average of the others, but its reduction was so much less that it has been excluded in calculating the average reduction. The fractures always occurred first in the outer wires, and the ropes evidently failed to develop their full strength owing to defects in sockets, which were not as well finished inside as they should have been.

ADAPTABLE SPECIFICATIONS.—XX.*

GLAZIERS' WORK: FACTS AND MEMORANDA.
(Continued.)

3. **ANCIENT GLASS.**—Glass was being manufactured by the Egyptians more than 4,000 years ago. There is a glass amulet in the British Museum dating from the time of the eleventh dynasty, and probably made about 2400 B.C. The Egyptians also applied glazed coatings to pottery and stone. Very elaborate articles of glass were made in Egypt during the Roman period, especially specimens of a minute species of mosaic. To form these, a number of variously-coloured glass rods were arranged in a bundle so that their ends formed a pattern. The rods were then fused together, and, of course, every cross section of them showed the same pattern repeated. The Phœnician glass now known is chiefly in the form of vases, which are brilliantly coloured, generally in zigzag patterns. Examples of Roman glass are numerous, and often very beautiful. The commoner qualities of it are greenish and bluish; but pure white, with the transparency of rock crystal, has also been found. Other tints in use at this period were blue, purple, yellow, green, and delicate pink, as well as a nearly opaque black; as well as imitations of onyx, agate, porphyry, and various gems. The Early Christian glass found in the catacombs at Rome is remarkable for a peculiar treatment of gold films. A sheet of gold-leaf having been affixed to the surface of the glass was decorated with patterns or figures; another piece of glass was then applied so as to inclose it, and the two pieces were fused, or partially fused, into one mass. In other cases the gold was simply attached to the outer face of the glass, and not protected by a covering plate.

Glass Mosaic was largely used in the latest period of the Roman Empire, and in Early Mediæval times fragments of this coloured mosaic were melted down to form window-glass. "There are found in the ancient buildings of the pagans," says the monk Theophilus, "different kinds of glass—namely, white, black, green, yellow, sapphire, red, and purple; and this glass is not transparent, but dense, like marble. There are also found various little vessels of the same colours, which the French, who are skilful in this manufacture, collect. They fuse the sapphire, adding to it a little clear white glass, and make tables of sapphire which are precious and useful in windows. They make tables of purple and green in like manner." The French, however, like the English and the Germans, soon learned to make coloured glass for themselves, and excelled the ancients in the brilliancy and variety of their colours.

4. "*Stained*" or *Painted Glass*.—It has been

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supposed that the very earliest productions of this art consisted simply of variously coloured pieces, fitted together into a pattern by means of plaster or cement. Glazing of this kind remains at St. Sophia, Constantinople, and is still used in the same city for domestic buildings. Window leads, however, came into use in Western Europe during the Romanesque period, if not sooner. They seem at one time to have been the only lines employed in a coloured window. No outlines or shades were at first drawn on the glass, but the whole effect was obtained by fitting together pieces of the desired shapes, and of the colours which the designer had decided on. In some Cistercian churches of the pre-Gothic period, to which painting was forbidden by the rules of the order, simplicity went even further than this. The whole design was white, or whitish, but was formed by the leads into striking patterns. It is possible even to produce effective figure-subjects without colour, keeping the figures and the drapery comparatively large in scale, and surrounding them with a background of diaper or other very small details, lined out by smaller leads than the principal subject.

The Early Romanesque glass, however, is, in strictness, neither "*stained*" nor painted; but windows which deserve both these names soon succeeded it. The mosaic of variously-coloured pieces, strongly outlined by leads, remained; but it was improved in and after the 12th century by painting on it lines and stippings of brown enamel, and by the application here and there of yellow stain. A great many modern enamels, being made up with borax, soda, or potash, soon absorb moisture, and crumble away. A really trustworthy enamel may be made with three parts of red-lead, one of white sand, and one of oxide of iron, with a little manganese. This serves for the dark lines, and a thinner film of it for the hair and the shadows in flesh and drapery. The only actual stain used is yellow of various shades, and is produced by heating the glass in contact with various salts of silver. These two materials, with thick horny, uneven glass, whitish or of various colours, sufficed for the production of the finest Mediæval work, from simple "*flowered quarries*," bearing only a spray or monogram, to such elaborate windows as those at York and Fairford. The varying thickness of the old glass and the varying tones of its ground colours supply the primary secret of its excellence, giving it this broken changing tints of a good painting instead of the raw regularity of a cheap chromo-lithograph. To imitate the latter, it is only necessary to use glass of ordinary modern manufacture, uniform in colour, uniform in thickness, even in surface, and not half as thick as it ought to be. Much depends, too, on the size of the leads by which the main lines of the design are marked out, and on the size of the wrought-iron staybars, or, in very large windows, of the wrought-iron frameworks which still further accentuate the main divisions of the composition. Of course, these sizes will vary in proportion to the distance of the windows from the eye.

The history of stained glass shows a gradual progress from the idea of a mosaic to the idea of a painting. In the 14th century the glass was used in larger pieces than before, the pieces being varied in parts by the use of yellow stain. This not only appeared as such, but was also employed to turn parts of a blue ground into green, and sometimes a ruby ground to an almost scarlet colour. The ruby, moreover, being usually "*flushed*"—that is, being only a thin skin of ruby adhering to a sheet of white glass—it was possible to grind out white patterns on it. This process, being laborious, was only sparingly

used in olden times; but it is easily imitated since the invention of hydrofluoric acid. Fifteenth and early 16th-century glazing generally contains a large proportion of white and yellow. "Dim, religious light" went out of fashion, and the windows were so large and so translucent that many of the churches were rather overdone with sunshine. Canopies, elaborately drawn in brown enamel, were greatly in favour at this time; but as the Renaissance style became more and more developed, they were gradually abandoned. The mere outline treatment of subjects was nearly given up. Elaborate shading and modelling came into vogue, the sparkle and transparency of the glass were no longer valued, and the tendency was more and more towards the imitation of easel-pictures. Very fine work, however, was done by able men, especially in Italy, even on these somewhat indefensible principles; but it rapidly declined, and until the 19th century revival of the art, glass-painting thenceforth consisted in applying dull, heavy, and perishable enamel colours to large sheets, scarcely broken up by leads.

5. Sizes and Weights of Glass.—At the present time ordinary *sheet glass* can be obtained in sizes ranging up to 12ft. super. It is made in thicknesses of 15oz., 21oz., 26oz., and 32oz., at least nominally; but it varies considerably in the same sheet, and, when glazed in sashes, not unfrequently averages some ounces to the foot less than it purports to do. Three qualities—best, seconds, and thirds—are generally recognised, and a special or "picture" quality can also be obtained. *Crown glass* is divided into best and second "picture" qualities, and best, second, and third glazing qualities. The ordinary kinds of crown glass weigh about 13oz. to the foot super., but can be had 4oz. or 5oz. heavier. Squares of crown glass can be obtained in sizes up to 4ft. or 5ft. super. "*Flattened*" crown is worth about 2d. per foot super. more than the usual kind. *British plate-glass* can be obtained in sizes up to 100ft. super. in a sheet or larger, at special prices. It is classed as Ordinary quality, Best glazing, and Silvering quality. The usual thickness is about $\frac{1}{4}$ in.; but it is made thicker at a slight extra cost. *Rough-cast plate* is made in thicknesses of $\frac{1}{4}$ in., $\frac{3}{8}$ in., $\frac{1}{2}$ in., and 1in., and in sizes up to 50ft. or 60ft. super. The cost, up to $\frac{1}{2}$ in. thick, is about the same as that of best sheet glass; but for $\frac{3}{8}$ in. and 1in. thicknesses rough-cast plate becomes expensive. The usual charge for bending plate glass is from one to three shillings per foot extra, according to size. *Patent plate glass* is made in best, second, and third qualities, and each quality can be obtained in thicknesses numbered from 1 to 4. No. 1 averages about $\frac{1}{4}$ in., and weighs about 13oz. to the foot super.; No. 2 is about $\frac{1}{4}$ in. thick, and weighs about 17oz.; No. 3 is $\frac{1}{2}$ in. thick, and weighs 21oz.; while No. 4 is $\frac{3}{8}$ in. thick, and weighs 24oz. An "extra white" patent plate is also made, which is excellent for pictures, but less suitable than the other kinds for glazing. *Rough-rolled plate* can be had either "plain" or fluted. The plain has a surface covered with fine lines; in the "fluted" there are from 4 to 11 lines in the inch. *Rough-rolled plate* is made in sizes not exceeding 9ft. by 3ft. or 3ft. 6in., and in thicknesses from $\frac{1}{4}$ in. to $\frac{3}{8}$ in. *Rolled cathedral glass*, in light variable tints, and with a sort of irregular dappled surface, weighs about 26oz. to the foot, and runs up to 80in. long by 28in. wide. There are also various figured rolled glasses to be had. The weights and sizes in this paragraph are chiefly taken from the very complete lists in Messrs. Lockwood's "Builders' Price-book." Coloured glass, whether "pot-metal" or "flashed," varies greatly in quality and cost, and to make good work needs very careful selection.

SPECIFICATION, PART XI.: GLAZIERS' WORK.

XI. 1. GENERAL DIRECTIONS.—All the glazing not otherwise described is to be properly bedded, bradded, and back-puttied: the putty neatly trimmed off, and all glass left clean when the building is given up for occupation. Ground-glass is to be sized before glazing to prevent the putty from discolouring the glass, and the size is to be completely washed off before the building is given up. The contractor is to submit to the architect for approval specimens of all the tinted and coloured glass, and the samples selected by the architect are to be exactly matched. All sheets or plates of glass inserted in door-panels are to be bedded on wash-leather, and all such sheets and all panels of lead-glazing inserted in doors or framings, are to be put in by means of

neat shifting fillets, of the same kind of wood in each case as that of which the doors or framings are composed, and secured with small brass screws. The leads for lead-glazing are to be strong, and of sections selected by the architect; all lead-glazing is to be executed in the very best manner [by a glazier approved by the architect]. The lead-glazing is to be properly soldered on both sides and thoroughly cemented so as to be absolutely water-tight, properly cemented into the grooves or rebates left for it, and secured to the stanchions and other supports by a sufficient number of strong copper wires. The glass in skylights is to overlap at the joints and edges at least $3\frac{1}{2}$ inches, and is to be secured by a sufficient number of strong copper clips. The free edges of any sheets of plate glass which may be used as shelves, ledges, or skirtings, are to be carefully ground off and rounded.

XI. 2. SHEET-GLASS.—Glaze the following windows—namely, with 21oz. seconds sheet-glass. Glaze with best 32oz. sheet-glass.

XI. 3. ROUGH-ROLLED PLATE.—Glaze the following [skylights]—namely, also [the lantern light and the basement windows] with Hartley's rough-rolled plate, $\frac{1}{4}$ in. thick, fluted.

XI. 4. ROUGH-CAST PLATE.—Glaze [the roof and the vertical windows of the greenhouse] with best white cast rough plate, $\frac{1}{4}$ in. thick. Glaze the [openings in the risers of front steps] with best white cast rough plate-glass.

XI. 5. PATENT PLATE.—Glaze the following [windows and openings] with second quality patent plate-glass, and No. 1 thickness—namely, Glaze the following [larger windows] with best quality No. 4 thickness of patent plate-glass. This glazing is to be of "usual colour," and not "extra white."

XI. 6. BRITISH POLISHED PLATE.—Glaze the following [windows]—namely, [and the fanlight of the front door] with best British polished plate. Glaze the [shop-front] with best British polished plate, $\frac{1}{4}$ in. thick.

XI. 7. EMBOSSED GLASS.—Glaze the panels shown on detail to be glazed in the [inner hall-door] and those in the [front windows of the private office, marked on the detail as embossed] with best British polished plate-glass, and emboss on them a pattern value [2s.] per foot super. to detail.

XI. 8. LEAD GLAZING IN [DOORS].—The panels prepared for glazing in the following doors [and framings], namely are all to be filled with patterns of [patent plate-glass in leads, with borders of blue, ruby, and other flashed or potmetal glass of specially selected quality] [tinted cathedral glass in leads] to varied details which will be supplied by the architect, value [5s.] per foot super., p.c.

XI. 9. MIRRORS.—The mirrors [in panels] are to be of British polished plate-glass of the very best, or "silvering," quality, silvered in the best manner, and free from all defects.

XI. 10. FLUTED SHEET.—Glaze the openings in the following [screens] with best 21oz. fluted sheet glass [usual colour] [crystal metal].

XI. 11. GLASS SLATES.—Provide and slate in, where shown on the roof of the No. proper [rough-plate] [sheet-glass] slates of the same size as the slating in that part, each formed with two nail-holes, and properly nail them with copper nails.

XI. 12. GLASS TILES.—Provide and work in where shown, with the tiles of the roof, No. glass tiles [$\frac{1}{4}$ in. thick of rough-rolled plate] [of 32oz. sheet glass].

XI. 13. ROLLED CATHEDRAL GLAZING IN LEADS.—Glaze all the windows of the hall with Hartley's rolled cathedral glass, in light mixed tints to be selected by the architect, and in strong leads; the glass being [in quarries averaging about 4in. by 3in.] [in squares averaging about 3 $\frac{1}{2}$ in. by 3in.] with two narrow borders all round, in Hartley's white cathedral glass, to detail.

XI. 14. PATTERN GLAZING IN LEADS.—Glaze the following windows, namely with best 26oz. tinted sheet glass (the tints to be selected by the architect) in patterns containing about the same quantity of work as the sketch hereto annexed [give sketch] the patterns being varied in each window, according to details to be supplied by the architect.

XI. 15. STAINED GLASS.—Provide for stained glass in the following windows, namely the sum of £..... prime cost, to be paid without deduction to anyone employed by the architect. Supply full-sized templates of the different lights as required; pay carriage and

packing, and provide scaffolding and all necessary labour in assisting the workmen sent by the maker of the stained glass to fix it.

XI. 16.—Leave all glazing clean and perfect at the delivery up of the building for occupation.

"BUILDING NEWS" DESIGNING CLUB.

A PAIR OF COUNTRY COTTAGES.

WE open well, and the very large number of designs submitted in this the first competition of our Designing Club for the forthcoming season of long evenings and work shows very conclusively that the Club is as popular as ever, and that it fills a very useful place among the many and various agencies of an educational character for the architectural student and pupil which exist in London and elsewhere. One considerable advantage which our club offers is that any one can join, no matter how remote or distant from London he may chance to be, and, moreover, we number ladies among our contributors—for example, the lady pupils of a very distinguished architect in London were members of our club.

The subject with which we have started the session was set in the following terms:—

SESSION 1896-7.—FIRST LIST OF SUBJECTS.

A.—A pair of *Country Cottages* suitable for middle-class tenants, one house to comprise three sitting-rooms and six bedrooms, and the other two sitting-rooms and four bedrooms. These villas are to have the usual kitchen and offices accommodation, a bath-room, and box-room each. The treatment to be adopted is to be cottage-like and simple, but the materials are left to competitors. The dining-room is in each house to be essentially the living-room, and is to measure about, and not less than, 18ft. by 15ft. The drawing-room should be about the area of 16ft. by 15ft., and in the first house, where there is a third reception-room, it should measure 10ft. 6in. by 12ft., or at least that area. A good larder and scullery are necessary, and the hall should not be a narrow ugly passage. Economy is not to be ignored, and comfort is to be a prime consideration. Two elevations and sections to be $\frac{1}{4}$ in. to the foot, and the plans may be drawn to $\frac{1}{16}$ in. scale. A view must be included, and also plans.

The designs placed are—"Pickles," No. 1; "St. Leonard," No. 2; and "Moss," No. 3. In making this choice we had some considerable difficulty, because of the average merit of many of the designs, and we must also add that not one scheme really makes an entirely satisfactory solution of the problem which we set. We do not expect model designs, and those who look for perfect plans, or even for plans which do not exhibit serious faults possibly, are unduly exacting, for, after all, the Club is primarily for students and their mutual improvement.

"Pickles" is cottage-like and unostentatious in his elevations without being merely crude and ugly. He is right in depending on simple forms and leading lines for his effects and shadows. We cannot say we care quite for the arrangements of his plan. The hall is perhaps a trifle too important, and in thus making it, so economy is the only condition not rigidly kept in view, for the space to the rear of the hall and the room occupied by the landing above cannot be described as close planning, which in practical work for middle-class houses erected to pay a reasonable profit, the proprietors are obliged to insist upon. The dining-room, which, as the conditions state, is to be essentially the living-room, is not a comfortable one with the window so far removed from the fireplace, and the chimney corner is too closely located to the kitchen for privacy and reasonable isolation from the smells of cooking, points of no small difficulty in any moderately-sized residence. "Pickles" aggravates them, and he has ill-considered the convenience of the cook, who would stand in her own light, and need a candle to see her work at the kitchen. There is not enough head room up the stairs, although the plans show there was no occasion for this fault. The scales should have been drawn on the sheet. "St. Leonard" does not do his design justice, for his drawings are poor and lacking in interest. His plan is thin and wanting in compactness. We like the unassuming and homely effect of this ordinary piece of building, which gets away from the tiresome ambitiousness and struggle after novelty which spoils so many well-intentioned designs. "Moss" has far more ability and a sense of quaintness, but he trifles with the likely, and his invitation to get out of

the ordinary rut would only land us in the street called "queer." His plan has merits and a degree of freshness, but economy of contrivance leaves him room for an exercise of skill. "Pot Luck" pleases us by his cleanly-cut and reserved attempt at design, which would look well enough in execution, but his plan is ordinary and not particularly good either. There is no attempt at diversifying the two houses externally. They look so obviously a pair of villas. "Dingo" is a crisp draughtsman, and exhibits a taste for planning; but his choice of a style for cottages does not meet with our approval. Plain surface is a relief, and even a lead flat we do not necessarily object to; but good proportion is of prime consequence, and particularly when a sort of Classic mode is aimed at, even though at a remote distance. The two doors nearly touching in the angle of the dining-room are not good, and the porches are ugly. "Tyke" has a kind of cruciform plan, and an ambitious-looking elevation too high set up to be really nice, though his general details are simple and right in the main. Room is lost in passages, mainly upstairs, and the dark hole in the corner scrovy between the kitchen and the dining-room is very bad, while the pantry, with no light whatever, is far worse. "Geisha" is less original, and gives inconvenient kitchens. The dining-rooms in his plan are very good, but the hall of his larger house is wasteful. In time "Geisha" will do much better if he works on. "Minaret's" plan is a long one, and half-timber is employed as the central feature in his front façade, which has been worked out carefully; but the corridors and passages are wasteful in plan, and those between the vestibule and kitchen are quite dark. We have not overlooked the care of this contributor, and we note no sections have been sent. "Strag" imitates the American mode rather, but he does so with grace, while not too great a care concerns him with his plans. We like the bays and main gable in the front, though the big semicircular arch to form the porch is a barbarism. "Jupiter" has a very pretty front, and mainly so because of the dormer-like gables in timber; but when we have said this we have said all we can in praise of his work. In one house the servants would have to pass through the sitting-room to answer the front door or reach the bedrooms. His perspective is crudity personified, wherein the chimney-stacks have sunk into nothingness. "Scotland" sends two distinct houses, which is a misreading of the conditions; we asked for a pair. His designs are distinguished by considerable originality, a central hall being a great feature, and in each case the arrangement leads to complications best avoided. We shall look for better things from "Scotland." "Pickwick" sends a timber design, looking rather well in perspective; but the rooms in his plan are pitchforked together, and made to fit the elevations. "Romulus" strives after the picturesque; but he cramps his contrivances without method. Thus in the larger house he has an indifferent drawing-room, and in the smaller house a spacious one. "Alfio" draws with an ugly mannerism—a needlessly liney style; but we are aware of his indications of taste which might be developed. His plans are compact, but the stairways in the left-hand house are too squeezed in. The verandah to the bedroom is a mistake. "Nadsy" is neat and careful, with good regard to light and economy, though we remind him that big roofs not utilised cost money. "Arch" has a quaint front marked by three gables; but the effect is not cottage-like—it is overdone. "B. S. A." in a ribbon device is a designer of marked taste, inclined to be careless of detail. His cottages would attract our approval by the roadside, though we fancy the stairs of the larger house would be very dark. Anyhow, "B. S. A." will be expected to distinguish himself after doing as well as this. "Baron" is too smug in the use of half timber, which should be used with plain sole-pieces or sills, and not let the uprights rise out of a moulded brick course. In the view this is not so. Space fails us to note all we should like to say, so that "Baron" must not think this his only fault. He is evidently a student who means to make our Club a success. "Toreador," too, is of the same opinion, and indeed his use of half timber is commonsense, and follows the good old English method. Unfortunately, he has forgotten the cottage-like spirit, and in making his façade he has let it dictate his plan, whereas the reverse order should prevail. His over-wrought drawings do not improve the effect of his elevations.

"Penrhyn" draws with freedom, and indicates a dashing style which ought to lead to better things. At present we cannot place him higher. Lavatories and water-closets are best removed from too close a proximity to the front door, and soil-pipe ventilators do not make pretty features in a front façade. "Enliso" dodges his plan cantways, and gets a V-shaped drawing-room, and bedroom like it over. This may be following the "Arts and Crafty," and so are the plaster trees and tulips up the rough-cast plasterwork; but these things are not good architecture. We wish to encourage "Enliso," and hope to see more of his work, for he has an appreciation of composition. "Hawthorn's" design would make a very fairly suitable pair of cottages; but his plan, with its narrow passage passing for a pantry presents a sample of the poverty of his plan. "Cyclist's" group looks like a big farmhouse in the view, and his elevation suggests a big bungalow. He is a promising contributor; but his printing is abominable, and looks intentionally ugly. "Hi Kiki" is quiet and respectable, and, moreover, sends a very good plan, rather wasteful in vestibule, hall, and landing. His drawings are neat. "Don Juan" also is careful; but the range of gables are hardly warranted to the attics, and they are out of character with the rest of the design, which favours the commonplace. "Cameo" is too dashing, and too fond of passages. "Pantile," on the other hand, is painstaking, seeking originality. Oddments in the way of angle cupboards and dodged-in bays do not necessarily mean comfort; and w.c.'s out of a porch are not nice. "Agon" sends an L-shaped plan, wasteful in corridors, but pleasing in elevation and grouping. The remaining designs we can only enumerate:—"Side Light," "Anglia," "Oberon," "Duniya," "Caporal," "The Wolf," "The Manxman," and "Novocastrian." These are among the best. The others are "Ulan," "K. K.," "Forfar," "Nut," "Five Opals," "Ashleigh," "P." in a circle, "Gnat," "Crow," "Aikane," "Q.E.D.," "R.," "E. G.," "Nil Desperando," "Jap," "Smiler," "Eta," "Ard," "Ashton," "Don't Know," "Percy," "Eagle," "Mostyn," "Leemo," "Llafurus," "Whitefriar," "Rudgrave," "Car," "J. H. W.," "Zulu," "Brix," "Valhalla," and "Poplar."

ART FOR SCHOOLS ASSOCIATION.

THE object of supplying an educational basis for exhibitions of pictures is a commendable one. To educate children by placing in the classrooms of elementary schools good reproductions of the best pictures is one of the main intentions of the founders of this Association, and its work in this direction has been very beneficial. The Association obtain permission to sell to these schools those art publications which are likely to encourage an interest for high art, and with this object in view the chief art publishers of London are placed under contribution. Through the agency of the Association upwards of 400 photographs, engravings, etchings, and chromo-lithos have been supplied from the works of the old and living masters. The schools have availed themselves of the agency, and the report of the Association shows a steady increase in the number of pictures sold to schools, elementary and advanced. The Association also publish works, and are pledged to produce every year one or more works in three classes, historical, natural objects, and reproductions of the old masters, and these are given to annual subscribers. During 1896 two large autotypes, one of Queen Elizabeth and one of Oliver Cromwell, have been published. Amongst the reproductions of standard works of art is an autogravure of Harlech Castle, by James Ward, R.A. These reproductions are of a high class, and are sold to subscribers and schools at a very moderate price; the portraits are sold at 3s. 6d., and the autogravure of Harlech Castle at 7s. 6d. In the class of natural objects is a chromo-lithograph of "Study of Hollyhocks," by E. L. Varley—a very excellent reproduction. The committee intend to publish reproductions of portraits to a larger scale for subscribers, and they will receive two historical portraits each year. The portraits of Elizabeth and Cromwell are reproduced from their originals in the National Portrait Gallery. The first is by a contemporary painter, the latter by Robert Walker.

The exhibition now open at Queen-square contains many masterpieces. We notice two

photographs by Fra Angelico, one of the "Resurrection of the Blessed" and another of "The Madonna and Child." Important works by S. Botticelli and by Raphael of Scriptural subjects are exhibited, and we notice several sacred subjects by Albrecht Dürer reproduced as photographs and autotypes; also works by Gerard Dou D. Ghirlandajo, Giorgione, Fra F. Lippi, and many others of the Italian, Dutch, and Flemish schools. Of English landscape painting we notice a fine heliogravure of Constable's "Salisbury Cathedral," published by the Association; several portraits (autotypes) by Sir Joshua Reynolds; a series of chromos and autotypes by J. M. W. Turner; very beautiful reproductions of Sir E. Burne-Jones' "Le Chant d'Amour," "Hope," "Venus' Looking-Glass," "Flamma Vestalis"; and several excellent and well-known subjects by Ernest George. Street views are reproduced in chromo-lithography. Works of Clara Montalba, Jean Francois Millet, J. O'Connor, G. F. Watts, R.A., and Turner are also represented. All interested in reproductions of this class cannot do better than to visit the exhibition, and notice the low prices affixed. The list of schools and school boards and high schools supplied during last year in various parts of the country is sufficient evidence of the interest taken in this agency, and the improving artistic culture of our schools.

THE CENTURY OF LOUIS XIV.*

THIS sumptuously produced volume is a credit to all concerned in its publication. It is undoubtedly true, as M. Emile Bourgeois says, that a peculiar—in some respects an incomprehensible—interest attaches to the arts and ideas of the century of the *Grand Monarque*.

It was an age of shams, and yet an age of the genesis of realities. It is hard to say whether France was the more to be pitied in the earlier decades of the reign of Louis XIV., when barren, but splendid victories were exciting the admiration of the brilliant courtiers of Versailles, or in those gloomier days when outraged Europe had risen in concert under William of Orange and his more able successor on the field, Marlborough, to shake off the predominance of the "Most Christian King." It is difficult, indeed, to get a really clear idea of the kaleidoscopic changes that make up the record of his reign. That there was, however, under the crust of venal public life and rococo art, a genuine, free, merry, French-like existence of the mass of the people, and a perfectly genuine devotion of her artists to their best traditions, is certain; but the trail of the serpent was over it all. Life had become so artificial under the elaboration of etiquette that hedged in the last worthy representative of the Legitimate Monarchy, that the restraints became at last intolerable, and the efforts at escape therefrom were almost as much caricatures as the customs and art of the *ancien régime* had become.

M. Bourgeois wearies us with few generalisations of this sort, however, and his readers will be duly grateful. He has given a fairly complete summary of the king's reign, of the aims and character of his ministers, of his domestic life, and the conditions of the arts, sciences, and religion. The numberless illustrations are superbly executed. There are twenty-two portraits engraved on copper, more than thirty full-page illustrations, and hundreds in the text, and no small proportion of these will be found of interest to the architect and artist, though the majority will, of course, appeal more to the general reader. It is certainly a book that should be on the shelves of every good library.

THE ABERDEEN MARISCHAL COLLEGE EXTENSIONS.

THE heating and ventilation of the extended and rearranged buildings at Marischal College have for some time been the subject of anxious inquiry on the part of the University authorities. By the system adopted, according to the *Aberdeen Free Press*, cold air is drawn into the buildings through open gratings; it is then cleansed and warmed and propelled through ducts into the various rooms. And by the propulsion of fresh air into the rooms the vitiated air ought to be forced out. It is part of the system that all windows should be immovable, and that doors

* The Century of Louis XIV. By EMILE BOURGEOIS. Translated from the French by Mrs. CASHEL HORT. London: Sampson Low, Marston, and Co. £2 12s. 6d.

should, as far as possible, be kept closed, for which purpose the doors are fitted with special self-acting swing apparatus. In this way equilibrium in the distribution of the warm and fresh air is held to be obtained.

Hitherto, according to our contemporary, the complaints in regard to the arrangements have been mainly that, in the first place, an insufficiency of fresh air has been obtained in certain of the departments, and that the vitiated atmosphere has not been discharged from the rooms with that quickness necessary, in particular, to the efficient carrying on of laboratory work. Another point to which attention is likely to be drawn in a prominent way is the large expense in coals needful to the working of the system. At present the amount of coals required to keep the apparatus going is about two tons and a half per day, which is understood to be considerably beyond what was at first thought to be necessary. Another point which is expected to lead to immediate alterations in the picture gallery leading into the Mitchell Hall is the effect of the method of ventilation on the pictures. The inlets for the hot air are above the oak dado and under the pictures, and recent examination showed that the alternate action of the hot air, when the ventilating apparatus was at work, and the cold, when the apparatus was at rest, is evidently having a deteriorating effect on the pictures. The circumstance caused, naturally, a good deal of alarm, and, pending a thorough consideration of the matter, these inlets in the picture gallery have been boarded up. Ventilation and heating of the picture gallery is meantime being effected by heating and ventilating the adjacent Mitchell Hall, and allowing the warm air to find its way thence into the picture gallery. In reference to the complaints made, it is the position of the inventor, it is understood, that the system has not yet in these buildings had a sufficiently full and fair trial, and that he is prepared to see the arrangements put in efficient working order in due time. To facilitate this, a change has been made in the engineering staff, and a new engineer started work last week. The inventor of the system is expected in Aberdeen within the next few days, when the matter will be fully discussed.

RENDLE'S "INVINCIBLE" GLAZING.

THE success which has attended the use of Rendle's "Invincible" system of glass roofing is known to most architects and engineers. Messrs. W. Edgcombe Rendle and Co. have very materially improved on their original patent system. The metal channel bar, which is of copper or zinc, has been made lighter and stronger, permitting squares of glass to be used up to 10ft. The little illustrated book issued by the firm, gives sections of the bar, showing the water channel below the glass, the condensation gutters on each side, and the cap which is screwed over the joint. In one section the bar covers a wood core or rafter. The "Invincible" is also shown mounted on a steel T bar. The simple bar itself is strong enough for bearings up to 4ft. The wooden core is of any depth to suit the length of glass. This system of glazing is largely used for railway stations, markets, sheds, skylights—for all kinds of buildings. Several photo. illustrations show its application to the Liverpool-street Station, where a very extensive series of platforms and railway-lines of four spans are covered—in all about 100,000ft. No wood or perishable material is exposed, the whole outer surface being of copper, the glass being $\frac{1}{4}$ in. rolled plate. This work has been highly successful. Moorgate-street Station, the Metropolitan Extension to Aylesbury, Leicester Station, the Amiens-street Terminus, Dublin, Belfast Station Extension, Baths at Salisbury and Hackney, Swimming Baths at Bow and Brighton, and other halls, stations, and conservatories have been covered by the "Invincible" glazing. A sheet of details half full-size showing a section of skylight with details of ridge capping, and at the overlaps for wood construction, is given, and how the slated portion of a roof is finished over the glass. These show the lead flashings and the connection of Rendle's "Invincible" bar with the glass. Messrs. Rendle and Co. supply detail drawings, models, and prices for all applications of this glazing, which seems to excel other systems in many important particulars.

Mr. E. W. Beckett, M.P., has presented to the Art Gallery of Leeds a bust of the First Napoleon in marble, by Canova.

OBITUARY.

THE death is announced of Mr. FREDERICK MORLEY, architect, of Commercial Buildings, Dublin. He had been an Associate of the R.I.B.A. since 1872.

MR. DAVID C. HALE, an architect of Boston, Mass., who died on November 10, at Ellsworth, Me., was a graduate of the Massachusetts Institute of Technology. On leaving the institute he entered the office of the late H. H. Richardson, of Boston. While in the employ of Mr. Richardson he was his representative in Albany during the construction of the New York State Capitol. He held that responsible position until the death of Mr. Richardson, after which Mr. Hale was at the head of the office of Shepley, Rutan, and Coolidge, the successors of Mr. Richardson, in Boston, and during this time superintended for them the Chamber of Commerce at Cincinnati, the Ames Building, the Boston Chamber of Commerce, and other important structures.

IN the Edinburgh Infirmary on Saturday, Mr. HENRY COOK CRAIG, chief inspecting foreman (Southern District) in the Colonial Architect's Department of Queensland, died after a somewhat prolonged illness, at the age of thirty-four. Mr. Craig, who had been for a number of years in the Government service of that colony, came home last September on leave of absence to consult the Edinburgh doctors regarding his health. About a fortnight ago he entered the infirmary for the purpose of getting an operation performed for tumour on the brain. Exactly a week after the operation was performed he succumbed. Many of the schools and public buildings in the southern district of Queensland were designed by Mr. Craig. His funeral took place at the Grange Cemetery, Edinburgh, on Monday.

MR. JOHN BRUNDRIT died on Tuesday at his residence, The Highlands, Runcorn, aged sixty-three years. The deceased gentleman was the senior partner in the firm of Messrs. Brundrit and Co., granite quarry proprietors, Penmaenmawr, and Gimblet Rock, Pwllheli. He qualified as a magistrate for Cheshire in February, 1873, and for the past ten years had been Chairman of the Runcorn Petty Sessional Division. Mr. Brundrit was widely known as an enthusiastic sportsman.

CHIPS.

The chapel to be formed in the north chancel aisle of All Saints' Church, Maidstone, according to the plans of Mr. J. L. Pearson, R.A., will be completed by Easter Day, April 18, as also the rood-screen. The two screens on the south side of the chancel have yet to be provided.

A new Baptist chapel in Crown-lane, Maldon, Essex, was opened on Wednesday week; it takes the place of an iron building which had been used for 23 years, and is built of stock bricks, with red brick dressings. Mr. P. M. Beaumont was the architect, and Messrs. A. Baxter and Son were the contractors.

At the last meeting of the City Court of Common Council, amended plans were approved for providing increased accommodation on the removal of the present fish section of the Central General Market to the site of the fruit, vegetable, and flower section, at a total cost of £21,000.

At the Mart on Thursday in last week, Messrs. Douglas Young and Co. sold the remaining portion of the High Elms Estate, Streatham (one of the assets of the House and Land Investment Trust). The total realised was £23,758, all but four lots being disposed off.

It is proposed to fill with stained glass a window in the parish church of Forgney, Mullingar, in honour of Oliver Goldsmith, who was born in that parish in 1729 during the twelve years that his father officiated in the church.

The new buildings of the Richmond-street Mission, Walworth, S.E., will be opened by Princess Christian on Tuesday week, the 15th inst. The buildings have been erected from plans by Mr. George Baines, Great Winchester-street, E.C., selected in competition, and include a hall, 53ft. by 33ft., four classrooms, and a kitchen, the main front being towards East-street. Mr. T. D. Leng, of Deptford, has been the contractor.

An indication of the extraordinary development of Blackpool is given by the building inspector's yearly report. During the year 744 houses have been certified for habitation, giving a rate of over two per day. Plans for no less than 112 shops have also been passed. In 1892 only 259 houses were erected. There are at present 688 houses in course of construction.

COMPETITIONS.

BELFAST TOWN HALL.—The city council of Belfast met in committee on Monday, to consider the award of premiums made by the assessors, Mr. Alfred Waterhouse, R.A., and Mr. J. C. Bretland, the borough surveyor, as to the 51 plans submitted in the preliminary competition for the new town-hall. We announced a month ago, on good authority, that the assessors recommended that the authors of Nos. 30, 42, and 43 be invited to take part in the final competition, and accorded the premiums offered. The proceedings of the council on Monday were private; but when the minutes were submitted to a special open meeting on Tuesday, a long and angry discussion arose. Mr. Woodside, in moving their adoption, said that 51 plans had been received. These had been considered by the assessors, and three out of the number were finally selected. But the majority of the corporation thought that the assessors had overlooked that the instructions to the architects contained a clause suggesting that the proposed new town-hall should have a large central hall. In the three plans selected this hall had been left out entirely, but the suggestion had been made to have this deficiency supplied. As he had stated, out of the fifty-one plans sent in, three had been selected, and they asked the corporation to confirm this selection. Mr. Masterson said some who had sent in plans had been unfairly treated. They had appointed as an assessor an eminent professional man to act with the city surveyor. This gentleman received £300 for his services in enlightening them as to what were the best plans to choose. This assessor and the surveyor had selected three for the final competition, and one of those three they ought to adopt, provided that it came within the amount of money they desired to expend. Each one of the final three, they should understand, would be entitled to a prize of £100. The council, however, had taken upon itself to override the decision of the assessors, and had considered two plans in addition to the three selected by the assessors, and when they came to their decision they had rejected one the assessors had selected, and included one of those they had brought in themselves in the three placed on the final list. At the meeting of the council in committee the previous day, the fourth plan, one of those outside the selection of the assessors, had received five plumpers. It was well known, he added, who had sent in that plan, and it had been stated by Councillor Young deliberately that it had been sent in by a certain gentleman in Belfast. He held that those five plans should not have been before the council. They should have considered the three the assessors selected, and those three only. The other gentlemen, he maintained, had reason to complain of their treatment. Mr. Young said the affair was an unmitigated job. Owing to the action taken on the previous day they would be practically tied down to one plan—namely, that sent in by Mr. Watt. The others, as they knew, exceeded the sum mentioned in the conditions. It was distinctly stated in the conditions that a central hall, though suggested, was not obligatory in the plans. A most improper thing had been done in interfering with the envelopes in which the names of the owners of the plans of the assessors' selection were contained, and in the bringing in of other plans not included in that selection. It was distinctly provided also that no canvassing of the officials or assessors of the corporation in connection with the plans should be permitted, and that the design of any competitor violating this condition should be invalidated. He would put it to the consciences of those who, having three votes, plumped for Mr. Watt's plan on the previous day, whether they could say that they had not been canvassed. By some mysterious means a number of the corporation were invited back to inspect plans which Mr. Waterhouse had told them were utterly unsuitable. The town clerk said the assessors had selected three plans from the number submitted to them. When the council had retired, and there were present only Sir William McCammond, the two assessors, and himself, Mr. Waterhouse himself suggested that the names of the three competitors should be ascertained. The envelopes were accordingly opened; but no person living except those he had named knew who the competitors were. Mr. Barklie stated that a letter was received on the previous day protesting against the five plans being brought in. It transpired that of the plans recommended by the assessors two were by Scotch architects,

and one by a Londoner, and that No. 22 had been substituted by the committee for another. After an acrimonious debate, it was unanimously decided to refer the report back to the committee.

GORTON, MANCHESTER.—The urban district council of Gorton have decided to award the premium of 30 guineas, recently offered for a design for the laying-out of the new cemetery and the erection therein of mortuary chapels, to Messrs. Marriott and Sons, of Dewsbury, who have also been appointed architects for carrying out the work, which is estimated to cost about £3,100.

HARPER ADAMS FOUNDATION.—In the competition for the proposed agricultural school buildings at Edgmont, near Newport, Shropshire, 25 sets of designs were received, with the following result:—1st, "Via," Mr. H. Teather, 92, St. Mary-street, Cardiff; 2nd, "Agricola" (B), Mr. H. W. Pye, 1, Verulam Buildings, Gray's-inn, London; 3rd, "O. K.," Mr. G. S. Nicholas, 2, South-square, Gray's-inn, London;—the assessor being Mr. A. E. Lloyd Oswell, A.R.I.B.A., Shrewsbury.

LISKEARD.—An old correspondent writes:—Church competitions in the West country appear to have peculiar fascinations for the profession generally. In the recent one for a new church in the parish of St. Thomas, across the Exe river, and outside the city and county of Exeter, no less than 440 sets of designs were sent in by architects from various parts of the empire. Designs are now advertised for a new western tower for the ancient church of St. Martin at Liskeard, in central Cornwall. Already, we understand, over 200 architects have undertaken the somewhat long journey (265 miles from London) with a view to sending in designs, a personal examination of the actual fabric being one condition of the committee. If it is really a fact—as the wise man says in Proverbs, that "in the multitude of counsellors there is safety"—then the Rev. J. Norris, the present vicar of Liskeard—or *Liskerret*, as it was called in old times—is to be congratulated. Let us hope, however, that too many cooks won't spoil the broth! A choice amongst heaps of designs—especially when many are almost equally good—is sometimes as difficult as it is dangerous, and undesirable. The contemplated expenditure is but £3,000.

SOUTHAMPTON.—The town council discussed at great length, at their last meeting, the report of a committee submitting the award of the assessor, Mr. William Emerson, in the infectious diseases hospital competition. The first premium was given to Messrs. F. H. Greenway and J. A. Smith, the second to Messrs. George F. Halliday and John W. Rodger, and in response to inquiries it was stated that the design by a Southampton architect was placed third in order of merit. The conditions of competition explicitly stated that the hospital should be intrusted to the architect awarded the first premium; but a section of the town council sought to evade this, in order that a local man might carry out the work. Several members professed dissatisfaction with the selected designs, and others raised a question as to the site, which has not yet, it seems, been purchased. Mr. James Lemon, F.R.I.B.A., called on the members, as honourable men, to carry out their engagement. The discussion was eventually adjourned, but the committee's report as to the awards was carried.

On Saturday evening the fourth annual dinner of the Bristol Association of Clerks of Works and Builders' Foremen was held at the Grand Hotel, Broad-street, Bristol. Mr. Frank Willis presided, and the vice-chairs were occupied by Mr. A. Snell and Mr. F. A. R. Woodward. There was a good attendance of members. The toast of the "Builders," proposed by Mr. W. Kidwell, was acknowledged by Mr. E. Walters, Mr. F. N. Cowlin, and Mr. F. A. R. Woodward.

At the last sitting of the Paris Academy of Inscriptions a letter was read from M. Gaukler, Director of Antiquities in Tunis, reporting the discovery at Susa of a well-preserved mosaic, the central figure in which is believed to be Virgil. Dressed in a white toga with blue border, he has on his knees an open papyrus containing the eighth line of the first book of the *Æneid*. The Muse of History and the Muse of Tragedy, standing on each side, are listening. The central figure, beardless and with short hair, agrees with ancient miniatures of Virgil, the only portraits hitherto known. The mosaic is thought to be a contemporary copy of some celebrated work, perhaps one of the vignettes mentioned by Martial.

ARCHITECTURAL & ARCHÆOLOGICAL SOCIETIES.

THE ARCHITECTURAL ASSOCIATION OF IRELAND.

—The ordinary meeting of this association was held on Tuesday night, at the Grosvenor Hotel, to consider the rules of the association and the syllabus for the ensuing year. The rules have been based on the London A.A. rules, and are almost identical with them. Mr. R. Caulfield Orpen, president, was in the chair. It was resolved that the rules as drafted by the committee be adopted, and that the syllabus outlined by the committee be also adopted, and include the following:—(Classes: Elementary and advanced building construction; elementary and advanced class of design; elementary quantities, estimating, and specification writing. Fortnightly lectures, with discussion, at which the following gentlemen have promised a paper:—Mr. T. Drew, "Architecture of Dublin"; Mr. W. G. Doolin, "Early Irish Art and Cotemporary Work on the Continent"; Mr. J. W. Bowcher, "Electric Lighting of Buildings"; Mr. W. Kaye Parry, "Drainage and Sanitary Construction"; Mr. Ald. Maguire, "Heating of Buildings"; Mr. F. Batchelor, "Hospitals, and Hospital Construction"; Mr. J. C. Buckley, "Medieval Embroidery, and Character of Ancient Vestments"; also Messrs. J. J. O'Callaghan and Howard Pentland. Visits to buildings in progress are being arranged for Saturday afternoons. It was also resolved to admit country members at a reduced fee of 5s. per annum. The presidential address is to be delivered at the Grosvenor Hotel on Tuesday, the 15th inst. The following prizes have already been offered, and conditions of same will be given in the syllabus shortly to be issued:—The Maguire Travelling Studentship, value ten guineas, for best set of measured drawings, the successful candidate to join the London A.A. Excursion of 1897; the Ashlin Prize of ten guineas, for the best design; the Slevin Prizes—first prize £5, second £2 10s.—for constructional designs. The association also intend to offer a prize for the best essay. Full particulars of the above prizes will be given in the syllabus, and will be open to all members both in Dublin and country. Mr. T. Drew has kindly promised to act as one of the judges of the prizes. The committee as elected are: President, Mr. R. Caulfield Orpen; vice-presidents, Messrs. J. Howard Pentland and Joseph Holloway; committee, Messrs. H. Allberry, F. Batchelor, A. I. McGloughlin, J. F. Macaulay, A. W. Moore, L. O'Callaghan, T. Coleman, M. J. Tighe, and J. H. Webb; hon. secretaries, Messrs. William R. Gleave and R. M. Butter; hon. treasurer and librarian, Mr. Fredk. Hicks; hon. auditors, Messrs. W. F. Becket and T. F. Slevin.

GLASGOW ARCHITECTURAL ASSOCIATION.—A meeting of this association was held at the rooms, 187, Pitt-street, on Tuesday evening, December 1. Mr. Wm. T. Connor occupied the chair. Mr. C. E. Whitelaw read a paper on "French Renaissance." He gave a short historical account, speaking more particularly on the chateau, and instanced a number of the best examples. He drew a comparison between the French chateau and Scotch castellated work; the former sumptuous and profusely decorated, the latter oftentimes bare and meagre in the extreme. Mr. Salmon thereafter read a paper on "Architects: their Relaxation." To design a house, the architect must have social intercourse with the inhabitants thereof, before he can build a house to suit his clients. To design hotels, churches, theatres, &c., he should frequent these various places in order to fully understand the various requirements of the work as it should be done. By this means he is not only indulging in necessary recreation, but is also (if he uses his opportunities aright) increasing his faculties as an architect. At the conclusion a vote of thanks was accorded to both essayists.

THE ROYAL INSTITUTE OF THE ARCHITECTS OF IRELAND.—The ordinary monthly meeting of the Royal Institute of the Architects of Ireland was held on Monday, the 30th ult. On the ballot papers being opened, the following were announced duly elected as members—viz., R. M. Butler, J. H. Lundy, G. P. Sheridan, F. Hayes, and V. Haghe. Communications from the Royal Institute of British Architects were duly considered. Recommended list for council and officers for 1897 was then arranged for ballot at general annual meeting. The annual general meeting was fixed

for the 17th inst., at 4.30 o'clock, at their rooms, 37, Dawson-street. The annual dinner will be held afterwards at the Central Hotel.

CHIPS.

Thanks to the fact that the palace fire brigade were promptly set to work, the fire which broke out in the grand saloon in Blenheim Palace on Wednesday afternoon was soon extinguished, but not before considerable injury had been done to Laguerre's painting in the centre of the ceiling, depicting episodes in the first Duke of Marlborough's military career.

On Tuesday week, Mr. G. W. Willocks, M.I.C.E., resumed the Local Government Board inquiry as to an application by the Lowestoft Town Council for sanction to a loan of £7,000 for the purpose of a new sewage outfall. There was considerable opposition to the scheme.

In connection with the works in progress at Whippingham Church for Princess Henry of Battenberg, Mr. Ion Pace, of Fulham-road, has been commissioned to fill the windows with stained glass from designs he has submitted.

The foundation-stone was laid last week in Eldon-street, Cardiff, of a new Baptist chapel. The building will be Gothic in style, and will seat 314 persons on the ground floor and 274 in galleries. Messrs. Habershon and Fawcner, of Cardiff, are the architects, and the contract for the first section of the scheme has been taken by Messrs. C. Price and Son, Wyndham-road, Canton, Cardiff, at £2,425.

Mr. G. A. Storey, A.R.A., will give a lecture on "Colour," on behalf of the Hampstead Art Society, at the Vestry Hall, Haverstock-hill, on Tuesday evening next.

The ancient parish church of Heneglwys, near Llangefni, was reopened on Tuesday after a thorough restoration and reseating at a considerable cost, from the designs of Mr. P. S. Gregory, architect, Bangor, the diocesan surveyor. Messrs. R. and G. Williams, Bangor, were the contractors. With the exception of Beaumaris, all the churches in Anglesey have now undergone restoration.

The Duke of Buccleuch has resolved to make a gift to the village of Newcastleton. Plans have been prepared by the Duke's architect for a clubhouse containing reading-room, refreshment-room, and caretaker's house, &c. The building will be of two stories, and will be constructed of freestone.

A new board school in Bronghton-road, Edinburgh, has just been opened. It accommodates 1,358 children, and has cost £24,500. Mr. Robert Wilson, of Edinburgh, was the architect, and Mr. William Gerard the contractor.

A fragment of an old cross has stood for many years in the churchyard outside the main entrance of Cutcombe Church. This has lately been restored in memory of the late Mr. John Myers King, who is buried in a small vault under the cross, and who was the eldest son of a former vicar of Cutcombe. The restoration work has been executed by Mr. J. S. Farley, of Kensal Green. The ancient part consists of a base 2½ ft. square, and a part of a shaft, together 3½ ft. high. The cross as restored stands on a base of York stone 9 ft. 6 in. square, and rises to a height of 16 ft. The shaft is octagonal in shape, tapering upwards to the fluted cross. The new parts, with the exception of the base, are of Ham Hill stone.

The house in Holland Park-road which belonged to the late Lord Leighton, and built from designs by Professor G. Aitchison, A.R.A., P.R.I.B.A., has been offered by his sisters as a gift to the nation, subject only to an assurance that the house will be suitably maintained, and that the Arab Hall is to be permanently preserved as it was at the time of Lord Leighton's death last January. The absurd suggestion has been made in the daily press that the Arab Hall should be removed, and rebuilt in South Kensington Museum.

At a meeting of the Bath City Council, on Tuesday, some bequests to the city were reported under the will of Mrs. Roxburgh, who died last week. In addition to legacies to charities in Bath and elsewhere, the sum of £12,000 is to be devoted to establishing a fund for the granting of annuities to unmarried women and widows. One-fourth of the residuary estate is bequeathed to provide scholarships at the Bath Technical Schools, and the remainder, about £8,000, for the erection of an art gallery.

A three-light stained-glass memorial window has been erected in the Westport Congregational Church, Malmesbury, to the memory of the late Samuel Randall, the subjects representing Faith, Hope, and Charity, the large centre light containing that of Charity by a representative of the Good Samaritan; on either side that of Faith and Hope by emblematic figures, the work of Messrs. Swaine, Bourne, and Son, Birmingham and London.

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ILLUSTRATIONS.

CHATHAM MUNICIPAL BUILDINGS AND TOWN HALL.—HOUSE AT LENTON PARK.—"FERNLEIGH," NOTTINGHAM.—"BUILDING NEWS" CLUB DESIGNS FOR A PAIR OF COUNTRY COTTAGES.—WESLEYAN CHAPEL, GARTON-ON-THE-WOLDS.—CEMETERY LODGE AT SNOPLAND.

Our Illustrations.

CHATHAM TOWN HALL AND MUNICIPAL BUILDINGS.

THE site for the above is at the end of the Military-road, in front of St. Mary's National Schools. It was purchased by the corporation from the War Department, and is in every sense a good position, one of its chief advantages being that it will have a good carriage-road on each of its four sides. The municipal offices are all arranged on the ground floor, opening out from spacious corridors, with good and convenient lavatory accommodation. On this floor are also two committee rooms, one large and the other a smaller one. The large one has a special staircase communicating with the town hall above, and may be used as a supper-room upon occasions when the town hall is let for a ball or party. The first floor is entirely taken up with the town hall, council chamber, and mayor's parlour, with staircases, lavatories, &c. This floor is approached by a broad flight of marble steps leading from the entrance hall. There are also three other staircases arranged as entrances and exits to and from the town hall. Over the back of the hall is a gallery capable of seating about 150 persons. Opening from the platform at the other end of the room are ladies' and gentlemen's retiring-rooms, with proper lavatory accommodation, and above these is a large room for an orchestra, with a projecting balcony front, an arched opening, 25ft. wide, connecting this room with the hall. This is well shown in the interior view of hall as illustrated. Caretaker's premises are provided on the second floor, over the landing and mayor's parlour. Ample storage is provided in the basement, and also rooms for engine and dynamo, kitchen, &c., and heating apparatus. The heating will be by low-pressure hot water, and the lighting by electricity. The buildings will be faced with Monks' Park stone, with Portland stone dressings and weatherings. Mr. George E. Bond, M.S.A., of Rochester, is the architect.

HOUSE, LENTON PARK, NOTTINGHAM.

THIS house is being erected for Mr. W. G. Player on a charming site in Lenton Park, near Nottingham. It is built of Ruabon bricks and red Corsehill stone, with random work built indiscriminately in the brickwork. Portions of the elevations are tile-hung. The timber framing and the windows are of Californian red-wood. The interior will be richly fitted up in various hardwoods. The cost, including lodge and stabling, will be about £7,000, and the work is being carried out by Messrs. Fish and Son, under the supervision of the architects, Messrs. Marshall and Turner, King-street, Nottingham.

HOUSE, ALEXANDRA PARK, NOTTINGHAM.

THIS house, now in course of erection for Mr. J. D. Player, is a remodelling of an old house,

with considerable alterations and additions. It is built of Ibstock bricks and fine Hollington stone, portions of the walls being covered with tiles or Portland cement rough-cast. All the principal rooms will be fitted up in hardwoods. The cost, including stabling, &c., will be between £5,000 and £6,000. Mr. T. Barlow is the builder, and the work is being carried out under the supervision of the architects, Messrs. Marshall and Turner, King-street, Nottingham.

"BUILDING NEWS" DESIGNING CLUB: A PAIR OF COUNTRY COTTAGES.

(See description on p. 803.)

A VILLAGE CHAPEL: GARTON-ON-THE-WOLDS.

THIS Wesleyan Chapel has recently been erected at Garton-on-the-Wolds, East Yorkshire, on a piece of land presented by Sir Tatton Sykes, Bart. The materials are red pressed bricks with Whitby stone dressings, and the interior woodwork is pitch-pine. The building will accommodate 200 persons, and the total cost has been about £750. It has been built from designs by Mr. Joseph Shepherdson, architect, Hull and Driffield.

CEMETERY LODGE AND CHAPEL, SNOPLAND, KENT.

THIS populous and increasing village has found it necessary to acquire a new burying ground. The spot chosen has a subsoil of chalk, and is interesting as being near the prehistoric cemetery called Bury Hill. The buildings are of simple arrangement, and consist of a small chapel separated from a chamber for the reception of the coffin by a fixed and impervious glass screen. The entrance doors are under the shelter of the upper story of the lodge. The walls are of Kentish rag stone, and the roof is covered with tiles. Mr. Hubert Bensted, F.R.I.B.A., of Maidstone, is the architect.

African House, Water-street, Liverpool, has been rebuilt at a cost of £15,000, from the plans of Mr. J. F. Doyle, architect, of Harrington-street, in that city.

Col. Coke, A.M.I.C.E., Local Government Board Inspector, conducted an inquiry at the Council Office, Ilford, on Thursday, respecting the application of the urban district council to borrow £3,000 for works of sewage disposal in accordance with plans prepared by Mr. W. Santo Crimp, C.E.

A contract for the Torrington and Okehampton Railway has been taken by Messrs. Topham, Jones, and Raiton. The line will be 20½ miles in length, commencing by a junction with the North Devon line of the South-Western Railway at Torrington Station, and terminating by a junction with the main line of that railway from Exeter to Plymouth and North Cornwall, a short distance from the Okehampton Station, with running powers into the same station, and the use of that and Torrington stations.

The Artisans' Dwellings Committee of the Aberdeen Town Council received, on Friday, plans submitted by the city architect, showing houses for two tenants and for four tenants, with two or three rooms each. The committee considered that what were wanted were not houses for two tenants at rents of about £12, but houses for a larger number of tenants at lower rents. The architect was therefore instructed to alter the plans for the two-tenant houses so that three tenants might be accommodated in the houses, at rents of between £7 and £8. He was also instructed to again bring forward plans which had been before a previous meeting for tenement houses for six families, at rents of between £7 and £8 each.

The memorial-stone of the Seamen's Institute mission house was laid in Suffolk-road, London-road, Lowestoft, on Friday last. The building is being erected by Messrs. Cornish and Gaymer, of North Walsham, from plans by Sir Arthur W. Blomfield, A.R.A. The length will be 60ft. and the breadth 34ft. inside the walls. The front elevation will be 33ft. in height, and the structure will comprise two stories, one to be devoted to a recreation-room, a private room, hook-room, kitchen, and lavatory; and the other will be set apart for religious ceremonies.

At the first meeting of the Salt District Compensation Board, held at Northwich on Friday, Sir Joseph Verdin was appointed chairman, and notices of claims from 171 property owners, representing 654 buildings and a rateable value of £11,120, were handed in. Four applications were received for the position of surveyor and valuer of claims, and Mr. E. T. Ward, C.E., of Northwich, was appointed, his salary for the first year, in which the work will be heavier than subsequently, to be £200 and out-of-pocket expenses.

Engineering Notes.

TULSE HILL, S.W.—Among the bridges on the London, Brighton, and South Coast Railway system which are being strengthened or renewed under the direction of Mr. Charles L. Morgan, the company's chief engineer, is that at the south end of Tulse Hill Junction Station, which carries the Peckham and Sutton line over Norwood-road. The bridge has a clear span of 67ft., and it having been found necessary to replace the old structure by a new one, the contract was placed in the hands of Messrs. Eastwood, Swingler, and Co., Limited, of Victoria-street, S.W., and the Railway Ironworks, Derby. The contract included also the removal of the old bridge. The new main girders weigh 22 tons each, and the intermediate work consists of corrugated flooring placed transversely. The bays carrying the up-and-down main lines have been built partly on a disused siding and partly on timber trestles specially prepared for the purpose, and the old work was successfully removed during Saturday night in last week, and the new portion traversed into its permanent position. These operations, which occupied just nine hours, were carried through without any accident. The work was under the personal direction of Mr. Morgan; his assistant, Mr. H. J. Mannering, was also in attendance; whilst the contractors were represented by Mr. Alfred Swingler and Mr. J. A. Arnold, and also by their London agent, Mr. Fred Atkinson.

CHIPS.

A new theatre, to accommodate an audience of nearly three thousand people, is about to be built in Laygate-lane, South Shields, from plans by Mr. Hope. The estimated outlay is about £20,000.

Mr. E. P. Burd, one of the inspectors of the Local Government Board, held an inquiry at the Audit House, Southampton, last week, to inquire into an application by the Southampton Corporation for a provisional order to enable them to borrow the sum of £25,000 for the purpose of further improving the water supply of the town. The waterworks engineer, Mr. W. Matthews, C.E., explained the plans and proposals.

A movement is on foot for the enlargement and reconstruction of the cathedral organ at Lincoln. It is thought that the work would cost from £3,000 to £4,000, and three offers of contributions towards the fund have been spontaneously made, amounting to over £1,500.

It was reported to the town council of West Ham at the last meeting that the cost of collection of house refuse for six months in the south and three months in the north district, under the direct control of the works committee, showed a saving of £736 8s. in the council's favour as against the contract system.

The rural district council of Thanet formally approved, on Thursday in last week, of the proposition of the Westgate Parochial Committee to apply for power to borrow £15,000 to carry out the sewage works according to the plans of Mr. Bailey Denton, and the seal of the council was affixed to the agreement with the Margate Corporation for the use of their main trunk sewer.

The new post-office at Tunbridge Wells was opened by the mayor of that borough on Saturday. The building is in Vale-road, and is fitted with the electric light. The builders were Messrs. Peters.

A meeting of the examination committee of the Plumbers' Registration District Council for Liverpool, West Lancashire, Cheshire, and North Wales was held at the offices, 4, Cahle-street, Liverpool, on Thursday evening in last week, when Mr. Henry Hartley, F.R.I.B.A., was unanimously appointed chairman of this committee, in place of Mr. Edmund Kirby, F.R.I.B.A., also of Liverpool, resigned.

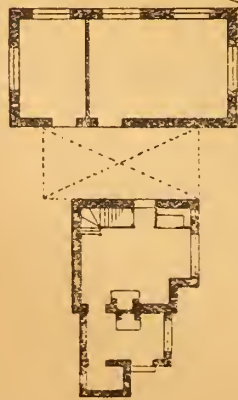
The new Cohurg Hotel in Grosvenor-square, built from designs by Mr. Lewis H. Isaacs, F.R.I.B.A., was inspected by the Duke of Saxe-Coburg and Gotha on Saturday. The hotel has been furnished by Messrs. Maple and Co.

Mr. Ernest T. Hooley, of Risley Hall, Derby, has offered to present St. Paul's Cathedral with a gold Communion service, in commemoration of the 60th anniversary of Her Majesty's accession in June next. The service will consist of two flags, four chalices, and four patens, and contain more than 250oz. of pure gold. The Dean and Chapter have formally accepted Mr. Hooley's offer.

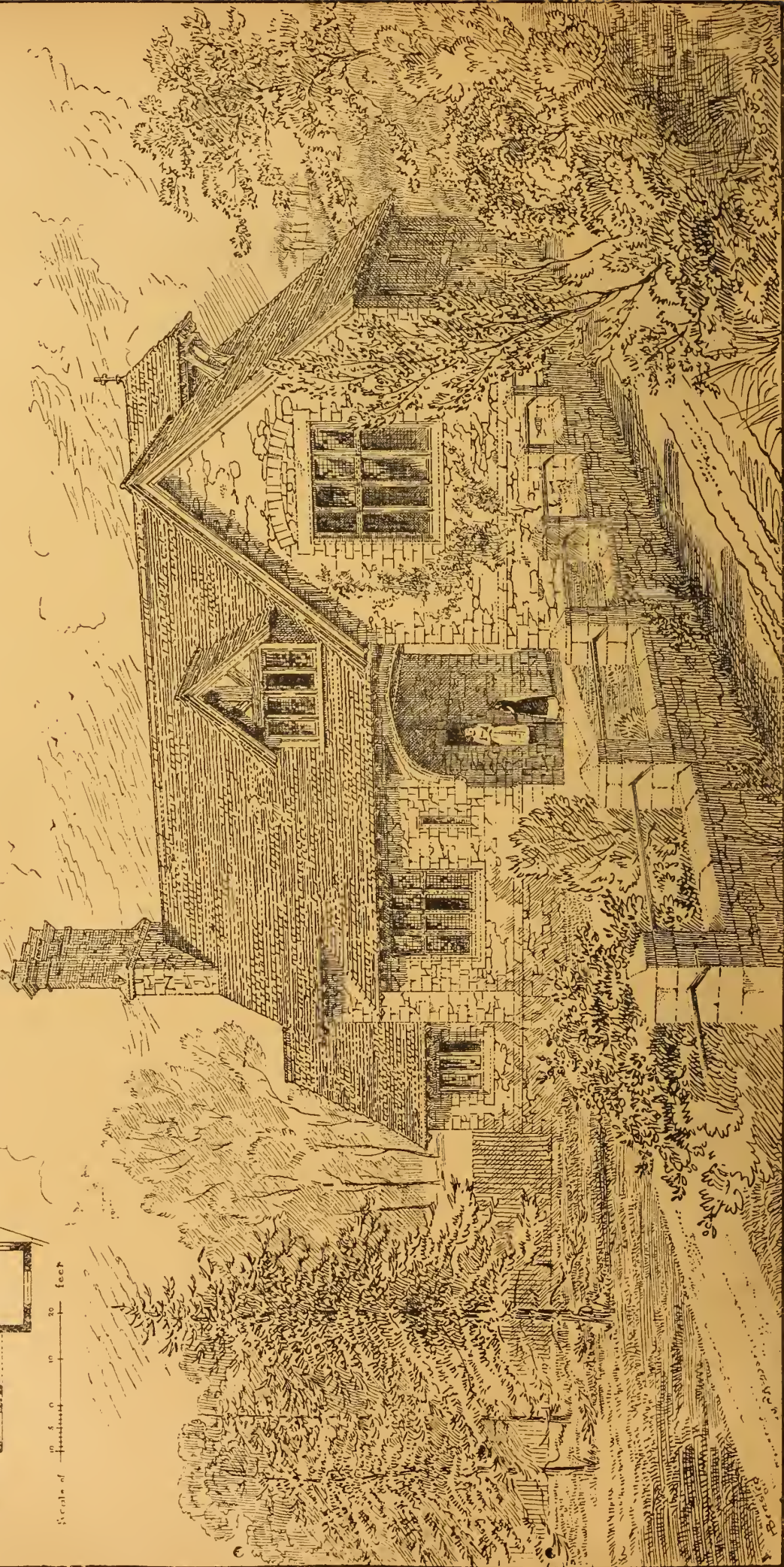
The Temperance Institute at Keighley, which has been built at a cost of £9,000, was opened by Sir Wilfred Lawson, M.P., on Thursday in last week. Messrs. W. and J. B. Bailey, of Keighley, and Bradford, are the architects.

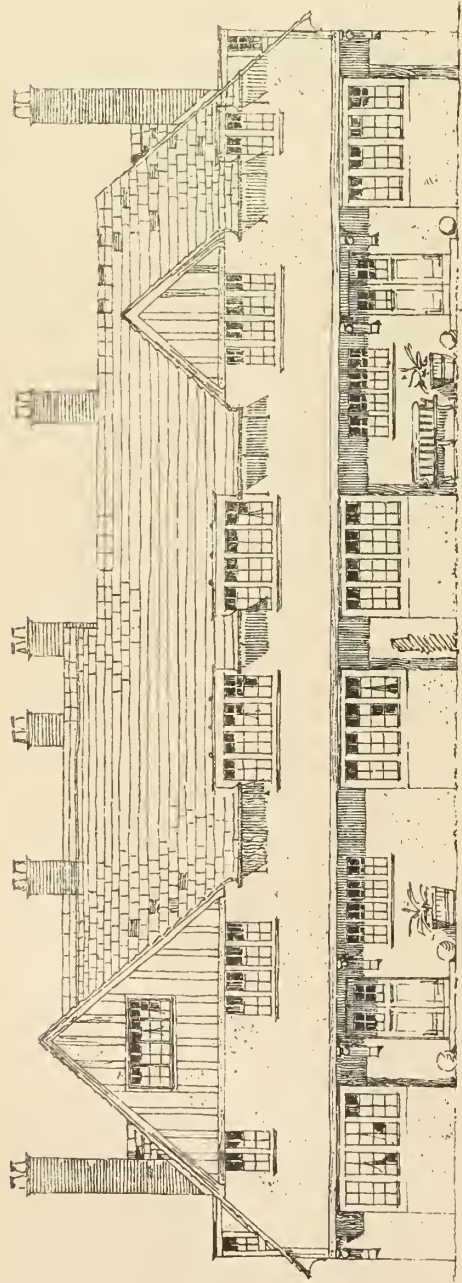
CEMETERY LODGE AND CHAPEL
SHODLAND, KENT

HUBERT BENSTED FRIBA ARCHT



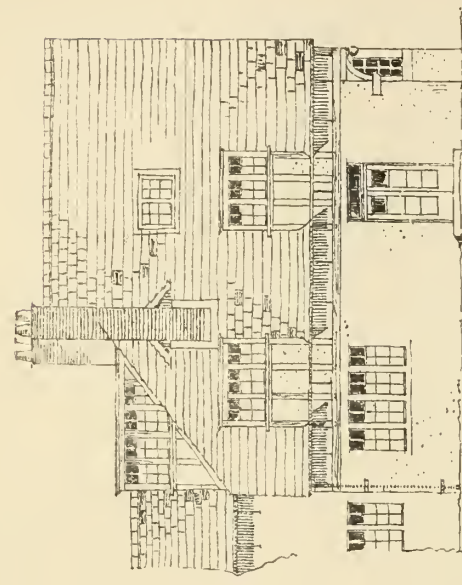
Scale of feet
0 5 10 20





MATERIALS :
Tallow Walls & roughcast
Floors, Long Tiles or Green
slates.

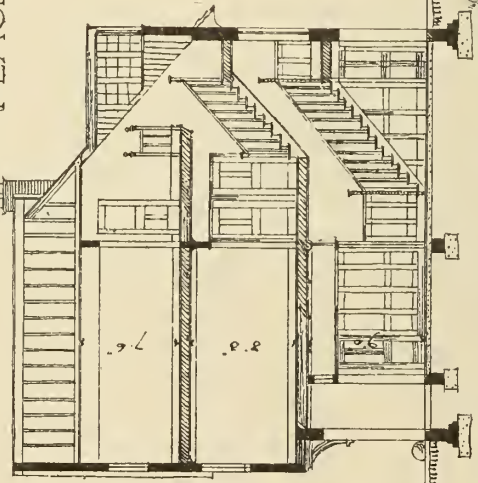
: FRONT ELEVATION :



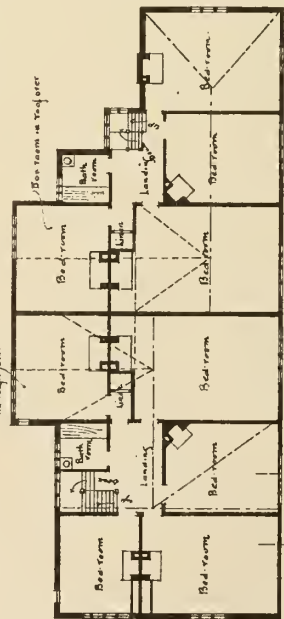
: SIDE ELEVATION : (W)

PLACED FIRST.

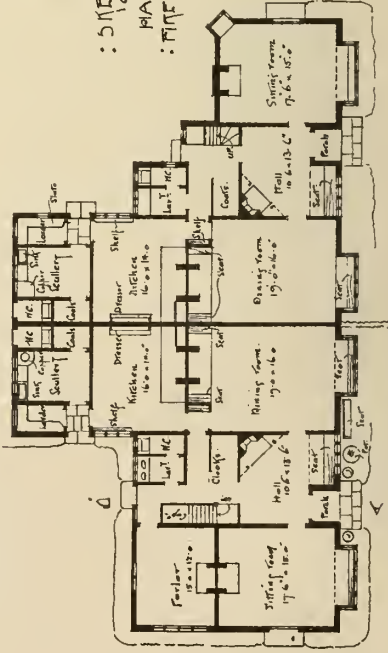
END: DESIGN FOR
A PAIR OF COUNTRY COTTAGES:



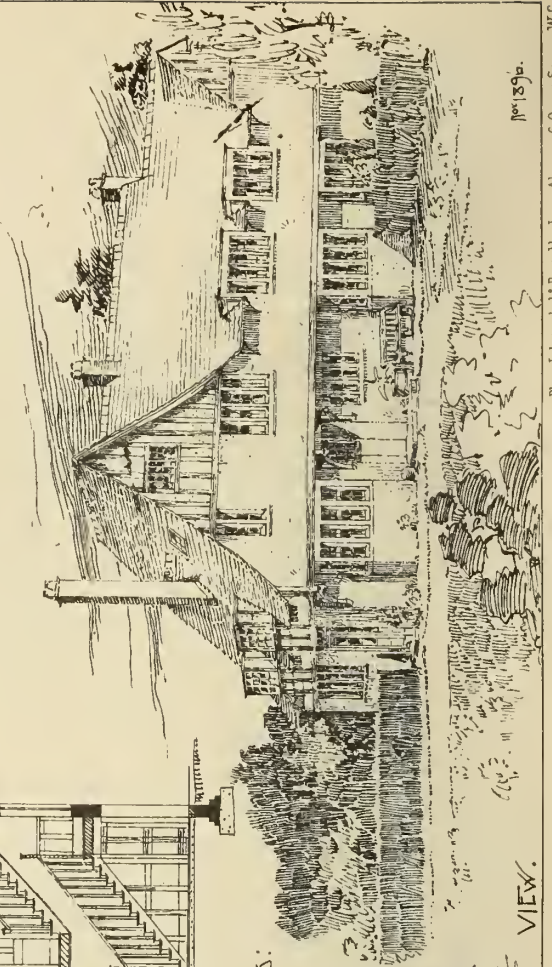
: SECTION A-B :



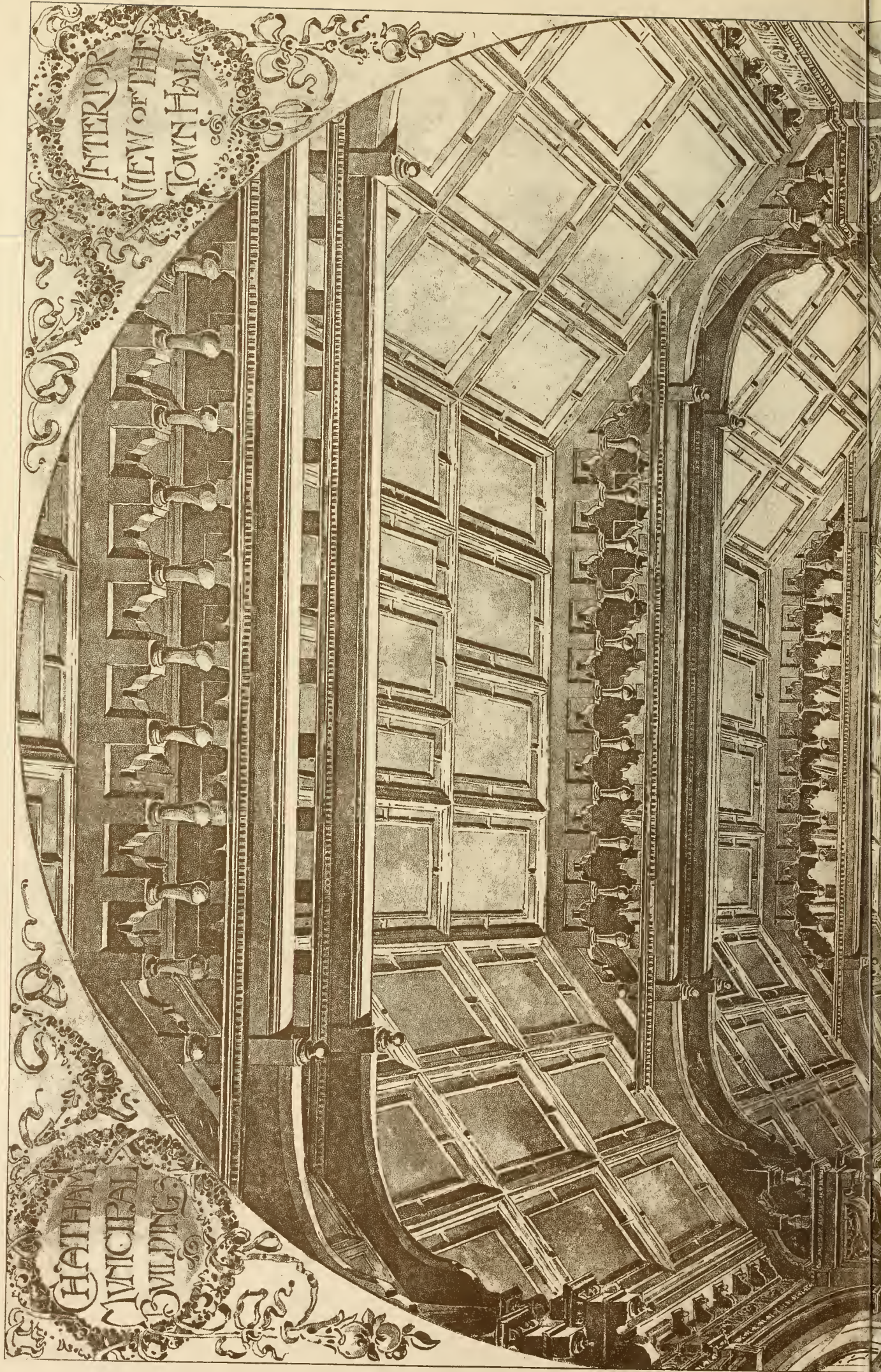
: FIRST FLOOR PLAN :

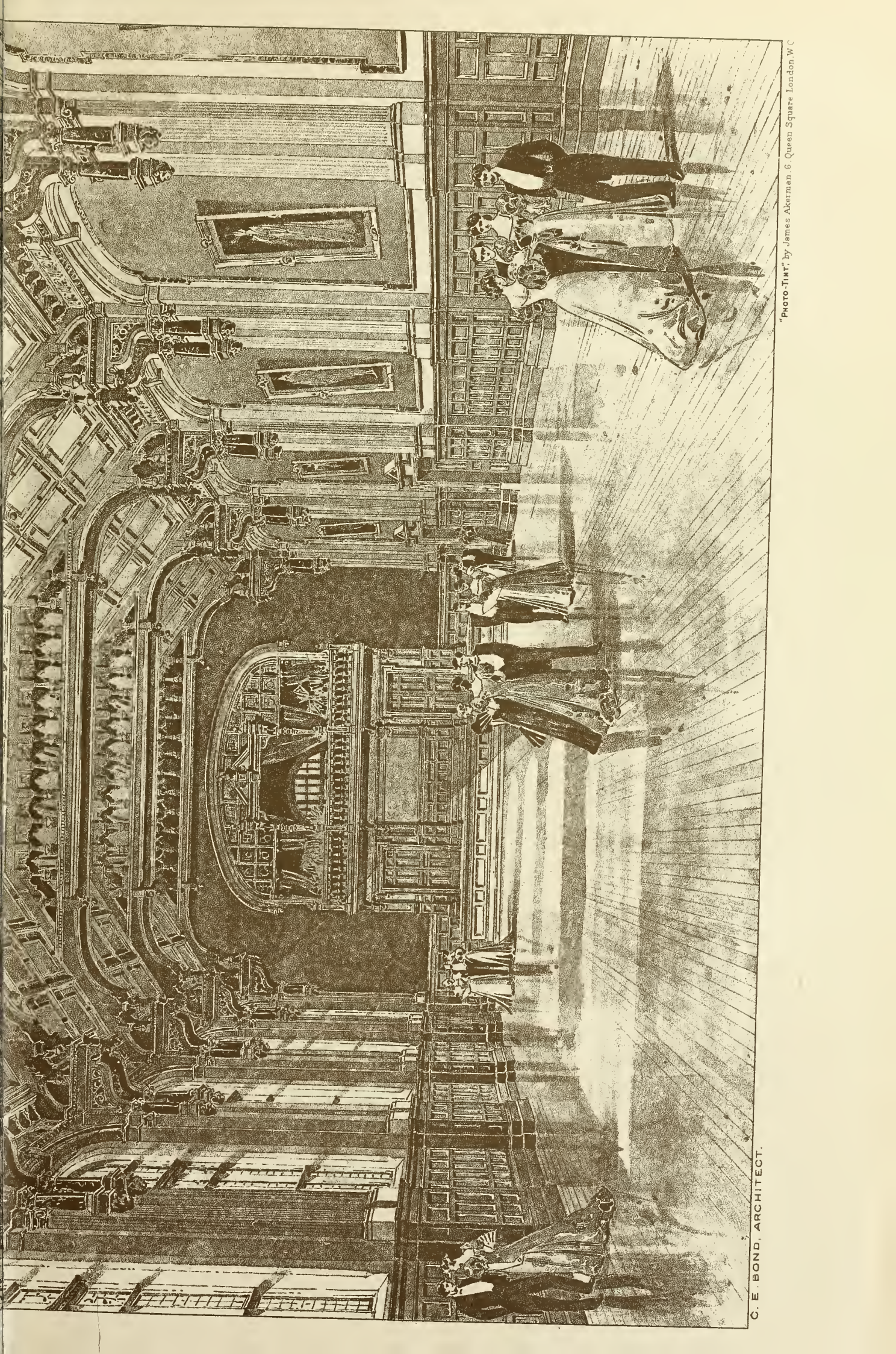


: GROUND PLAN :



VIEW.





C. E. BOND, ARCHITECT.

"PHOTO-TINT," by James Akerman, 6, Queen Square, London, W. C.

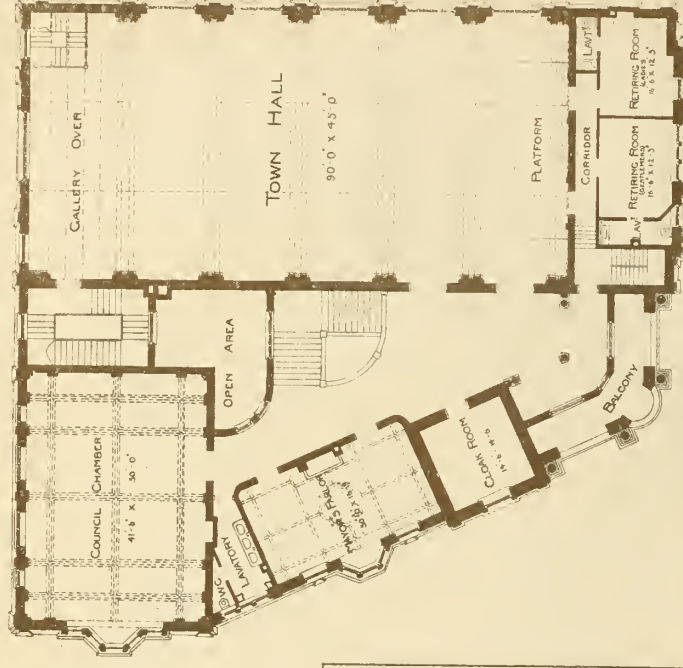
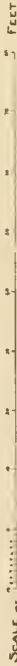
MUNICIPAL BUILDINGS & TOWN-HALLS

CHATHAM

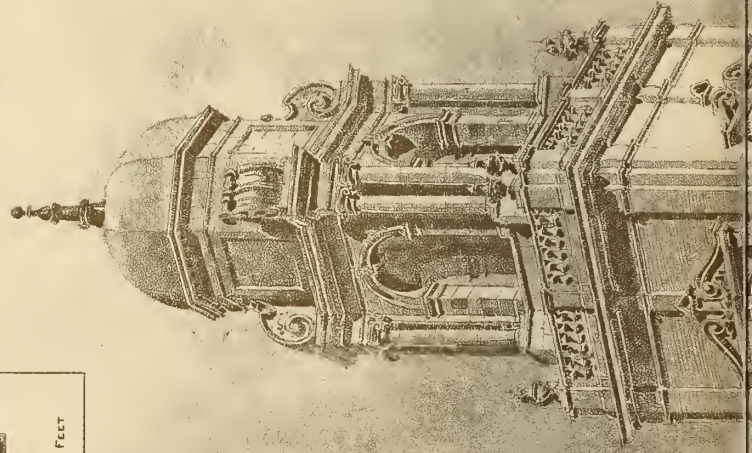
C.F. BOND ARCHT

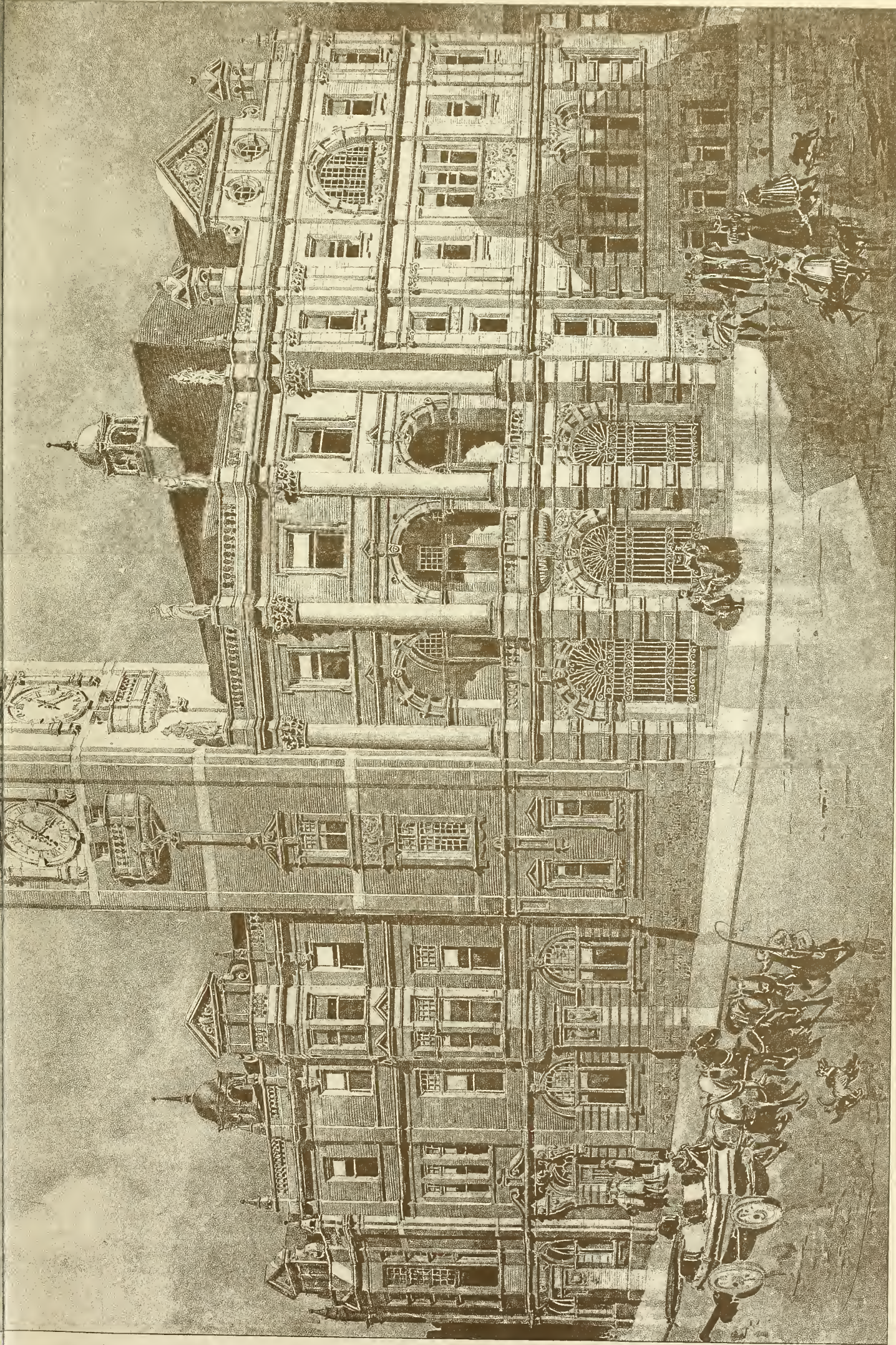


GROUND FLOOR PLAN

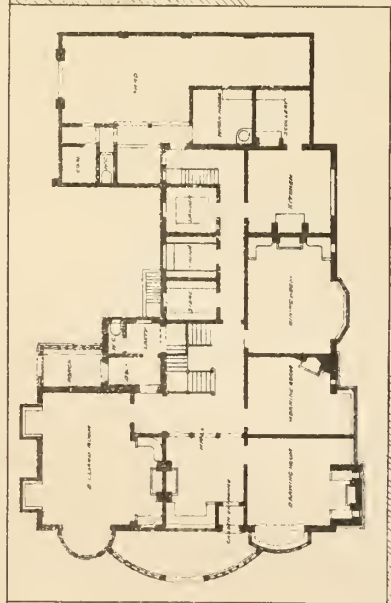


FIRST FLOOR PLAN





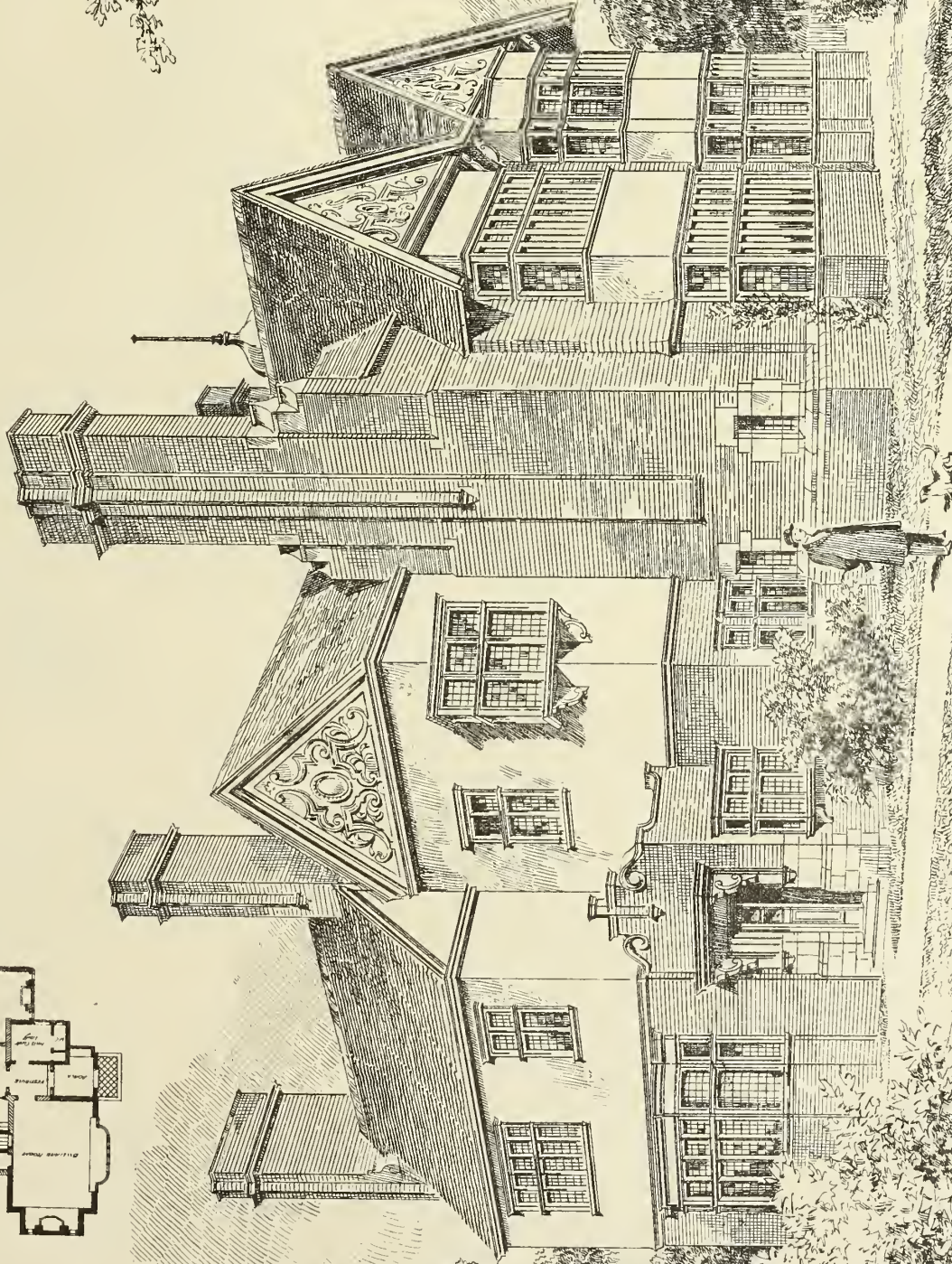
"PHOTO-TINT," by James Akerman, 6, Queen Square, London, W.C.



HOUSE,
LENTON PARK
for W. G. PLAYER esq.
MARSHALL & TURNER ARCHITECTS.

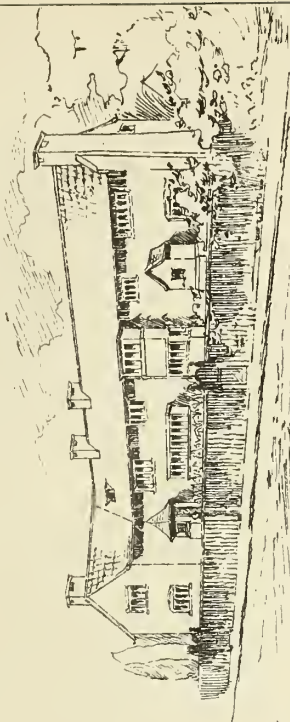
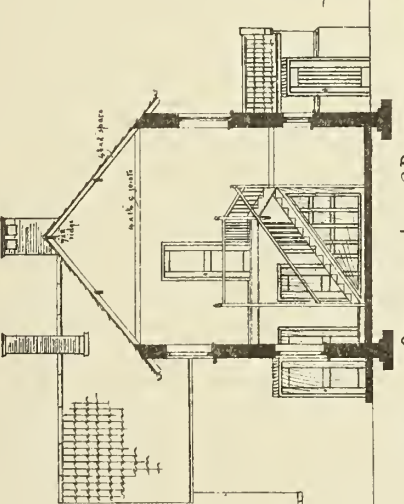
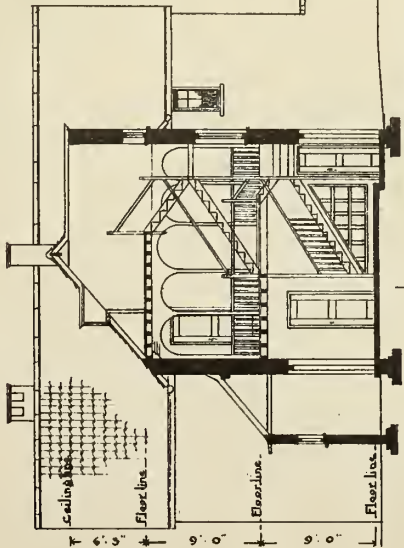
ALTERATIONS TO "FERNLEIGH," NOTTINGHAM.

MESSES MARSHALL & TURNER ARCHTS.



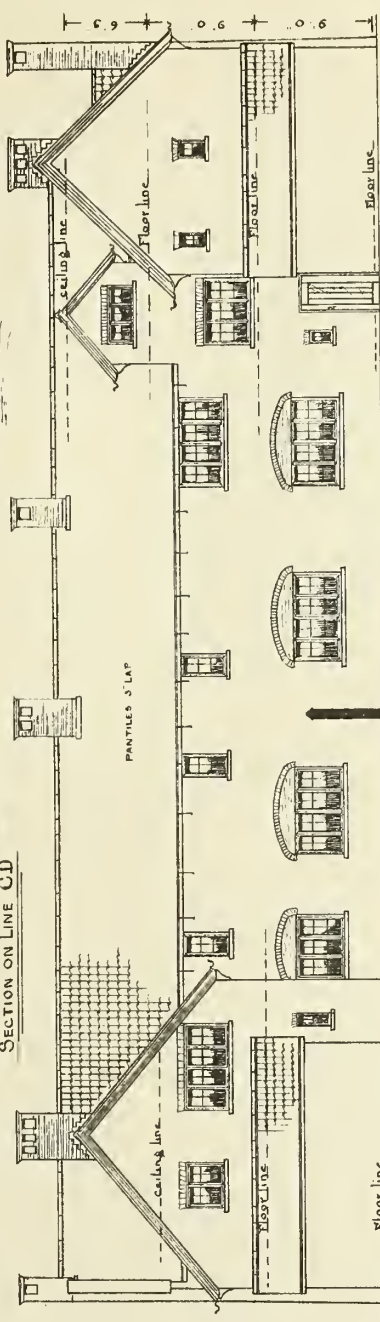
B.N.D.C.

DESIGN
FOR A PAIR OF
COUNTRY COTTAGES
BY
"S" LEONARD

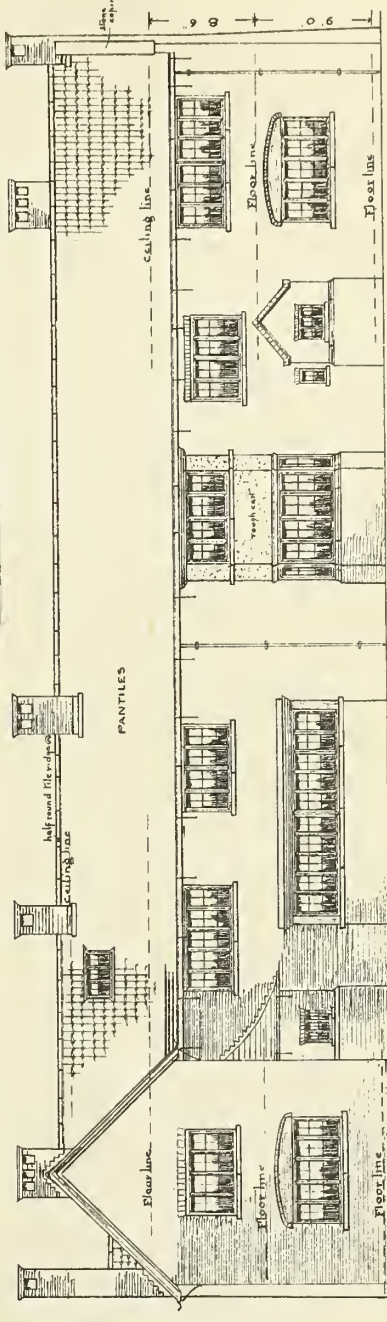


SECTION ON LINE AB

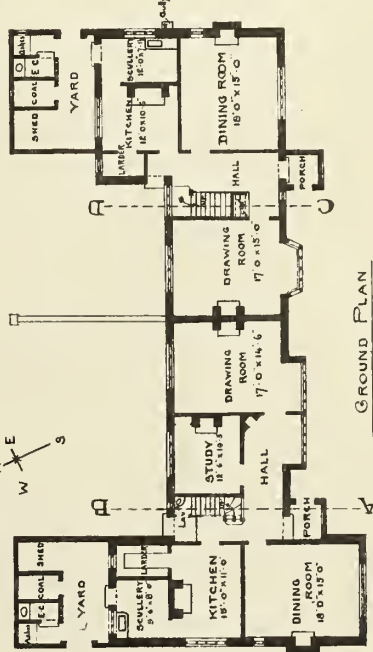
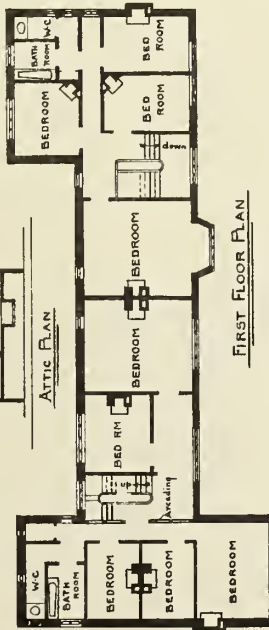
SECTION ON LINE CD



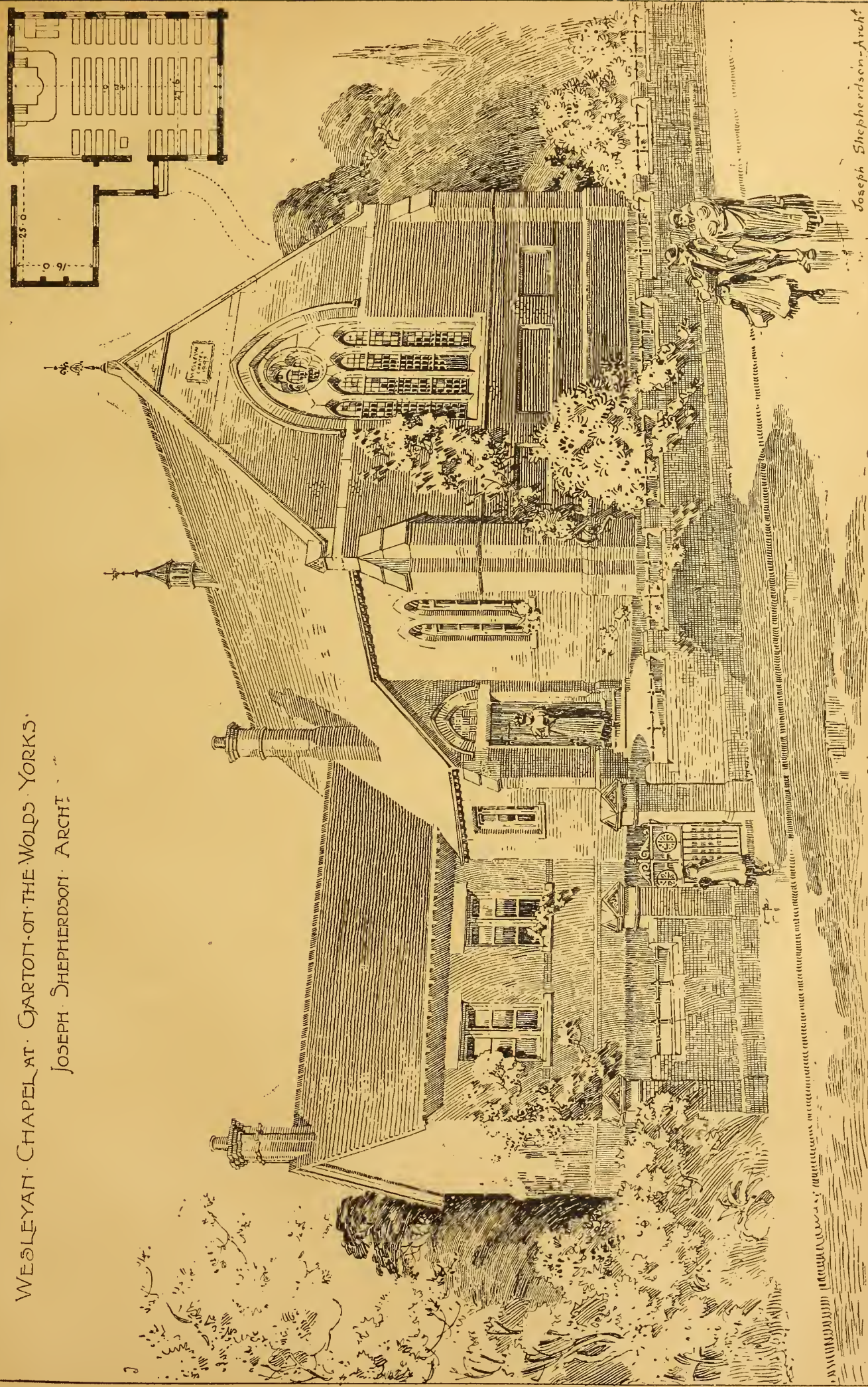
ELEVATION TO NORTH EAST



ELEVATION TO SOUTH WEST



WESLEYAN CHAPEL AT GARTON-ON-THE-WOLDS YORKS.
JOSEPH SHEPHERDSON ARCHT.



Building Intelligence.

BEXLEY HEATH.—The plans prepared by Mr. G. T. Hine, F.R.I.B.A., for a lunatic asylum for the London County Council have been approved by the Home Secretary. The plan is designed on the continuous principle, combined with villas. The entrance block provides committee-room, office accommodation for medical officers, clerical staff, &c. In the centre building to the south of this block are the steward's stores, kitchens, recreation hall, dispensary, and rooms for the principal officers, including a separate block for the assistant medical officers. Flanking the administrative offices on each side are the blocks for nurses and attendants, and in the rear of these are blocks for 120 working patients on each side. On either side of the administrative centre are the wards for the patients, the females on the west side, the males on the east. Each side of the main corridor is formed into a quarter circle, the blocks being stepped back southwards; they are arranged in a continuous series, so that the officers can go their rounds without having to retrace their steps. Part of the main corridor is widened out and arranged in recesses for use as visiting rooms. The laundry and workshop buildings occupy the remainder of the north frontage each side of the entrance block. The patients' blocks are all two stories high. The main building will provide for 1,845 patients, and, in addition, there are provided one detached villa for 35 farm-workers on the male side, two villas, each for 35 women, and a special hospital villa for 50 women, making a total of 1,100 women and 900 men. A chapel will be erected as a detached building on the north side of the asylum, and an isolation hospital is also provided.

FARNBOROUGH.—The memorial-stone of the Town Hall for Farnborough was laid last week. The building, which has been designed by Mr. George Sherrin, will be of red brick with white stone dressings, and in the centre of the roof will be a turret containing clock. The style is ruralised Georgian. The ground floor will contain the large hall, which is to be 75ft. by 34ft. with gallery, and attached to it there will be two retiring-rooms 11ft. square. On the same floor are a committee-room 20ft. by 17ft., and a reading-room of the same size. Separate offices will be provided with private entrances, for the clerk to the council, the surveyor, and the rate-collector. Lavatories have been provided, as well as a kitchen and other offices for the caretaker. On the first floor there will be a smaller meeting-hall, 32ft. by 20ft., serving as council chamber. On this floor, also, there are to be two living-rooms for the hall-keeper. In the roof will be a store-room. The roof is to be of green Westmoreland slate. The contractor is Mr. E. C. Hughes, of Wellingham.

GARTLOCH, N.B.—The new lunatic asylum at Gartloch, belonging to the Glasgow District Lunacy Board, has just been opened. It has been built from designs by Messrs. Sandilands and Thomson, of Glasgow, the chief contractors being Messrs. Herbertson and son, and the cost has been about £150,000. The estate, which cost £8,500, covers 340 acres, and is situated seven miles east of Glasgow. The building has been six years in course of erection, and accommodates 530 patients and an official staff of 150. It is François Premier in style, the external walling being of red sandstone. There is a central administrative department, flanked by a tower at each angle 130ft. high, and four blocks each of two wards for patients, connected with this department by covered ways, besides the usual hospital, chapel, mortuary, and other detached buildings.

GLASGOW.—The new Pathological Institute connected with the Western Infirmary at Glasgow has just been opened. The building consists of two floors, and is lighted throughout by electricity. On the ground floor are a chemical laboratory, a balance-room, rooms for the professor and his assistants, and a laboratory for private research. There is a museum equipped from the existing university and infirmary pathological departments, a post-mortem theatre, a mortuary, and a mortuary chapel. Besides these there are a lecture theatre with a photographic dark-room attached, various workshops, and the engine-room. On the upper floor are the upper portions of the two theatres and the museum, two

practical classrooms, and a bacteriological laboratory. The building cost some £15,000 and was designed by Mr. John Burnet, F.R.I.B.A., of Dowan-hill, Glasgow.

MANCHESTER.—A special general meeting of the Trustees of the Royal Infirmary has been called for Monday week, the 14th inst., in the Memorial Hall, Albert-square, to receive and consider the recommendations of the Grand Committee as to the rebuilding of the Infirmary on the site where it now stands. It will be recollected that in the competition between the selected firms of architects, in July, 1895, Mr. Alfred Waterhouse, R.A., awarded the first premiums for plans for the reconstruction to Messrs. Simpson and Milner-Allen, of London, those by Mr. Alexander Graham, F.S.A., London, being placed second in merit, and those of Messrs. T. Worthington and Son, of Manchester, third. Since then no practical steps have been taken to realise the scheme. The Grand Committee now recommend that the selected plans be adopted for rebuilding on the existing site, at a probable cost of nearly £200,000, while a sub-committee propose to improve the present building, and to erect an annexe at Stanley-grove, at an estimated cost of £105,000.

NEW CLARIDGE'S HOTEL.—On Saturday last (by permission of Messrs. Trollope and Sons) Mr. Charles Mitchell, accompanied by about 120 masters and members of the Polytechnic Building and Architectural Classes, Regent-street, W., paid a visit to Claridge's new hotel, Brook-street, Grosvenor-square, now in course of erection from the designs of the architect, Mr. C. W. Stephens, Hans-place. The party was met by the representative of Messrs. Trollope, Mr. Matthews, who gave a description of the building and the materials used. The building consists in plan approximately of a hollow square. The principal entrance is in Brook-street, and consists of two large archways for the entry and exit of carriages, communicating directly with the courtyard, which is to be laid out as a winter garden and surmounted by a glass dome, also with the principal reception rooms. The chief difficulty occurred with the foundations, owing to the "brook" that flows across the site from which the street takes its name. The ground was taken out to the water-level, and a uniform bed of concrete 3ft. 6in. deep laid over the whole site, and extending about 12ft. beyond the external walls on each side, and upon this the piers were set out and reared. The cast-iron stanchions that support some of the upper walls and floors are bedded on circular C.I. bases 6ft. in diameter, under which are inserted steel joists embedded in the concrete bottom. The red facing bricks are from Messrs. Thomas Lawrence and Sons, of Bracknell, also the rubbers for the gauged work. Fletton bricks are used for the backings. At intervals in the inner jambs of all the openings sawdust fixing bricks from Antwerp are bedded to form the fixing for the joinery. All the half-brick partitions throughout the building are constructed of these bricks, which, owing to their great porosity, resist the transmission of sound to a great degree. The mortar is composed of one of Portland cement to four of Thames sand. The flues throughout the building are constructed of circular tubes of fireclay 12in. diameter. The courtyard is faced with white glazed bricks with 9in. bands of a light brown tint at intervals. The window openings here are spanned by lintels formed of glazed bricks, which have a small triangular portion cut from the margin about the frog at the upper end of the bricks, forming, when the same are laid side by side on the turning piece, a diamond-shaped orifice into which Portland cement grout is poured, filling up the frogs and forming a joggle of that material. These lintels save the cutting of radial joints, or the delay involved in manufacturing special bricks. The floors throughout are fire-resisting, being constructed of steel and concrete formed of 1 of Portland cement to 6 of broken brick laid on a centring of corrugated iron, which is bent to an arched form about 4ft. 6in. in span; wood ceiling joists are notched on the steel joists, and to these fibrous plaster slabs will be fixed to form the ground for the plaster ceilings. The roof will be of steel and concrete, similar to the floors, with the exception of the iron centring. The whole of the architectural stonework will be of red Mansfield. The columns of the principal entrance are monoliths of Shap granite of a dark red tint. The reception rooms will have parquetry floors, while the corridors will be covered in mosaic. The heating will be by hot water, special

apparatus being employed to soften the water before it is circulated, and thereby make it possible to use pipes of a much smaller bore than is usual. Arrangements have been made to supply all rooms with filtered air, and it when vitiated will be discharged by flues leading into a very high stack. The drains, owing to the sewers in that neighbourhood not being deep, will mostly be above the basement level. The soil drains will be of iron, the remainder of stoneware. After a tour of inspection over the building the party met on the ground floor, where a vote of thanks to Mr. Matthews for his able and weighty descriptions, proposed by Mr. Charles Mitchell, and seconded by Mr. T. Hobart Pritchard, was carried with enthusiasm.

ST. PAUL'S CATHEDRAL MOSAICS.—The mosaics which occupy the spandrels of the arches in the choir of the cathedral are now complete along the north side, while those on the south side are being pushed forward, and by St. Paul's Day, Jan. 25, all the scaffolding will be removed. The pictures are executed in the rough mosaic work also employed by Mr. W. B. Richmond, R.A., in the decoration of the roof and apse. The spandrels are divided by the arches and pillars into six sections, the first two containing an allegorical representation of the Creation of Light. The two following sections show the Visit of the Angel Gabriel to the Virgin at the Annunciation. The last two sections show two guardian angels keeping watch on the walls of the holy city. On the south side the subjects of the mosaics are the Expulsion from the Garden of Eden, the Temptation in Gethsemane, and the figures of two angels bearing the emblems of the Passion. When the choir is completed the four quarter-domes are to be treated, but the subjects have not yet been chosen. The windows in the north and south transepts are to be filled with stained glass, the gift of the Duke of Westminster, and the execution of this work has been entrusted to Messrs. Powell, of Whitefriars. These windows will commemorate the conversion of England to Christianity, the figures representing the first Bishop of each of the Kingdoms of the Heptarchy, with the corresponding Monarchs. Mr. Richmond is designing a large group of statuary in memory of Lord Leighton, to be placed at the eastern end of the south side of the nave.

CHIPS.

In the case of the application for discharge from bankruptcy of William Eames, of St. Alban's, builder, the order has been suspended for two years ending Oct. 26, 1896.

At the last meeting of the Ipswich School Board, Mr. J. Shewell Corder, architect, of that town, was instructed to prepare a plan for adapting Tower House, Tower-street, for the purposes of the new board offices, cookery centre, and pupil teachers' centre.

Colonel John Ord Hasted, R.E., held an inquiry on Thursday last week at the Town-hall, Morley, into an application by the corporation for sanction to a loan of £16,500 for completing and furnishing the new town-hall. The town clerk explained that in 1892 powers were obtained for the borrowing of £25,000 for a town-hall. The actual cost of erecting and furnishing the building was £41,646 12s. 11d., but the increase upon the original estimate was caused by the alteration of certain portions of the work as the building proceeded, and the provision of an electric lighting plant for the hall. Evidence as to the alterations in the original specifications was given by Mr. Fox, of Dewsbury, the architect.

The dissolution of partnership is announced as to W. Mosedale, E. Mosedale, T. Mosedale, H. Mosedale, and J. Mosedale, builders and contractors, Derby, under the style of Mosedale Brothers, so far as regards W. Mosedale.

It has been decided to double the line from Basley to Blandford, on the Somerset and Dorset Joint Railway, forming part of the route between Templecombe and Bournemouth. It is proposed to do the work in sections, and it is hoped that before long there will be two sets of rails over the whole line. The engineers have taken measurements, and the work is to be pushed forward without delay.

Mr. W. Ambrose, Q.C., M.P., the arbitrator appointed by the Local Government Board with reference to what is known as the Southampton slum improvement scheme, again sat in the Audit House, in that town, on Friday, for the purpose of hearing claims by tenants of the various properties for compensation. The total expected loss on the scheme is estimated by the corporation of Southampton at £40,000.

TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. All communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondents.]

It is particularly requested that all drawings and all communications respecting illustrations or literary matter should be addressed to the EDITOR of the BUILDING NEWS, 332, Strand, W.C., and not to members of the staff by name. Delay is not unfrequently otherwise caused. All drawings and other communications are sent at contributors' risks, and the Editor will not undertake to pay for, or be liable for, unsought contributions.

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Front-page Advertisements 2s. per line, and Paragraph Advertisements 1s. per line. No Front-page or Paragraph Advertisement inserted for less than 5s.

Advertisements for the current week must reach the office not later than 3 p.m. on Thursday. Front-page Advertisements and alterations in serial advertisements must reach the office by Tuesday morning to secure insertion.

SITUATIONS.

The charge for advertisements for "Situations Vacant" or "Situations Wanted" is ONE SHILLING FOR TWENTY-FOUR WORDS, and Sixpence for every eight words after. *All Situation Advertisements must be prepaid.*

NOTICE.

Bound copies of Vol. LXIX. are now ready, and should be ordered early (price Twelve Shillings each), as only a limited number are done up. A few bound volumes of Vols. XXXIX, XL, XLI, XLVI, XLIX, LI, LII, LIV, LVIII, LX, LXI, LXII, LXIII, LXIV, LXV, LXVI, LXVII, LXVIII may still be had, price Twelve Shillings; all the other bound volumes are out of print. Most of the back numbers of former volumes are, however, to be had singly. Subscribers requiring any back numbers to complete volume just ended should order at once, as many of them soon run out of print.

RECEIVED.—G. M. and B. R. Co.—Geologist.—B. S. P.—
J. W.—F. T. B. Co.—Lancastrian.—W. T. (Truro).

Correspondence.

HONOURS EXAMINATIONS IN BUILDING CONSTRUCTION.

To the Editor of the BUILDING NEWS.

Sir,—In reading the examiners' report on the above, which has just been issued by the Science and Art Department, one cannot help being struck with the enormous proportion of failures in the honours stage of this subject. Of the 473 candidates who sat, 95·36 per cent. are returned as having failed. Certainly the examination questions this year were a little more difficult than usual, but not to such an extent as would seem to warrant the wholesale failures recorded.

This state of affairs must be very discouraging to the examiners, and it certainly is most disheartening to teachers and students. The case is even worse than would appear at first, for it is well known that a large number of honours students are also teachers of the subject, and many have sat for this examination several years in succession.

If one turns to the records of previous years, it seems, judging by the statistics of results, that the average honours student is steadily deteriorating, and at no very distant date honours certificates threaten to become things of the past. Thus, for the last eight years the percentages of failures have been successively 56, 74, 59, 63, 78, 90, 89, and 95, although in the same period the number of candidates has increased from 225 to 473.

During the last ten years enormous sums of money have been spent in establishing Polytechnics and technical colleges both in London and the provinces, yet in this—one of the most advanced and practical courses of instruction dealing with

the building trades—it seems that we are worse off, as far as efficient teaching is concerned, than was the case before they started. Students now have better textbooks, better accommodation, more classes, and lower fees, besides greater facilities in every way, than was formerly the case; yet, in spite of all this, the results will hardly compare with those of a Civil Service competitive examination. The examiners' report referred to affords no help towards a solution of the difficulty, for absolutely nothing is said as to the deficiencies of the teaching, or of the answers to the questions.

My object in thus trespassing on your valuable space is to obtain, if possible, something by way of reply to the following queries:—(1) What amount of knowledge is really expected from an honours student? This is far from clearly laid down in the Science Directory. (2) What are the chief shortcomings of candidates who fail to pass the examinations? (3) What deficiencies appear to exist in the present systems of teaching and study?

If any of your numerous readers can throw any light upon this matter, I am sure they will receive the heartfelt thanks of many a sorely puzzled teacher and weary student. Thanking you for inserting this letter.—I am, &c.,

HAROLD BUSBRIDGE.

CHIPS

A memorial reredos, altar, and table, all constructed of English oak, were unveiled in Colebrook parish church on Advent Sunday. The sculptured panel in the reredos and the statues in the flanking niches are of clunch stone. The works have been executed by Messrs. Harry Hems and Sons, of Exeter.

Sir John Jackson has entered into an arrangement with the Commissioners of Rye Harbour to take shingle from the river bed for use at his Dover contract, on condition that he does no damage to the channel of the river, and removes a ridge which now causes an obstruction.

The parish church of Maentwrog, which has been rebuilt from plans by Messrs. Douglas and Fordham, of Chester, has been reopened this week.

The City Commissioners of Sewers sanctioned on Tuesday an arrangement for setting back No. 89, Fleet-street, to the new line of improvement, for the sum of £6,000, to include all interests. A plan was agreed to of an improvement at the western end of Cheapside, by setting back the railings at the southern end of the old Post Office, and it was decided to offer £2,500 for the improvement, subject to the sum being devoted to the scheme for acquiring as an open space "the Postmen's Park" in Aldersgate-street.

Thomas Stokes, one of the workmen employed by Messrs. Gillow and Co., of Oxford-street, in the redecoration of the Mansion House, slipped, on Tuesday, while painting the internal ceiling of the saloon, fell a distance of some 30ft., and died on the spot. His father was working at his side at the time. The deceased was 29 years of age, and was married, but had no children.

The new pulpit in the R.C. Church of the Holy Name at Manchester has just been completed by the erection of a canopy of carved oak. It rises some 15ft. from the sounding-board of the pulpit, and is Gothic in character, to harmonise with the interior. It is the work of Mr. Joseph Hansom, son of the architect of the church. The pulpit, which is constructed of alabaster, marbles, and mosaics, was opened on Sunday morning by Father Vaughan. Arrangements are being made for installing the electric light in the church.

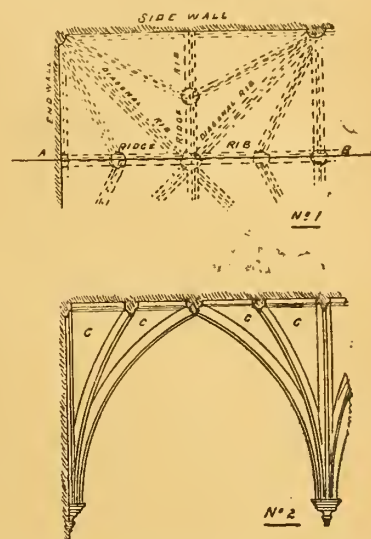
During the sale at Christie's on Friday of the late Sir John Pender's pictures, books, and works of art, a copy of Joseph Nash's "Mansions of England in the Olden Time," 1839-45, the plates coloured and mounted on cardboard, was sold to Mr. Quaritch for £16 10s.

The Nunhead Free Library, the fifth institution of the kind now in operation in the parish of Camberwell, was formally opened on Tuesday night. The building, which is the gift of Mr. J. Passmore Edwards, occupies a site in Gordon-road. The whole of the rooms devoted to the use of the public are arranged on the ground floor. There are news and magazine-rooms, and a lending library with shelf accommodation for 13,000 volumes. The present stock consists of 6,292 volumes, representative of all branches of literature. The cost, including the fittings for the library, together with the gas-lighting and the heating apparatus, has been about £2,500. The building has been erected from designs by Mr. Robt. P. Whellock, A.R.I.B.A., 45, Finsbury-pavement, E.C., and was illustrated by a plan and perspective in our issue of April 17 last; the builders were Messrs. F. Gough and Co., Church-end, Hendon.

Intercommunication.

QUESTIONS.

[11592].—**Vaulting.**—Sketch No. 1 is the half-plan of a Gothic vault over one bay of the aisle of a church. Sketch No. 2 is a sectional elevation on the line AB.



Would someone kindly inform me how the groining joints in the spandrels CC ought to be drawn in this section ?—
GOTH.

[11593].—**Chimney**.—Will some reader kindly explain to me why two of my chimneys so very frequently smoke, and how is it that there appears to be so frequently a down-draught when no fire is alight? I shall be glad to have the theory of the cause, and a suggestion or two, for a cure? Will be glad to give any further particulars, if necessary. Can any reader also suggest any textbook dealing with such matters? With thanks in anticipation.
—SMOKE.

[1594].—**Building Line.**—I have to deal with an urban district council. In cities and towns shopfronts are allowed to be brought up to the street line. In this instance, a village, the houses adjoining (at one end only) are set back, say, a couple of yards from the roadway, and the clerk, on my inquiry why the plans had not passed, informed me that the shopfront must be kept back to the line of the houses (as sanctioned by the 1893 Act), thus reducing the size of the shop materially, and any purchaser wishing to claim articles in the window, or goods which will have to go out of the way to inspect same, which the majority will not. Is not this arbitrary?—reducing the area and letting power of the shop. Other property recently built in the vicinity has projections in the way of bay windows, &c. The clerk said he was not bound to give any reason why objection is taken in this instance, and he suggested issuing a madamus, by way of asserting one's right to come forward but doubted whether there would be any real gain in that case. In the town where I reside shopfronts are frequently put to houses standing back from the street line, the shop front and windows, however, being brought up to street line by way of improving; the letting power, and consequently the ratable value. What is best to do under the circumstances, the person tackled being unable to incur much cost?—**FAIRBANK.**

REPLIES.

[11590].—**Solomon's Temple.**—Farrar's "Life of Christ" shows four plans of the Temple (possibly Herod's) by Fergusson, Williams, Porter, and Lewin respectively; and "Student" might possibly be able to get at their writings. Eadie's "Biblical Cyclopædia" shows a plan; and so probably do most other books of the kind. *Good Words* of July, 1865, gives a suggestive account of a visit. See also Thomson's "Lave and the Book" and Josephus. But there is so much room for conjecture, and difference of opinion, that I should advise "Student" to reserve his own judgment, and seek by reverent study of the Bible, and careful comparison of what plans, maps, and topographical accounts he can get, to form his ideas. There are many references in other parts of scripture besides Kings and Chronicles which all throw light, such as in Ezra and Ezekiel. Architectural papers and books occasionally contain references. There is a pleasing one in Britton on "Dry Rot." One matter generally overlooked is that the design of the Temple was, by Divine inspiration, delivered to David, and by him handed over to Solomon. (See 1 Chron. xxviii. 19.) It may not be, therefore, perhaps out of place to say that the real architect was God, and that we are directly authorised by Scripture to apply to Him for wisdom.—**GOD FIRST.**

A stained glass east window was unveiled by the Bishop of Bangor in the parish church of Pwllheli, South Carnarvonshire, recently. The window is a memorial offering by Mr. H. Parry, for his parents.

The Caledonian Railway Co. are seeking powers for an important scheme for the extension of Grangemouth Harbour, which includes about 1,000ft. of sea-wall, reclaiming foreshore, and forming a new and more commodious entrance, with a new dock 32 acres in extent, having two jetties, with a junction cut communicating with the existing docks.

LEGAL INTELLIGENCE.

DUNFERMLINE GASWORKS.—The award of the arbiters in the reference between the Dunfermline Gaslight Company (Limited) and the town council of Dunfermline was received on Saturday by Mr. William Reid, solicitor, the clerk in the reference. The sum claimed by the Gaslight Company was £140,000. The arbiters find that the value of the works and undertaking of the company is £80,000. It is calculated that the total sum which the corporation will have to pay will be at least £104,000, including the expenses of the arbitration, which will amount to £8,000. The Gaslight Company have got £40,515 less than they claimed, and the bargain is generally regarded as a fair one for the town.

RE WILLIAM HARVEY COLE.—This debtor, whose examination took place at the Southampton Bankruptcy Court on Nov. 25, was described as of 78, Dover-street, Bevois Town, and Clarence-street, Northam, Southampton, lately residing at No. 35, Radcliffe-road, Northam, builder and decorator. He filed his own petition on the 10th November, being adjudicated bankrupt by his own consent. The gross liabilities amount to £1,965 4s. 6d., of which £1,590 17s. 0d. is secured, and £371 12s. 6d. is unsecured. The assets, including an estimated surplus from securities in the hands of creditors of £454 3s. 6d., amount to £602 10s. 5d., and on the whole figures, as filed, a surplus in favour of the estate is shown, amounting to £130 17s. 11d. The failure is alleged to have been caused through building speculations and want of capital. The debtor was allowed to pass his examination.

RE G. F. SHARPE.—The bankrupt, whose examination took place at the London Bankruptcy Court on Friday before Mr. Registrar Linklater, carried on business as an architect and surveyor at 57 and 58, Chancery-lane. The accounts showed gross liabilities £907 13s. 6d., of which £888 13s. 6d. was expected to rank, and assets £350. It appeared that the bankrupt commenced business on his own account in 1887, having previously for eight years been the managing clerk to a surveyor. In 1894 he purchased an estate at Mortlake for £2,200, of which £2,000 was obtained on mortgage of the property, and the balance was paid by bills, which were not met at maturity, and the petitioning creditor's debt was in respect of them. He attributed his failure to the foreclosure in March or April last by the mortgagees before he had time to develop the estate, and to their not financing him as, he stated, had been arranged. Mr. A. H. Wildy attended as official receiver, and questioned the bankrupt, and the examination was eventually concluded.

SUB-DIVISION OF WAREHOUSES.—At Worship-street Police Court, on the 26th ult., Mr. Cluer made an order affirming a "notice of objection," served under section 150 of the London Building Act, 1894, by Mr. Arthur Crow, district surveyor, upon Messrs. Kearley and Tonge, the owners of warehouses in Durward-street, Whitechapel. The notice in question required that a certain additional warehouse which is about to be erected of a greater extent than 250,000c.ft., should be divided by party-walls in such manner that no division thereof should extend to more than 250,000c.ft. in accordance with the provisions of section 75 of the Act. In appealing against this requisition of the district surveyor, Mr. J. P. Grain, on behalf of the owners, contended that Sec. 74 entitled them to adopt fireproof ceilings or floors in lieu of party-walls. He quoted the section as follows: "Every building shall be separated, either by an external wall or by a party-wall, or other proper party structure from the adjoining buildings," and pointed out that by definition 20 a horizontal floor was included in the term "party structure." He said that a party-wall by Sec. 5 (16) was defined as being "a wall forming part of a building, and used or constructed to be used for separation of adjoining buildings belonging to different owners, or occupied or constructed, or adapted to be occupied by different persons," and consequently did not apply to the present case, as the buildings in question would be owned and occupied entirely by his clients. He then called Mr. William Eve, architect, who produced the plans of the building and described the method of construction proposed to be adopted. He stated that the buildings would be entirely separated from each other by fireproof floors, the only means of communication between them being an approach on each floor from a staircase which was external to and separate from the buildings themselves. He suggested for the learned magistrate's consideration that they would thus form three separate buildings each having a separate entrance from without. He thought it right, however, to say that there would be lifts running up through the buildings; but shut off by 9in. walls and iron doors. In cross-examination by Mr. F. F. Daldy, who appeared for Mr. Crow, Mr. Eve stated that the floors would be of heavy construction, being calculated to carry about 7cwt. to the foot, and that they would be carried by cast-iron supports. Asked whether in the event of a serious fire breaking out in one of the

stories the cast-iron supports would not be liable to crack, and thus cause the floors to fall in, he said they would substitute wrought iron if the district surveyor preferred it. Mr. Daldy urged that although the term "party structure" in section 74 included a horizontal floor as well as a party-wall, section 75 required a "party-wall," and not a "party-structure," and his learned friend could not get out of his liability to provide a party-wall under section 75 by falling back on the party-structure provision of section 74. He quoted the case of "Holland and Hannen v. Wallen," which decided that a horizontal floor was not a party-wall. Mr. Grain, in reply, contended that section 75 was merely inserted in the Act in order to amend the corresponding section of the Act of 1855, which limited the size of a warehouse to 216,000c.ft., and section 74 of the new Act being entirely fresh legislation, his clients were entitled to take advantage of it. Mr. Cluer, who had taken time to consider his judgment, said he was unable to agree with Mr. Grain's contention that ceilings were to be treated as party-walls. The building was, he decided, one building, and as such had to be divided by party-walls. If the statute had meant that you might build a large building, and each division of it—each floor, that is—might be 250,000c.ft., it would have said "unless it be divided by party-structures," making it clear that each floor then might hold 250,000c.ft. He could not read into section 75 of the Act the word "structure" instead of "party-wall." In affirming Mr. Crow's notice of objection, he allowed seven guineas cost. It being suggested that a case on a point of law would be asked for, Mr. Cluer said he should be very glad for the High Court to decide whether a ceiling was a party-wall.

CHIPS.

Extensive additions are being made to the Homerton infirmary, and especial consideration has been given to the ventilation, which will be carried out on the Boyle system.

In April last, some scaffolding placed round the spire of St. Mary's Parish Church, Lydney, was blown down in a gale, and great damage done, part of the spire being brought down. The restoration is now completed. The tower and spire are now 175ft. high. The gilt weathercock, weighing 30lb., stands on the end of a copper rod 25ft. long, and has a bearing of agate. Altogether, an expense of over £650 has been incurred.

The highway bridge at Redbridge, Hants, is being reconstructed, from plans by the county surveyor. Mr. Osman, of Southampton, is the contractor for the works, including a temporary bridge now in course of erection adjoining the site.

There has just been placed in Gorgie Free Church, Slateford-road, Edinburgh, a new organ, built by Messrs. Ingram and Co., of Edinburgh and Hereford. The organ is erected on the choir platform beside the pulpit, and is inclosed in a wax-polished oak case, with decorated pipes, designed by Messrs. McArthy and Watson, the architects for the church. The opening took place on Friday.

A parolose screen of carved oak is about to be placed on the south side of the chancel of Liskeard parish church, as a memorial to the late Mr. Thomas Baker, land surveyor, estate agent, and auctioneer. The work is being carried out by Messrs. Harry Hems and Sons, of Exeter.

The York Water Gate had become more dilapidated, and the London County Council, in whose charge it is, have directed it to be examined, and, where necessary, repaired, under the personal direction of Mr. T. Blashill, their architect. This work is nearly completed, and has consisted in clearing away the deposits of mud on portions, and in making good some defective joints with cement and sand. Nothing more has been done to its exterior. The interior has been cleaned and painted, and some support given to broken parts. The old corrugated-iron roof has been removed, and a lead flat is being put on at the ancient level, the holes in the old timbers being used for this purpose.

During the past year two-and-a-quarter million cubic yards of sludge have been removed from the Clyde, one million cubic yards having been dredged from the new Cessnock Dock, over three-quarter million cubic yards from the harbour, and the remaining half-million cubic yards from the Clyde between Glasgow and Port Glasgow.

The Ribble Commissioners, after an inspection by a committee of the dredging machinery in construction at the yards of the largest inakers in England and Holland, have given an order to Messrs. Lobnitz and Co., of Renfrew, for a suction dredger of a capacity of 825 cubic yards, the cost to be £15,000, with £1,600 additional for electric light, pipes to discharge on shore, and other extra fittings. This dredger is to be employed in deepening the waterway up to the dock at Preston, and forms part of the scheme for which powers were obtained last Session. A tender has also been accepted for the erection of additional sheds for the storage of China clay.

WATER SUPPLY AND SANITARY MATTERS.

BUCKNALL, STAFFS.—During the term of office of the retired surveyor, Mr. Bradford, the Stoke Rural District Council acquired some 40 acres of suitable land for irrigation and pumping-station. The whole scheme has been reconsidered upon reports from the present surveyor, Mr. Larnar Sugden, of Hanley and Leek. The plans adopted by the council include main sewers at about 5ft. deep for the whole of the township. Adams's sewage lift has been decided upon for raising the low-level sewage to the pumping-station by the aid of the sewage descending from the higher streets. The remainder gravitates to the pumping-station, whence the whole will be raised some 80ft. rise by steam (ram) direct-acting pumps—after a portion has first gravitated over the lowest irrigation area. For the sewage farm the system contemplated is one of distributing chambers placed some 100 yards apart, and connected below ground by patent jointed stoneware pipes, the sewage gravitating therefrom to any portion of the land by closing a valve and the liquid rising in the chambers and flowing on to the surface, whence ordinary trenches convey it in irrigation. Then at the end of the season the whole area will be ploughed over, a saving as compared with the spade-industry necessitated by "ground-carriers." The land will be drained by agricultural pipes, each covered with 9in. of clay to keep out the loose soil. The effluent from these discharges into ditches, and finally therefrom into the Trent. The number of houses in the district is nearly 650. The only tenders at present accepted are Mr. W. Owen's (of Bucknall) for direct-acting steam ram pumps, and the Stantou Iron Company's for cast-iron sewage mains.

IPSWICH.—A sewerage scheme is now being carried out from plans by the borough surveyor, Mr. E. Buckham, based on the Shone and Ault ejector system, for the districts of Stoke, on the south side of the river, and the Marsh on the north-easterly border of the stream. The power station of the combined Stoke and Marsh sewerage scheme is a red-brick building, with a 90ft.-high chimney-shaft, nearly on the bank of the river, not far from the Portman-road cricket and football field. All the machinery has been supplied and laid down by Messrs. Davey, Paxman, and Co., of Colchester. Next to the boiler-house is the engine-room, 72ft. by 28ft., one part of it two stories high. A high-pressure engine drives a dynamo, the armature of which describes 900 revolutions per minute. The electricity thus generated is used for electrolysis of the sea water, which is pumped up from the dock at the rate of 600 gallons per hour. A sewer 2ft. 6in. in diameter, has lately been put in to carry off the storm-water from the intercepting sewer. Another sewer, 2ft. in diameter, is now being put in near the drift-hall, with which the house-drains will be connected. On one side of the ejector are the iron pipes conveying the compressed air, and on the other those through which the sewage is forced. The two ejectors into which all the sewage of the Marsh district will gravitate have already been placed in position. Over Stoke there will be three similar stations. The total cost of the scheme will be about £28,000. The contractors are Messrs. Hipwell and Co., and the work is being carried out under the supervision of Mr. C. Skeritt as clerk of the works. Messrs. Girling are the contractors for the buildings.

THE COWLYD LAKE SUPPLY.—Acting upon the suggestion offered by Mr. T. B. Farrington, C.E., the engineer in charge of the Cowlyd Waterworks scheme, which is to supply water to Conway, Colwyn Bay, and Llysfaen, the members of the Cowlyd water committee made an inspection on Friday of the extensive works which are being carried out by Mr. Bugbird, Carnarvon, at an approximate outlay of £40,000. The works are being carried out under great difficulty, there being practically no access by road to Llyn Cowlyd, which is embosomed in the mountain between Trefriw and Capel Curig. The total length of the pipe line is about 40 miles, the water being carried by steel girder bridges over the Afon Ddu, the Porthlwyd stream, and a steel suspension bridge 340ft. span over the Conway river between the Tubular and Suspension Bridges. From the standpoint in the lake, in course of construction, a gangway is to be erected by the Glenfield Company, Kilmarnock, who have also supplied the valves, other details of the contract being executed by Messrs. R. Dempster and Son, Elland, Yorkshire, and Messrs. Vaughan and Co., Newcastle. The formal opening of the works, which are now completed except the pitching of a portion of the embankment, will take place early next year.

An analysis of the occupations of the 145 students at the Central School of Arts and Crafts, opened a month since, shows that those engaged as silver-smiths number 7, architectural pupils 29, cabinet-makers 7, and decorators 8, while the remainder are drawn from various trades demanding artistic skill.

Our Office Table.

DR. INGRAM, the Dean of Peterborough, has issued a fresh appeal for aid in meeting the cost of the strengthening of the foundations of the west front of the cathedral, in which he points out that the work already carried out at the west front has revealed a much more serious condition of the fabric than was, or could be, at first perceived. At the end of July their architect, Mr. J. L. Pearson, R.A., informed the Restoration Committee that very reluctantly he felt compelled to advise that portions of the gables should be taken down and rebuilt, numbering and marking each stone of the outer surface so that the whole or nearly the whole shall be replaced without alteration. The committee, realising the serious responsibility of deciding upon this step, felt to be their duty before doing so to obtain a second opinion as to its necessity. They therefore sought the advice of Sir Arthur W. Blomfield, who, after a careful examination of the building, has furnished them with a report which entirely confirms Mr. Pearson's view. The committee has, therefore, decided to act upon the recommendations of these two eminent architects. The foundations of the west front have been made perfectly secure, and the work of the restoration of the gables is to be immediately proceeded with. For the work of the restoration of the fabric as now contemplated £11,000 will be needed; towards this sum there is about £1,600 in hand. The Dean makes an earnest appeal for funds to enable the committee to carry out this work without intermission, which would almost inevitably necessitate increased expenditure.

SIR J. C. ROBINSON writes in reference to the Dean's appeal, that there is a very competent and influential consensus of belief "that it is not necessary to deal with the west front of the cathedral in the drastic manner proposed by the Dean and Chapter and their architects." His competent authorities appear to consist of members of the Society of Antiquaries, for Sir Charles Robinson adds that at a meeting of this society, held on Thursday in last week, "several eminent architects and other members of the society, especially entitled to be heard on the subject of the 'preservation' of our ancient ecclesiastical monuments as opposed to this so-called 'restoration,' expressed the opinion that by another course of procedure, which had been fully explained to the Dean and Chapter, the disintegrated stonework of the gables might be made secure again without its being taken down and rebuilt. A resolution of the society was thereupon unanimously passed, requesting the Dean and Chapter to give further consideration to the course pointed out." It need only be added that Mr. Pearson and Sir Arthur Blomfield, for whom Sir Charles Robinson would be the first to claim that they are "eminent" and "competent" architects, and both of whom are members of the Society of Antiquaries, have personally examined the foundations and gables of Peterborough west front before offering their separate and concurrent recommendations; whereas the skilled architects who make an alternative suggestion have presumably not had the advantage of a similar opportunity before forming a judgment.

PROFESSOR G. BALDWIN BROWN, of Edinburgh University, lectured to a large audience in Moffat Academy on Saturday afternoon on "Classic Architecture." By Classic he explained that he meant Greek architecture, which is striking from its mass, while the ornamentation is always of the best setting and effect. Greek architecture possessed every element desired but that of mystery. There was nothing suggestive in Greek architecture. In Gothic architecture, on the contrary, there was something that stimulated the fancy. Greek architecture presented a calm beauty and solemn grandeur, whereas Gothic, with pinnacles, shaft, and spire, aroused imagination. There was nothing like that in Classic architecture, where everything could be explored, and which presented the perfect proportion of each portion to the general effect. The Greeks seemed to like to give effect, size, and mass to their buildings. The column, a prominent feature, was wherever possible made to look as if carved out of one piece of stone, which gave effect and grandeur to the buildings. Dealing in detail with the various parts of the building, he pointed out the contrast between the simplicity of the column and the richness of the frieze. In Greece and in most of the colonies the cities were along

the seashores arranged in terraces, and the Greeks being fully aware of the importance of taking advantage of the lie of the ground, the severe, simple lines of temple contrasted effectively with broken masses of the rocks and the rounded forms of olive-trees.

MR. W. H. ST. JOHN HOPE, F.S.A., suggests that the recumbent effigy to be erected on a cenotaph tomb in Canterbury Cathedral, as a memorial to Archbishop Benson, should be executed not in cold and unsympathetic white marble, as is the current fashion, but in gilt bronze, designed, as its tomb should be, by an architect and not a sculptor. This might be laid on a tomb of Purbeck marble, with enamelled shields. An archiepiscopal effigy of gilt bronze in the cathedral church of Canterbury is not without precedent, for Leland, describing the monuments there in the reign of Henry VIII., says that Archbishop Simon of Sudbury "lyeth in a Highe Tumbe of Coper and gilte," while the figure of Edward the Black Prince, in the same building, is of this material. As a site for the memorial, Mr. St. John Hope suggests the south aisle of the choir, opposite the tomb of Simon of Sudbury, against the outer wall of the church, and just to the west of the chapel known as St. Anselm's. Here Archbishop Benson would lie within a few feet of his predecessors, Simon of Meopham, John of Stratford, Thomas of Bradwardine, Simon of Sudbury, and John Kemp, and nigh to the ancient resting-places of St. Anselm and St. Dunstan.

At the annual conversazione of the Lancashire and Cheshire Antiquarian Society held on Friday evening in the City Art Gallery at Manchester, the Lord Mayor of the city occupying the chair, Mr. Alfred Darbyshire, F.R.I.B.A., gave an address on "Ordsal Hall, Past and Present." Aided by a series of plans and drawings, Mr. Darbyshire described the hall as it existed in pre-Reformation days. As to its present condition, it was, he said, about six months ago a mass of rotten dilapidation. The present owner of the property, Lord Egerton of Tatton, had, however, determined to rescue the historic place from demolition and decay, and the renovation was being carried out under the lecturer's directions. During his investigations Mr. Darbyshire said he had been unable to shake off the fascinations of Harrison Ainsworth's novel "Guy Faux," and he certainly did not like to give up the idea that the personages mentioned in that work as connected with Ordsal Hall ever existed. Many present would remember the thrilling chapters in which Ainsworth described the escape of Viviana Radcliffe, the recusant priest, Catesby, and Humphrey Chetham, from the hall through a subterranean passage to Chat Moss. When he came to deal with the new drainage of Ordsal Hall a mysterious passage was discovered which was entirely unknown to the authorities, and which proved beyond doubt that there had been a secret communication between the Hall and outside, which might have been used during the troublous times with which the story of Harrison Ainsworth dealt. Investigations which a member of that Society had made into the Chetham papers proved conclusively another point—viz., that Humphrey Chetham was intimately associated with the Radcliffe family. One of the most important discoveries made in the course of his investigations was an ecclesiastical roof of what had undoubtedly been an oratory in the pre-Reformation days.

THERE has just been issued as a Parliamentary paper a list of those buildings of architectural and historic interest in the United Kingdom of which the structure and fabric are under the control of or maintained by her Majesty's Commissioners of Woods and Forests. The catalogue comprises, it will be seen, 16 buildings, and is as follows:—England.—Dorset: Sandsfoot Castle, near Weymouth; Gloucester: Castle of St. Briavels and the Speech-house, in the Hundred of St. Briavels, Old Preaching-cross in the Manor of Staunton; Hants: the Queen's House and Verderers' Hall in the New Forest; Kent: Eltham Palace; Middlesex: portion of the ancient Wall of the City of London, George-street, Tower-hill, City; Northumberland: Lindisfarne Priory, Holy Island. Scotland.—Inverness: Ruins of the old Church and Monastery of Beaulieu. Ireland.—Cork: James Fort or Old Fort, near the town of Kinsale. Wales.—Denbigh: Denbigh Castle, the Burgess Tower at Denbigh, Leicester's Church (part of the ruin of); Merioneth: Harlech Castle. Isle of Man.—Castle Rushen, Peel Castle, embracing St. German's Cathedral.

A COMPANY of glass-workers have, it is said, recently discovered that ordinary plate glass will make a more durable monument than the hardest marble or granite known to stonemasons. Glass is practically indestructible. Wind, rain, heat, and cold have their effect on the hardest rock; solid granite eventually crumbles away; and one can seldom read the inscription on a stone grave-stone 50 years old. A glass "stone" will look as fresh a couple of centuries after its manufacture as on the day it was erected, and the inscription can be made ineffaceable. The thick plate glass used to glaze the port-holes of steamers can resist the stormiest sea, and is practically unbreakable.

IN one of the principal squares of Patras, a mosaic pavement, some marble sculptures, and other Greek remains have recently been discovered, and have been examined by Mr. Cecil Smith and two students of the British School of Archaeology at Athens. Among the sculptures have been found a statuette which is undoubtedly a copy of the Athena Parthenos of Pheidias which stood in the Parthenon. The head and arms are missing, but they may possibly be recovered in the course of further excavations. About two-thirds of the shield are also missing, but the remaining portion displays part of the subject in relief (the battle of the Greeks and Amazons) which, according to Pliny and Pausanias, existed on the original. The figures which have been preserved are those of two Amazons, together with the feet of a Greek warrior. They can be identified with those of the "Lenormant statuette" at Athens, and the Strangford marble in the British Museum, but are of better workmanship than either. The discovery not only supplements the evidence furnished by the "Lenormant statuette" with regard to the subject of the Strangford shield, but conduces to a better appreciation of the lost original of Pheidias than can be derived from the other examples.

IN June last the London County Council, on the recommendation of the Public Health Committee, instructed the Parliamentary Committee to insert clauses in the Council's General Powers or other Bill of next session enabling the Council to make by-laws similar to those which can be made by urban authorities outside London under section 157 of the Public Health Act, 1875, for the prevention of the occupation of any new dwelling-house until the drainage should have been completed, and the dwelling-house certified by a duly authorised officer of the sanitary authority as fit for human habitation. The Public Health Committee state that they have now received from the Parliamentary Committee a report by the Parliamentary agent, pointing out that a by-law to the above effect would make the letting and occupation of any new dwelling-house dependent entirely upon the individual opinion of an officer of a sanitary authority as to what was and was not fit for human habitation. The agent stated that he did not think that the Council could succeed in justifying an application for powers to make such a by-law in London, looking to the fact that there were more than forty sanitary authorities, whose officers might entertain different opinions on the subject of the by-law, and that what might be regarded as fit for habitation in one district would perhaps not be certified as such by the officer acting in an adjoining district. The committee have, therefore, informed the Parliamentary Committee that they think the question of obtaining powers with reference to a certificate that a house is fit for habitation should stand over for the present.

THE number of Private Bills to be introduced into Parliament during the coming Session is 293 as against 258 last year. Of the proposed Bills, 73 relate to railways, 35 to gas and water undertakings, 15 to tramways, 12 to docks, harbours, and canals; whilst of the remaining 86 no fewer than 59 are promoted by county councils, corporations, and other public bodies for miscellaneous powers. Of the total number of Bills, 37 directly affect London and the Metropolis, and of these the London County Council will promote 15, including eight Bills for the acquisition of the eight London water companies. Among the chief London schemes are projected underground electric railways from Earl's Court to the Mansion House (District deep-level); from Brompton to Piccadilly-circus; from Whitechapel to Bow; and from Hammer-smith to Cannon-street. The rejected scheme of last Session for the construction of the Watford,

Edgware, and London Railway will be reintroduced. By another Bill it is proposed to empower the London County Council to construct a new subway under the River Thames from Greenwich to Millwall.

It was reported to the Birmingham School Board, at their annual meeting on Saturday, that it had been discovered that certain irregularities had crept into the conduct of the Works Department, which had under its charge the carrying out of such small repairs and alterations as could hardly be tendered for with advantage, and had been under the control of a clerk of the works and a foreman of the shop. As the result of an inquiry conducted by a special committee, the prominent employes in the department had resigned, and the committee submitted proposals for the reorganising of the Works Department, and recommended that in consideration of additional responsibilities imposed upon certain officials by the new scheme, their salaries be advanced—that of Mr. Binks, clerk of the works, to £190, and that of Mr. Harris, inspector of caretakers, to £120, and that a chief carpenter be appointed to take charge of the workshop at 2s. 6d. per week advance on the ordinary rate of wages fixed by the trade. The report and recommendations were adopted without discussion.

At San Francisco, local eucalyptus wood has been advocated as a paving material. It has been found to give satisfactory results in Australia, and as the wood in the California forests is of the same kind as that in Australia, Mr. McCullough, the engineer of the Merchants' Association, thinks it may be used. The expense is estimated to be rather more than asphalt. The blocks proposed would be 6in. to 8in. long, and 3in. to 4in. wide, and 6in. deep.

In the construction of the Glasgow District Railway the tunnels pass under the corners of buildings, and a method had to be employed to support the buildings temporarily. The top of the tunnels were in some cases within 4ft. of the foundation. Piles 12in. square were driven at short intervals close to the outside walls of houses, and on the tops of them were laid beams connected by "dogs." Needles 12in. square were then passed through holes in the walls, one end resting on these runners or beams, and the other on beams inside. The soil was removed in short lengths and the walls carried up in brickwork to the foundations of the houses, the timbers being afterwards removed. A great part of the tunnelling was constructed in concrete, inverts and crown as well: other portions comprised brick side-walls of three rings. The sections in clay were built circular 11ft. diameter, with four rings of brick in cement in the crown and sides, and with inverts of concrete. Other portions were of cast-iron segments.

The St. Helen's Corporation have decided on the purchase of the local tramway lines and depot at the cost of £23,000, exclusive of rolling stock. There are ten miles of rails, and about three-fifths of this distance has yet to be laid with the new girder rails and repaved, which will cost the corporation another £23,000. The corporation will lease the permanent way and depot to the present tramway company at a rent which in thirty years will recoup the present expenditure.

On Wednesday week Mr. W. O. Meade-King, M.Inst.C.E., an inspector of the Local Government Board, held an inquiry at the Public Offices, Swindon, respecting an application by the New Swindon District Council for sanction to borrow £3,200 for reconstructing the Golden Lion Bridge, which spans the Wilts and Berks Canal at the end of Regent-street. On the following day Mr. Meade-King held a similar inquiry at the Swindon Water Board Offices, in reference to an application by the Water Board to borrow £2,150 to enlarge the water-works.

The Exeter City Council have entered into a novel arrangement for improving the navigation of their river. The channel during recent years has been deteriorating owing to the deposit of shingle in the bight of the harbour. Sir John Jackson, the contractor for the construction of Keyham Extension Works, for which a large quantity of concrete will be required, has offered to remove at his own expense the beds of shingle which are now shoaling the channel, and also the material on the other shoals, provided the Corporation will pay him 6d. per ton for the removal of all material not suitable for his purpose. This offer has been accepted. It is estimated that the removal of the material to be dredged will extend over five or six years, and that the cost to the Corporation will not exceed £300 to £400 a year.

MEETINGS FOR THE ENSUING WEEK.

MONDAY.—Society of Engineers. "The Ultimate Purification of Sewage," by George Thudicum, F.C.S. Royal United Service Institution, Whitehall. 7.30 p.m.

Society of Arts. "The Use of Gas for Domestic Lighting," Cantor Lecture No. 3, by Professor Vivian B. Lewes. 8 p.m.

Surveyors' Institution. Discussion on "The Agricultural Rates Act, 1896"; paper on "Fruit-Growing as an Auxiliary to Agriculture," by C. H. Hooper, F.S.I. 8 p.m.

TUESDAY.—Institution of Civil Engineers. "Tipping and Screening Coal," by Jas. Rigg; and "The Surface Plant at Kirkby Colliery," by Thos. Gillott. 8 p.m.

WEDNESDAY.—Society of Arts. "Mining at Great Depths," by Bennett H. Brough. 8 p.m. Carpenters' Hall, London Wall. "Sanitary Appliances," by Professor A. Wynter Blyth. 8 p.m.

THURSDAY.—Dundee Institute of Architecture. Dinner and "At Home"; address by the President, Robert Keith. 8 p.m.

FRIDAY.—Architectural Association Lyric Club. Cinderella Dance at the King's Hall, Holborn Restaurant. 7.30 p.m.

CHIPS

From Ceylon it is reported that the Colombo harbour works, under the direction of Messrs. Coode, Matthews, and Co., are progressing; a dock is to follow; and the project for an Indo-Ceylon railway to connect the central, safe, and commodious harbour of Colombo with Southern India is on the tapis.

The committee of the Royal Albert Asylum, at Lancaster, have accepted an offer by Sir Thomas Story to build on the asylum estate a home for 40 feeble-minded girls who have been trained in the institution, and who will be occupied in its domestic and nursing service.

An excellent tone prevailed at the Auction Mart during last week, very few properties affording sound investment having to be taken back, and prices throughout having shown full strength. Town houses met with small demand, and the gigantic properties, Olympia and the Victoria Graving Dock at Silvertown, failed to change hands. The aggregate for the week was £104,621.

The urban district council of Nantwich have increased the salary of the surveyor, Mr. W. S. Williamson, who has held office since 1870, by £20 a year.

The workmen on the Great Northern Railway, Doncaster, have erected a new turret striking clock, showing the time upon two external dials, to the memory of the late Mr. Shotton, foreman, G.N.Ry., and superintendent of St. James's Church schools, where the clock is erected. The work has been executed by Messrs. Wm. Potts and Sons, clock manufacturers, of Leeds and Newcastle-on-Tyne, who have also fixed a new illuminated clock at Melton Hall, near Doncaster, this week, and have another for the Doncaster New Turkish Baths for Mrs. Turner, South Parade House, Doncaster.

It has been found necessary that extensive repairs and alterations should be made in the drainage at Lambeth Palace, which will make it impossible for the Archbishop and Mrs. Temple to go into residence there for some time.

The work of rearranging and reinstalling the wiring at St. George's Church, Hanover-square, where the recent fire took place, has been intrusted to Messrs. Drake and Gorham.

On Thursday in last week the Bishop of Lichfield dedicated the new National schools erected in connection with the parish church, Burslem. The schools replace old buildings which were not considered adequate or suitable for their purpose, and have been erected from the plans of Messrs. A. R. Wood and G. L. Jones by Mr. W. Cooke at a cost of £4,500. Accommodation is provided for 708—250 in the boys' department, 250 in the girls', and 208 infants. The lower story can be utilised as classrooms or as a parochial hall.

Mr. W. Sturge, the arbitrator appointed to assess the value of the Free Methodist Chapel in Hotwell-road, Bristol, which will be required in connection with the making of a new road from Dean's Marsh to Hotwells, has given his award. The inquiry was held about a fortnight ago. The chapel trustees claimed £2,800 for the building site and disturbance, and witnesses for the Corporation put the value at £1,000. The sum awarded by the arbitrator is £2,000.

The London County Council will next session apply for powers to extend the Chelsea Embankment of the Thames, to widen the Strand between the churches of St. Mary-le-Strand and St. Clement Danes, and to widen Tottenham-Court-road, at its junction with Oxford-street, by removing the block of buildings on the east side of Bozies-court.

Trade News.

WAGES MOVEMENTS.

THREATENED CRISIS IN THE LONDON BUILDING TRADE.—The Central Association of Master Builders of London have issued a statement alleging that the Plasterers' Association appear disposed to act on the principle that they are only bound by the letter of the rule adopted early in the year providing for reference of disputes to a Conciliation Board, entirely ignoring its spirit. "The tactics pursued against certain firms, though not successful in preventing their carrying on their business, is neither more nor less than a system of boycott, in this way—viz., by the members of the Plasterers' Association abstaining from taking employment in the firms in question, and in cases where decoration work is required for contracts undertaken by them, and which, as a rule, has to be obtained from specialists, influencing the workmen in their employ, so as to prevent the work being supplied. This must be assumed to be an organised interference on the part of the Plasterers' Association, and its individual members have little freedom of action, but are fully conscious of what would result from inattention or disregard of this policy. It must be apparent that no association of employers can quietly submit to any of their members being subjected to such a system of persecution and annoyance, especially as it is undoubtedly in direct violation of the agreement. It is to be hoped that the plasterers will seriously consider what they are doing, and what must be the result of such a conflict, but by reasonable compliance with the spirit as well as the letter of their undertaking, avoid doing anything which may destroy the anticipated active and prosperous period which appears to be in prospect for the building trade in the coming year."

BIRMINGHAM.—The representatives of the operative carpenters, bricklayers, masons, plumbers, plasterers, and labourers engaged in the building trade in Birmingham served notices on the Master Builders' Association, on November 1, of certain alterations they desired in the rules governing the trades, and on the 26th inst. a meeting of the association was held at the Grand Hotel for the purpose of electing a committee to consider the men's proposals, and arranging for a joint meeting. The alterations suggested deal chiefly with the hours of labour, but in the case of the labourers and scaffolders an advance of 3d. per hour is asked for. Whatever alterations are made will come into effect on April 1, 1897. It is not considered likely that any friction will arise in connection with the majority of the alterations asked for.

FARNWORTH.—A singular strike of joiners has taken place at Farnworth, near Bolton, owing to Mr. Leath, agent for Darley Hall estate, having refused to withdraw cabinet-makers who were engaged making cupboards and other fixtures at Darley Hall under trade-union rates. The whole of the joiners and carpenters engaged on the work at the Darley Hall estate struck work on Saturday morning. The strikers will be supported by their union.

HUDDERSFIELD.—The members of the Huddersfield district of the National Association of Operative Plasterers have sent a notice to the Masters' Association asking for an increase of one penny per hour on the present rate of wages. The notice, which will expire on April 1st, will affect Huddersfield, Mirfield, Lepton, Berry Brow, Honley, Shepley, Holmfirth, Meltham, Lougwood, Golear, and Slaithwaite.

LORD PENRHYN'S SLATE QUARRIES.—Lord Penrhyn's Carnarvonshire slate quarries were thrown open on Monday after a nine weeks' strike, involving a loss of £40,000 in wages. Acting upon a resolution passed at a mass meeting at Betesda on Saturday, no man presented himself for work. The works will be closed to-morrow (Saturday). The North Wales Quarrymen's Union have issued a circular to the trade-unionists of the United Kingdom appealing for financial help. They say that at the Bethesda slate quarry, which is the largest in the world, there are about 3,000 men and boys on strike in consequence of the refusal of Lord Penrhyn to agree to their demands, and his intimation that "he would recognise no committee or combination of any sort or kind in his negotiations with the employes"; and they claim that they are now engaged in "a life-and-death struggle for a recognition of the rights of combination in North Wales."

The London County Council resolved on Tuesday to advertise for a manager of the Works Department at a salary of £1,500, who shall devote all his time to the service of the Council, the arrangement to be subject to three months' notice. Four officials in that department—Messrs. W. F. Dyson, Pimnock, Hutt, and Harwood—were dismissed, but will receive their salaries to the end of the year, and the principal assistant in the Building Department, Mr. G. Wise, was ordered to be severely reprimanded.

CHIPS.

The Birmingham City Council adopted on Tuesday, after a long discussion, the water committee's report, recommending that the salary of Mr. E. Anthony Lees, secretary and superintendent of the water department, be increased from £600 to £800 a year, and that certain rearrangements of the engineering staff be adopted, involving the appointment of Mr. H. Davey, of London, to take the entire engineering responsibility of the department (exclusive of the Elan supply works) at a salary of £600 per annum, in place of the present arrangement, under which Mr. Davey is paid partly by commission.

On Sunday a stained-glass east window, designed and executed by Messrs. Lavers and Westlake, of Endell-street, for the Church of the Holy Cross, Crediton, was unveiled and dedicated. In the apex of the stonework of the window is placed a representation of the Holy Lamb, and in the tracery opening immediately about it are adoring angels. Underneath these, in as many long and narrow openings, are figures of the Twelve Apostles. In the eight main lights are represented scenes from the life and Passion of our Lord.

Mr. Martin Colnaghi, of Pall Mall, has presented to the National Gallery a fine example of the art of Cornelis Bega, a pupil of Adrian van Ostade. This is a well-known *genre* piece, "The Philosopher," which was last publicly exhibited at one of the loan exhibitions at the Guildhall.

The new church of St. Patrick, which has been erected in Frank-street, Highgate, Birmingham, was opened last week by the Bishop of Worcester. The edifice is in the Early Pointed style, and is built of red brick. At the present time the church consists of a nave, north aisle, and double south aisles, with a chancel in course of erection, and a baptistery under the future tower. There is accommodation for 700 worshippers, and the total cost of the building will be between £4,000 and £5,000.

The new board schools, Okehampton, are being warmed and ventilated by means of Shorland's patent Manchester stoves, the same being supplied by Messrs. E. H. Shorland and Brother, of Manchester.

The well-known parish church of Bow, E., which stands in the centre of the high road, has been closed on account of its dangerous condition. It is estimated that £600 would suffice to insure its stability, but a discussion has arisen whether the church should be restored or pulled down. It would undoubtedly be a great pity if the latter alternative were adopted in the case of so interesting and historic an edifice.

We regret to hear that it is proposed to demolish some of the picturesque 15th-century houses in the quadrangle of the Hospital of St. Cross at Winchester, to provide a master's residence. By a narrow majority of one, the hospital trustees have decided in favour of the vandalistic scheme.

The death is announced at Workington of Mr. Jas. Taylor, a well-known sewerage works contractor, at the age of 74 years.

Orford Church, East Suffolk, was opened on Saturday week after partial restoration. The roof of the chancel being in 1892 pronounced unsafe, the rector resolved to restore at once that part of the fabric, and thus to utilise again the nave, from which the congregation had been driven into the south aisle. Mr. I. T. Micklethwaite, F.S.A., architect, reported that £10,000 would be needed for the entire restoration of the church. £2,000 was raised, and applied to the reconstruction of the nave roof in old English oak, and the rebuilding of the east wall of the chancel, including the east window, and on March 10th, in the present year, the Bishop of the diocese placed the cross upon the apex of the nave. Since then Lady Wallace has given another £200 with which to assist in some further repairs. It was determined to reroof the north aisle, restore the windows throughout the church, and refoor the nave and north aisle. The tower needs entire rebuilding. The south aisle requires a new roof, and much else still remains undone.

The Hebdomadal Council of Oxford University has accepted an offer from Professor Poulton to present a statue of Mr. Charles Darwin, to be carved by Mr. Pinker, and to be placed in the court of the University Museum.

At the Ipswich Police-court, on Monday, Messrs. Grimwood and Sons, builders and contractors, Sudbury and Ipswich, were summoned, upon the information of the town clerk, Mr. Will Bautoft, for "failing to give required notice as to new buildings"—viz., the new workhouse. The defence was that the builders understood that a workhouse was an exempted building; but the Bench decided that a technical offence had been committed, and imposed a fine of 10s., with 6s. costs.

An accident occurred in Glasgow on Saturday, at the junction of Gordon and Renfield-streets, where a large building is being reconstructed, and Martin Welsh (33), a labourer, residing at 15, Taylor-street, was instantaneously killed, owing to the slipping of the pin in a hand-crane.

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TENDERS.

* * Correspondents would in all cases oblige by giving the addresses of the parties tendering—at any rate, of the accepted tender: it adds to the value of the information.

ACTON, W.—For the erection of the South Acton Board Schools, for the Acton School Board. Mr. Edward Monson, F.R.I.B.A., Acton Vale, W., architect. Quantities by Mr. Francis Miller, of 10, Delahay-street, Westminster, S.W. :—

Kellet, A., Willesden	£14,878	1	8
Foord and Sons, Brentford	13,891	0	0
General Builders, Ltd., Southampton-row	13,000	0	0
Soble and Son, Richmond	12,988	6	0
Lascelles and Co., Bunhill-row	12,870	0	0
Ferris Bros., Acton	12,844	0	0
Yerbury and Sons, Kilburn	12,694	0	0
Godson and Sons, Kilburn-lane	12,650	0	0
Wimpey and Co., Hammersmith	12,486	0	0
Lyford, G., Shepherd's Bush	11,995	0	0
Blackburn, W., Chiswick	11,800	0	0
Nye, T., Exors of, Ealing Green	11,659	0	0
Flint, H., High Wycombe	10,957	0	0
Hooper, G., Acton	10,898	1	4
Gibson, G. H., High Wycombe	10,680	0	0

(Architect's estimate, £11,570.)

AYLESBURY.—For alteration to No. 17, Market-square, Aylesbury, for the trustees. Mr. Guest Luckett, Aylesbury, architect :—

Mayn and Son, Aylesbury (accepted).

AYLESBURY.—For erection of new bakery and oven at Victoria Park, Aylesbury, for Mr. J. Paxton. Mr. Guest Luckett, Aylesbury, architect :—

Mayn and Son, Aylesbury (accepted).

(Lowest of six tenders received.)

AYLESBURY.—For alterations at the White Hart Hotel, Aylesbury. Mr. Guest Luckett, Aylesbury, architect :—

Mayn and Son, Aylesbury (accepted).

(No competition.)

ASTON, BIRMINGHAM.—For alterations and additions to the fire brigade station in Chester-street, for the urban district council :—

Hughes, R., Merton (accepted) ... £821 0 0

BATTERSEA PARK, S.W.—For the erection of a refreshment house at Battersea Park, for the London County Council :—

Garrett, J., and Sons	£1,897	0	0
General Builders, Ltd.	1,683	0	0
Shurmer, W.	1,656	0	0
Yerbury, R. A., and Sons	1,626	0	0
Cridlan, E. J., and Co.	1,572	0	0
Lapthorne, T., and Co.	1,509	0	0
Faulkner, H., and Co.	1,835	0	0

BIRMINGHAM.—For constructing a gas-meter testing station in Sheep-street, for the city council :—

Whitehouse, B. (accepted) ... £1,438 0 0

BOURNEMOUTH.—For alterations and additions to the Wesleyan chapel, Springbourne, for the committee. Messrs. Lawson and Donkin, Yelverton Chambers, Bournemouth, architects and surveyors. Quantities supplied :—

A.	B.	C.	D.
Hoare, W., Bournemouth	£530 0 0	£47 0 0	£20 0 0
Hoare, F., and Sons, Bournemouth	550 0 0	30 0 0	13 10 0
Jenkins and Sons, Bournemouth	517 0 0	44 0 0	22 0 0
George and Harding, Bournemouth	515 0 0	39 0 0	24 0 0
Shears and Sons, Bournemouth	495 0 0	30 0 0	15 0 0
McWilliam and Son, Bournemouth	*486 0 0	40 0 0	*5 0 0
*Accepted total, £491.			

A.—Alterations. B.—Fencing. C.—pitchpine seating in lieu of red deal. D.—Total.

CAMBRIDGE.—For Presbyterian Theological College at Cambridge, for the Synod of the Presbyterian Church of England. Mr. Henry T. Hare, architect. Quantities by Mr. Geo. Fleetwood :—

Higgs and Hill	£30,740	0	0
Halliday, S. F.	27,453	0	0
Grimwood, G., and Son	26,687	0	0
Colls and Sons	26,474	0	0
Lovatt, H.	26,052	0	0
Parnell, J., and Son	25,706	0	0
Sindall, W.	24,553	0	0
Bell, W., and Sons	24,426	0	0
Saint, W.	23,373	0	0

CLERKENWELL.—For the supply of gasholders at the Rosebery-avenue gas-meter-testing station, for the London County Council :—

Cowan, W. and B., Ltd.	£1,673	5	6
Sugg, W., and Co., Ltd.	1,450	0	0
Wright, A., and Co., Ltd.	1,203	10	0
Glover, T., and Co., Ltd.	1,144	0	0

CONWAY.—For the sewerage of Ogwen-terrace, for the town council :—

Parry, E., Gyffin (accepted) ... £27 10 0

CONWAY.—For laying water-mains to Machoo-terrace, for the town council :—

Parsons, W. (accepted) ... £70 5 10

FARNBOROUGH, HANTS.—For building shops, &c., for Messrs. T. White and Co., Ltd. Mr. S. Friend, M.S.A., Aldershot, architect :—

Kemp, G., Aldershot	£3,429	0	0
Snuggs, J., Aldershot	2,947	0	0
Garland, W., Aldershot (accepted)	2,739	0	0
Bateman, M., Ash	2,549	0	0
Hughes, J., Aldershot	2,473	0	0

FARNHAM.—For building residence at Hale, Farnham, for Mr. M. A. Rice. Mr. T. Wonnacott, Southsea, architect :—

Garland, W., Aldershot (accepted) ... £1,369 0 0

GRAVESEND.—For the erection of two semi-detached houses in Darnley-road, for the Kent and Essex House, Land, and General Investment Company, Ltd. Messrs. Rayner and Bridgland, architects and surveyors :—

Multon and Wallis, Gravesend ... £1,455 0 0

(Accepted.)

GRAVESEND.—For additions and alterations and repairs to No. 44, The Grove. Messrs. Rayner and Bridgland, surveyors :—

Dering, J. M.	£223	0	0
Archer, W. H.	205	0	0
Tuffee, W. (accepted)	199	0	0

(All of Gravesend.)

GRAVESEND.—For reinstating four houses, Prince's-street. Messrs. Rayner and Bridgland, surveyors :—

Multon and Wallis	£605	0	0
Archer	590	0	0
Rayfield	584	0	0
Tuffee	579	0	0
Dering (accepted)	555	0	0

(All of Gravesend.)

GRAVESEND.—For decorations to 39, Cobham-street. Messrs. Rayner and Bridgland, surveyors :—

Rackstraw	£127	10	0
Multon and Wallis	117	10	0
Carpenter (accepted)	95	0	0

(All of Gravesend.)

GREAT MISSENDEN.—For alteration and addition to the Buckingham Arms Hotel, Great Missenden. Mr. Guest Luckett, Aylesbury, architect :—

Parsons, G., Prestwood (accepted), at schedule price.

GREENHITHE.—For decorations and repairs to Stone Park, Greenhithe, Kent. Messrs. Rayner and Bridgland, surveyors :—

Maple and Co., London	£434	15	0
Robinson	395	0	0
Multon and Wallis	378	10	0
Carpenter	376	0	0
Rackstraw (accepted)	375	0	0

(Rest of Gravesend.)

GRENDON, UNDERWOOD.—For erection of stables and rooms over, for the Rev. H. Piggott. Mr. Guest Luckett, Aylesbury, architect :—

Parker (accepted)—No competition.

HIGHCLIFFE, HANTS.—For house and stabling at Highclere, for Dr. Douglas Thomson. Messrs. Dawson and Donkin, Yelverton Chambers, Bournemouth, architects and surveyors :—

Kingerlee, T. H., Oxford	£2,134	0	0
Bance, E. A., Woodhay (accepted)	1,967	0	0

HIGHCLIFFE, NEAR CHRISTCHURCH, HANTS.—For the construction of new roads and sewers on the Highcliff Castle Estate, for Major Edward M. Stuart Wortley, C.M.G. Messrs. Lawson and Donkin, Bournemouth, surveyors :—

Troke, G., Bournemouth	£1,965	0	0
Saunders, W. H., and Co., Bournemouth (accepted)	1,936	0	0

ILFORD.—For the erection of a mortuary, for the local board :—

Wilmott, F. (accepted).

(Continued on page XVI.)

LIST OF COMPETITIONS OPEN.

Rhos-on-Sea, Colwyn Bay—Laying-out Building Estate	£100, £35, £15	Philip J. Kent, Rhos Abbey, North Wales	Dec. 5
Swadlincote—Farm Bailiff's House and Stabling (£500 limit)	No premium	R. Cartwright, Surveyor, U.D.C., Swadlincote	" 7
Foleshill—Water Supply Schemes for Bedworth Parish	No premium; competitors to name rate of commission	A. P. Oswin, Clerk R.D.C., Workhouse, Foleshill	" 9
Weston-super-Mare—Pavilion at Knightstone (£8,000 limit)	£50, £20, £10	Wm. Smith, Clerk U.D.C., Town Hall, Weston	" 10
Earlsheaton, Yorks—Fever Hospital (Local Architects)	No premium	G. T. Lee, Clerk, Town Hall, Dewsbury	" 12
Kieff, Russia—Theatre (£18,000 limit, 1500 seats)	£280, £160, £120, £76, £32	Imperial Society of Architects, 83, Quai de la Moika, St. Petersburg	" 15
Longton, Staffs—Schools and Free Library (£8,000 limit)	£75, £25	Geo. C. Kent, Town Clerk, Longton	" 31
Odiham—Board School	No premium	F. S. Chandler, Clerk, Odiham	" 31
Liskeard, Cornwall—Rebuilding Tower, Parish Church (£3,000 limit)	£50 (merged in commission), £25	Nettle and Bone, Hon. Secs., Liskeard	Jan. 1
Knaresborough—Grammar School (£1,000 limit)	£10	Wallace Gill, Solicitor, Knaresborough	" 1
Sevenoaks—Four- and Five-roomed Cottages (£150 each)	£5	The Surveyor to Urban District Council, Sevenoaks	" 1
Tottenham—Higher Grade Schools, Wood Green (900 places)	No premium; commission 3½ p.c.	J. F. A. Adams, Clerk to School Board, Tottenham	" 15
Sunderland—Technical School (£18,000 limit of cost)	£100, £50, £25	Fras M. Bovey, Town Clerk, Sunderland	" 16
Cobham, Surrey—Sewerage and Sewage Disposal Schemes	25gs. (to merge in commission)	W. O. Reader, Clerk, Epsom R.D.C., Lonsdale, Epsom	" 16
Worcester Corporation—Sewage Disposal	£160 and two lesser premiums	Samuel Southall, City Clerk, Worcester	" 31
St. Gilles, near Brussels—Town Hall (£2,000 limit of cost)	10,000, 4,000, 2,000, and 1,000 kr.	Municipal Authority, St. Gilles, Belgium	Feb. 1
Christiania—Railway Station Plans	No premium	Railway Offices, 6, Victoria-terrace, Christiania	Mar. 31
Osgodby, Lincolnshire—Wesleyan Chapel & Schools (cost £600)	£20, £10	E. H. Davy, Secretary to Trustees, Kirkley, Market Rasen	"
Eccleshill, Bradford—Sewage Disposal	25gs., 10gs., 5gs	Jos. Richardson, Clerk, U.D.C., 4, Town Hall-square, Bradford	"
Beeds—Hotel	25gs., 10gs., 5gs	Fred. Beauland, Hotel Engineer, Harrogate	"
Harrogate—Hotel Extension	£80, £20	Fred. Beauland, Hotel Engineer, Harrogate	"
Colwyn Bay—Electricity Lighting Scheme	£150, in three premiums	The Clerk, Urban District Council, Colwyn Bay	"
London—Electric Omnibus and Cab Designs		Sec., London Electric Omnibus Co., 6, Northumberland-av., W.C.	"

LIST OF TENDERS OPEN.

BUILDINGS.

Bradford—Nurses' Home	Board of Guardians	Thomas Crowther, Clerk, 22, Manor-row, Bradford	Dec. 7
Epsom—Post Office	H.M. Commissioners of Works	Hon. Reginald B. Brett, Secretary, H.M. Office of Works	" 7
Sowerby Bridge—Bank and Shop	Yorkshire Penny Bank	Horsfall and Williams, Architects, Halifax	" 7
Colchester—Vagrant Cells	Board of Guardians	G. H. Page, Architect, Trinity Chambers, Colchester	" 7
Bradford—Caretaker's House, Whetley-lane	School Board	T. H. and F. Henley, Architects, 42, Tyrryl-street, Bradford	" 7
Bridlington Quay—Houses, Hilderthorpe-road	Jno. Scott	Samuel Dyer, Architect, Bridlington Quay	" 7
Ashburton—Two Houses	Henry Veale	Samuel Legar, Architect, Union-street, Newton Abbot	" 7
Stokeinteighhead—House and Farm-Buildings Alterations	Ed. Jas. Murch	Samuel Legar, Architect, Union-street, Newton Abbot	" 7
Ynysyhir—Chapel in Watts-road	Board of Guardians	Edwin Jones, Architect, Cymmer, Porth	" 7
Belfast—Alterations to Workhouse	Board of Guardians	Jas. C. Neeson, Clerk, Belfast	" 8
Plymouth—Workhouse Laundry Fittings	Board of Guardians	W. Adams, Clerk, Plymouth	" 8
Glasgow—Five Tenements, Barony-street	Corporation	J. D. Marwick, Town Clerk, City Chambers, Glasgow	" 8
Gilfach Goch—Baptist Chapel	E. E. Bevan	W. S. Morgan, Ironmonger, Gilfach Goch	" 8
Neath—Cambrian Hotel	School Board	Lambert and Rees, Architects, Neath	" 9
Kirkley, Lowestoft—Schools, Lovewell-road	J. J. Wagstaff, Southend-on-Sea	R. B. Nicholson, Clerk, Lowestoft	" 9
Westcliff-on-Sea—Substructure of Queen's Hotel	J. Sharp	Thompson and Greenhalgh, Architects, Bank Chambers, Southend	" 9
Silloth—House and Shop	Metropolitan Asylums Board	Geo. Armstrong, Architect, 75, Lowther-street, Carlisle	" 9
Harverstock Hill—Additions to North-Western Hospital	Sir John Barran, Bt.	T. Duncombe Mann, Clerk, Norfolk House, Norfolk-street, W.C.	" 9
Chapel-Allerton, Leeds—Eighteen Terrace Houses	Jones, Dickinson, and Co.	W. Carby Hall, A.R.I.B.A., Park-row, Leeds	" 9
Dowlaish—Stables	J. J. Wagstaff, Southend	James and Morgan, M.M.S.A., Charles Street Chambers, Cardiff	" 9
Roath, Cardiff—Steam Laundry	School Board	Habershon and Fawcner, Architects, Pearl-street, Cardiff	" 9
Westcliff-on-Sea—Superstructure Queen's Hotel	F. and J. Bales	Thompson and Greenhalgh, Architects, Southend-on-Sea	" 9
Brighton—St. Lawrence Schools	Board of Guardians	Jno. W. Simpson, Architect, 10, New Inn, Strand, W.C.	" 9
Golgar—Additions Clough Head School	Hants County Council	D. J. Bailey, Clerk, Yorkshire Banks Chambers, Huddersfield	" 10
Yarmouth—Three Houses, Saxon-place	Board of Guardians	C. G. Baker, Architect, Town Hall Chambers, Great Yarmouth	" 11
Oswestry—Workhouse Infirmary Extension	Hants County Council	J. C. Ball, Clerk, Oswestry	" 11
Southampton—Converting Old Grammar School into Police-court	Board of Guardians	H. Barber, Clerk, The Castle, Winchester	" 11
Celbridge—Three Labourers' Cottages	Tynemouth School Board	L. A. McDonnell, Architect, 1, Clare-street, Dublin	" 11
North Shields—Coach-lane Board Schools	H.M. Works Commissioners	J. W. Lambton, Clerk, Howard-street, North Shields	" 11
St. Helen's, Lancs—Post-Office Enlargement	Benskin's Brewery, Ltd.	Hon. Reginald B. Brett, Secretary, H.M. Office of Works, Whitehall	" 11
Watford—New Brewery	First Presbyterian Church Committee	Geo. Adam and Sons, Engineers, Bristol	" 11
Donaghadee—Manse	School Board	Thomas Pentland, Architect, 35, High-street, Belfast	" 12
Burnham-on-Crouch—Schools	Corporation	J. Cook, Clerk, Burnham, Essex	" 12
Sedburgh—Girls' Homes	Croydon Board of Guardians	J. F. Curwen, F.R.I.B.A., Highgate, Kendal	" 12
Burnley—Destructor Shed and Office, Aqueduct-street	School Board	W. T. Fullalove, Town Clerk, Burnley	" 14
Thornton Heath—Two Pairs Cottage Homes, Mayday-road	Corporation	Harry List, Clerk, Mayday-road, Thornton Heath	" 14
Walsall—Alterations to Wolverhampton-road Schools	Great Western Railway Co.	A. Jeffries, Clerk, Bradford-street, Walsall	" 14
Liverpool—Additions to Westminster-road Baths	Governors	W. R. Cawt, 15, Great George-square, Liverpool	" 14
Devonport—Alterations to Royal Oak Inn	Grammar School Governors	Chas. Cole, Architect, 50, High-street, Exeter	" 14
Wells, Somerset—Waiting-Rooms at Station	Urban District Council	G. K. Mills, Secretary, Paddington Station, W.	" 15
Colne, Lancs.—Refuse-Destructor Chimney (70 yards high)	City Council	T. H. Hartley, Borough Surveyor, Colne	" 16
Porth—Additions to Intermediate School	Board of Guardians	Jacob Rees, Architect, Pentre, Glam.	" 17
Morpeth—Science and Art Schools (Separate Trades)	School Board	Geo. Brumell, Clerk to Governors, Bridge-street, Morpeth	" 23
Dartford—Stables and Mortuary, Overy-street	B. W. Tolhurst	J. C. Haywood, Clerk, Sessions House, Dartford	" 31
Leeds—City-square Improvement (Granite Work)	S. J. Burdett	Wm. Bakewell, F.R.I.B.A., 38, Park-square, Leeds	"
Southsea—Salvation Army Barracks, Albert-road	Co-operative Society	Alex. Gordon, M.S.A., 107, Queen Victoria-street, E.C.	"
Dublin, South—Workhouse Alterations	Bradford Banking Co.	T. Phelan, Clerk, James-street, Dublin	"
Middlesbrough—Morton-road Schools (1,040 places)	Trnstees	J. T. Belk, Clerk, Middlesbrough	"
Calder Vale—Rebuilding Foundry	Leeds Industrial Co-operative Socy.	Simpson & Richardson, Architects, Southgate Chambers, Wakefield	"
Southend-on-Sea—Eight Shops, Whitegate-road	Bradford Banking Co.	Thompson and Greenhalgh, Architects, Bank Chambers, Southend	"
Southend-on-Sea—Substructure, Hotel Victoria	City Council	Thompson and Greenhalgh, Architects, Bank Chambers, Southend	"
Fort William—Two Houses	Messrs. Barry	Duncan Cameron, Architect, Inverness	"
Newchurch, Lancs.—New Chancel and Vestries, St. Nicholas	School Board	Preston and Vaughan, Architects, Diocesan Chambers, Manchester	"
Barry, Cardiff—Wesleyan Chapel	School Board	Jones, Richards, and Budgen, Architects, 18, St. Mary-st., Cardiff	"
Coventry—Cycle Factory, Far Gosford-street	Building Committee	E. J. Punnell, Jun., Bank Chambers, Little Park-street, Coventry	"
Ilkestone—Factory	Corporation	W. Dymock Pratt, Architect, Long-row, Nottingham	"
Newcastle-on-Tyne—Shops and Offices, New Bridge-street	School Board	Wm. Hope, Architect, 40, Westgate-road, Newcastle	"
Atherstone—Alterations to Premises, Long-street	Co-operative Society	F. E. L. Harris, F.R.I.B.A., Atherstone	"
Bradford—Alterations to Bank	Bradford Banking Co.	T. C. Hope, Architect, Old Bank Chambers, Bradford	"
Darnall Hill—Semi-Detached Houses	Trnstees	J. P. Earle, Architect, Norfolk-row, Sheffield	"
Chesterfield—17 Houses	Leeds Industrial Co-operative Socy.	J. P. Earle, Architect, Norfolk-row, Sheffield	"
South Normanton—Hotel	Bradford Banking Co.	J. P. Earle, Architect, Norfolk-row, Sheffield	"
Stubbington, Fareham—Two-Story Building	City Council	Wilberforce Cobbett, C.E., West-street, Fareham, Hants	"
Nottingham—Higher Grade School, Clifton Estate	Messrs. Barry	W. J. Abel, Clerk, Victoria-street, Nottingham	"
Nottingham—Enlargement Smeinton School	School Board	W. J. Abel, Clerk, Victoria-street, Nottingham	"
Horwich—Foundations, St. Catherine's Church	Building Committee	F. Moreton Palmer, Architect, 3, Lee-lane, Horwich	"
Newcastle-on-Tyne—Corrugated-Iron Sheds on Quay	Corporation	J. Law, City Engineer, Newcastle	"
Porth—Caretaker's House at Intermediate School	School Board	Jacob Rees, Architect, Pentre, Glam.	"
Bristol—Clearing Site of Burnt-out Wesleyan Chapel, Red-land-road	Trnstees	H. J. Jones, M.S.A., 12, Bridge-street, Bristol	"
Beeston Hill, Leeds—Seven Back-to-Back Houses	Leeds Industrial Co-operative Socy.	John W. Fawcett, Secretary, 10, Albion-street, Leeds	"
Bradford—Bank Alterations	Bradford Banking Co.	T. C. Hope, Architect, Old Bank Chambers, Bradford	"
Exeter—Bandstand on Northernhay	City Council	D. Cameron, City Surveyor, Exeter	"
Cardiff—Rebuilding 30 and 31, Bute-terrace	Messrs. Barry	Jones, Richards, and Budgen, Architects, 18, St. Mary-st., Cardiff	"
Bradford—Houses and Shops, Barker End-road		107, Lonsdale-road, Bradford	"
Bradford—Warehouses, Harris-road		Samuel Robinson, Architect, Cheapside, Bradford	"
Bradford—Hotel and Shops		Jno. Jackson, M.S.A., Barry-street, Bradford	"
Belfast—Nineteen Houses and Shop, Miller-street		J. C. Reid, 5, Ulster Chambers, Belfast	"
Oundle—House in West-street		J. G. Stallebrass, Architect, North-street, Peterborough	"
Pentrefelin, Llangollen—Villa		Foulkes Jones, Solicitor, Llangollen	"
Poole—Longfleet Schools		Sanders and Stileman, Archts, Observer Chambers, Bournemouth	"
Wellingborough—Council Chamber	Urban District Council	Sharman and Archer, Wellingborough	"

THE BUILDING NEWS

AND ENGINEERING JOURNAL.

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OFFICIALS AND AMATEURS.

BETWEEN the professional and the amateur a gulf is fixed. The man who gains a living by following a certain vocation and the one who makes it a hobby—talk and write about it in very different ways and from opposite positions. Perhaps it is well for all concerned that there are these two classes—the one is generally contented to work in grooves of its own making, and the other to find fault. But, as everyone will have seen, there are two kinds of critics—constructive and destructive. All that is beneficial in art and literature has been done by the first kind of criticism—it has produced advanced schools of artists, and literary men, historians, philosophers, and men of science; but the destructive critics are content to find fault without endeavouring to show what can be put in the place of the old or what method can be substituted that is better. Most critics are unpractical, and this is particularly the case with the latter, who are ever ready to call in question the methods of professional men.

That the spirit of amateurism is still strong, and asserts itself whenever an opportunity occurs, is apparent to all who take any interest in public works of building or of restoration. It raises its voice whenever a new national work is contemplated, as it did when the Government Offices competition was being discussed, when the new Law Courts were being erected, when St. Paul's Cathedral decorations were before the public, and latterly we have heard it on the question of the extension of the South Kensington Museum. But it is chiefly on the subject of the restoration of our national buildings and monuments that the amateur is most active, as when he protests against any radical restoration of an old cathedral or church. In this sphere he seems to assume a great deal of authority when he calls in question all that the officials, deans and chapters, and leading architects have contemplated or suggested. Thus we heard the amateur claim a hearing when the spire of Salisbury Cathedral was said to be in a condition requiring immediate attention; and lately, when the beautiful clustered pinnacles at the base of the spire of St. Mary's, at Oxford, were reported by the architect to be in a decayed condition requiring complete reparation. At a still later period the amateur element has again been busy in calling in question the proposals of the Dean and Chapter of Peterborough, and in protesting against the mode of restoring the west front of that cathedral, which has been embodied in the report of the eminent experts who have been commissioned to survey and report upon the fabric, quite regardless of the practical investigations and examination of the structure and its foundations that have been made. In these questions, the amateur spirit has no doubt been a useful check to wholesale or destructive "restoration." By exercising a conservative opinion, much injurious tampering with old buildings has been prevented, and much that has an historical interest preserved. In the interests of archaeology we have to be thankful for the existence of a spirit of preservation when there is so much that is destructive going on. We see every day the greed of landowners and property owners in letting and selling their acres to builders, and in giving their sanction to the demolition of historic houses and grounds which have long been ornaments to the localities. All this is very

distressing, yet the work goes on in spite of protest from those who are independent of any interest. The amateur, in short, in all these cases becomes the mouthpiece of the unrepresented, unofficial classes. Property-holders, and the custodians of our national buildings and monuments, belong to the official class; and so it will ever be that the amateur mind is, to a certain extent, the unprivileged, and takes an interest in our national architecture apart from all official interests, and to this extent it is a valuable agency.

Unfortunately, however, the amateur in building is very unpractical; if he were practical he would be less amateurish than he is. He pretends to tell us how we can save a building from becoming dangerous without taking down or removing portions and then rebuilding—how, in fact, it is possible to save every stone; but when his panacea is put to the test it is found to be useless. Half our old cathedrals would have been in helpless ruin if we had followed the advice of that amiable and learned body who set themselves up as protectors of our ancient buildings. No one more than ourselves would have hailed any process by which so much injurious restoration might have been averted. But we were powerless. In many instances it meant either ruin and catastrophe or reconstruction, as was proved in the case of Chichester Cathedral spire, and only just prevented in the instance of others, which were scarcely taken in hand in time. And who of the ancient builders of our great churches ever hesitated to pull down and rebuild or restore? Do not the records of Canterbury, Winchester, and Lincoln show that their great builders boldly undertook to rebuild and restore in each case, and of even rebuilding and incasing portions of the older styles?

There are different kinds of amateurs. The amateur generally appeals to history or to style, especially if he be of an antiquarian turn of mind. If it is an ancient building, as a church, which interests him, he is fond of picking holes in the design, showing, for instance, that a high-pitched roof is not in conformity with the style of the building, as was attempted when St. Alban's Cathedral was about to be restored. Or he finds fault with the details, asserts they are too Early or too Late. At another time his critical inclinations will make him a formidable apologist for or opponent of any scheme of decoration. He will either advocate or oppose the introduction of polychromy in our public buildings and churches. On the question of St. Paul's decoration, the proposal to veneer its interior with slabs of marble was eagerly contested by amateurs, as the question of stained glass has been over and over again. So, too, has the subject of sculpture in our public buildings. Into these and similar subjects, it must be allowed, the amateur has often been able to bring to bear valuable knowledge and experience. And then we have our Grimthorpes, who take the practical and commonsense view of buildings, but are often very irritating to the professional mind. The question may, perhaps, turn on some practical matter—the particular stone to be used, as in the controversy that took place when the Houses of Parliament were built, in which case the scientific lithologist had it his own way. Or it turns on the question of heating and ventilation, in which the general theories of an irresponsible writer are often as baseless as they are misleading. It is often some faddist or inventor who has the hardihood to find fault with the official scheme, and the general reader is apt to credit the remarks as sound, especially if the letter is persuasive. The practical man has to bear the brunt of these statements; the architect is questioned about them, and the amateur's opinion generally finds a champion in some member of the building committee

who knows nothing whatever about the matter. The idle and irresponsible question is taken up to make a little capital. Perhaps it is a point of acoustics that is raised; the architect's building is condemned for its bad proportions for sound, the ceiling is not shaped on right principles, the room is too wide, or long, or high, or it has other defective properties. These are the sort of complaints which the amateur who plumes himself upon practical points makes the more vexatious because, in many instances, they are groundless charges, and his proposals are often too theoretical or impracticable to be adopted. It is so much more easy to talk and to criticise than to do. The theorist who has never carried out a building, who knows nothing of building restrictions and of practical requirements, who has only a smattering of the styles, or is only read in archaeological matters, is generally the most intolerant of critics. Sir Charles Barry, Scott, Street, and a host of other architects have been victims to this sort of idle amateur criticism, but happily their works have outlasted the storm while their blatant critics are forgotten.

But we do not say this of all amateurs. We have had men who have been an honour to the art, who have devoted their lives to researches, explorations, to the philosophy, and principles, and history of architecture, and whose names have enriched the literature of the profession. From the days of that great patron of architecture, the Earl of Burlington, whose taste in the best Italian of his time is recorded in history, or of Horace Walpole, who was one of the earliest revivalists of Gothic and the architect of Strawberry Hill, the amateur has been strong in the domain of architecture—no doubt largely owing to the fact that the art was then considered one of the branches of literature and of a polite education. Even in Wren's time there were amateurs who occupied distinguished positions, like Dean Aldrich, who wrote a work on the Classical Orders, and Dr. Clarke; and within the present century we have had men like Britton, Willis, Dallaway, Freeman, the Earl of Aberdeen, Parker, and Ruskin. As an historian of the art, the late Mr. Fergusson was a champion of non-professional and amateur architecture, and was never tired in his pages of exposing the weakness of professional work, of contrasting the life and growth of an art before the Renaissance with the imitative architecture of men who took it as a profession. And is not Mr. Ruskin equally a denouncer of official art? Do not the pages of his "Seven Lamps" and "Stones of Venice" declare in undisguised terms that art cannot be learned by rules or traditions? Fergusson was analytical and critical, Ruskin visionary. Men like Willis, and Whewell, and Parker exercised great influence on architecture from an antiquarian point of view, and their works have helped to shape our ecclesiastical architecture and adorn the literature of art. Indeed, it is not too much to say that the unremitting researches and labours of literary amateurs like Parker and Fergusson, Ruskin and Beresford-Hope, have done a vast deal to formulate and consolidate the architectural development of the present era. Their practical influence may appear to be small, but their writings and suggestions have silently moulded many of the best designers of the day, and have also done much to influence craftsmanship. Look, for example, at what the influence of the writings of Pugin, Parker, and Hope has done for ecclesiology, in inculcating true Gothic principles in the arrangement and designing of churches and their accessories. If it had been left to the practical architect it would have been very different; if only because he often lacks the power to do more than follow the path before trodden on.

More recently the interference of amateur criticism has been to stop works of recon-

struction; it has been directed by the "leave alone" policy. Shoring, iron bands and ties, or other mechanical expedients for holding together the old masonry have been advocated, and the engineer expert has been pitted against the architect. To the archaeological obstructives, taking down and rebuilding is not restoring, but simply destruction, and as such they protest. It is giving us, they say, a new copy, not preserving the old work. Very true, no doubt; but is not this the only practical way of maintaining our historic buildings, restoring little by little? How is the west front of any cathedral to be preserved when the outer stones have so far decayed and become dislocated by foundation weakness if not by such means? So long as the professional architect is paid by commission on cost, or has a personal interest in building, we may expect to find the non-official or unprofessional element amongst us. It is only natural that it should be so. The amateur asks why it is that only those professionally or remuneratively interested should have all to say on a subject of this sort. Has not the medical profession had to contend against the "quack" element, yet "patent medicines" and quacks abound? They have, it may be, helped to "redress the balance," to check the abuse of drugs, and to become a beneficent element. Who knows? Do we not see the same non-official element in other professions—the clerical and the legal, which each has its heterodox followers—men who like to set up their own views and shibboleths? And the body politic is perhaps none the worse for it.

UNIMPEDED FOOTWAYS AND THE LONDON BUILDING ACT.

A QUESTION of much importance to architects and building owners in our Metropolitan streets is how far it is legitimate to introduce "architectural decorations" to buildings or shop-fronts which bound our public footways? Granting that it is very necessary to prevent obstruction on pavements, yet a prohibition of architectural features like pilasters, piers, or columns—anything, in fact, of a decorative kind—beyond the external wall of a building would very materially restrict the opportunities of design. The beauty and picturesqueness of our old city streets are attributable to the irregularity of building lines and the "ins-and-outs" of shop-fronts, porches, and windows. Our building regulations have made this state of things impossible by imposing a line of frontage and reducing all projections to a few inches. Section 73 defines how far any shop-front may project beyond the wall of the building. In ordinary streets of more than 30ft. in width the shop-front is allowed to project not more than 10in., and the cornice not more than 18in. beyond the wall. Nothing is said about pilasters, though these are included under the term of "architectural projection" in the first sub-clause. The effect of these provisions is to limit the architect in his design by confining him to a few inches of projection in the case of shop windows and cornices. Of late, a few clever and ingenious devices have been followed, by which depth and play of window and convenient lobby space can be secured. These are generally obtained by recessing the whole or a portion of the shop-front by forming a lobby within or an external arcade to the frontage, which gives a few feet more of display and breaks up the straight frontage, and a few artistic arrangements of this kind may be seen in Ludgate Hill, Fleet-street, Piccadilly, and Oxford-street. These recessed fronts are decidedly an improvement, but they reduce the space within and limit the amount of light to the shop. What there is good in these variations of shop design is largely attributable to the restrictions in operation. We speak chiefly

here of the projecting features of the ground story which affect the paved footway. The upper stories of street buildings which have land of their own in front, and are erected in streets of a width of 40ft. or more, may have bay windows under certain conditions. They must not be more than three stories above the footway, and must not project more than 3ft. from the front wall, and are to be at a certain distance from either party-wall. Oriel windows or turrets are also allowed in streets of such width; but not to project more than 3ft., nor to be less than 10ft. above the footway, and must be also at a certain distance from the party-wall, which means, of course, that it cannot be a corner projection or oriel. These are new rules. The law, in short, has given permission to projecting features, provided they do not add to the risk or spread of fire; and where the rules do not apply, the consent of the Council must be obtained. There is now, therefore, an opportunity in certain streets to make projecting features, when the owner has sufficient space in front; but along the lower story the rule is properly more strict. The point to determine is, what kind of projections may be used in these lower stories of buildings. If we look at the ordinary shop-front, we shall find two distinct varieties, the plain glass front directly under the wall front, with side lobby recesses, in which case there are only end pilasters or piers at the party-walls, and the projecting double window with doorway in centre, the only architectural features being the sash or shop-front bars, both of which types are incapable of any architectural design. In the more modern examples we find often a flat window divided into bays by pilasters, or sometimes brick piers or pilasters are built between distinct windows, a more solid and satisfactory treatment. These pilasters or their pedestals and their bases, if there are any, must project a few inches, and 10in. is, of course, little enough, if it means the plinth. If bolder projection is required, the owner must obtain the consent of the Council if he does not set back his main wall to obtain the few extra inches he wants.

A special case arises when a shop-front is to be constructed on the flank wall of premises. Legal proceedings were taken the other day in such a case at Marlborough-street Police Court, when the district surveyor of St. Pancras West was summoned before the magistrate to show cause why a notice of objection with respect to certain pilasters proposed to premises in Tottenham Court-road should not be quashed. The side front to which the pilasters were to be attached had always a small area inclosed with railings of about 2ft. wide. It was argued by the plaintiff that clauses 3 and 8 of section 73 entitled him to project the front 10in. beyond the external wall, and the pilasters a greater distance, in this case 14in. The surveyor said the limit of 10in. applied equally to the pilasters as to the actual sashes of the shop front, and that they were not like "architectural decorations," as those described in section 8, inasmuch as none of them would reach the pavement and cause an obstruction. But, as a matter of fact, if pilasters were not permitted, neither could a dado or plinth below a shop window which projects on the pavement be; nor could some window dressings be permitted if this rule was observed. There can be no question, though the sub-section 8 does not directly say so, that pilasters are in this case "window dressings and other like architectural decorations," and come within the exceptions spoken of in this clause; and this view was held by the magistrate, who made an order setting aside the notice of objection of the district surveyor. The decision is at least reasonable, and will be satisfactory to the profession. Pilasters form so important a feature of ground-floor stories

and shop fronts that the omission of the word must be an oversight which ought to be amended whenever a revision of the Act is made. It is quite clear, however, the framers intended such a feature to be included in the term "decorations." An undesirable restriction would be placed on all architectural design if these rules are to be interpreted narrowly, and the owner who had an area and gave it up to the pavement would justly complain if when he attempted to improve the frontage of his premises he was told he had exceeded the limit a few inches. At the same time, we should insist as far as possible on maintaining unobstructed footways. More reprehensible to our minds are many of the poles or awnings and lamps which project from shop windows in many of our crowded thoroughfares, like Fleet-street and the Strand, and become an annoyance to passengers, which things are, we believe, liable under the old Metropolitan Police Act, but which few people take any trouble about. It ought to be remembered that projections prohibited by section 73 can be made by permission of the Council under the Regulation of 1895, and agreeably to the Standing Orders of the Council.

THE ARCHITECTURAL ASSOCIATION.

THE fourth ordinary meeting of the Association for the present session was held on Friday evening at 9, Conduit-street, W., the President, Mr. Beresford Pite, F.R.I.B.A., in the chair.

PRESENTATION TO MR. H. D. SEARLES-WOOD.

In opening the proceedings, the President remarked that he had a duty of an unusually pleasant character to perform. He was old enough as a member of the Association to recollect the enthusiasm with which the work of the Entertainment Committee used to be carried on by his old friend, then known as Mr. H. D. Appleton. Later on he took part in the committee work of the Association when the onerous duties of the honorary secretaryship fell into the same hands, and with many others then present, he sat with much pleasure under the presidency of the same genial friend. Since then Mr. H. D. Searles-Wood had taken upon himself the mantle of Mr. H. D. Appleton, and had continued, on behalf of the members, his most self-denying and arduous labours as honorary secretary of the committee which arranged the annual excursions. Of late Mr. Searles-Wood had been associated with Mr. W. Talbot Brown, of Wellingborough, whose very serious illness had prevented his being with them that evening, and now they regretted to learn that their warm-hearted friend, Mr. Searles-Wood, found it necessary to retire from the Excursions Committee Secretaryship, although he would continue as a member of the committee, and it was now his pleasing duty, as President, to present him, on behalf of those who had joined in the excursions, with some little token of their appreciation, esteem, and regard. The President then, amidst hearty applause, presented to Mr. Searles-Wood a pair of massive silver candelabra, with twisted branches, designed after models of the Chippendale period, and each suitably engraved on the foot.

Mr. SEARLES-WOOD, who evidently spoke with some difficulty, heartily acknowledged the gift, remarking that he had always regarded the work of the Association sufficiently interesting to be its own reward, and had never looked for any recognition. The value of the excursions, which, he felt, were not sufficiently appreciated by the younger members, was more than mere holiday visits to old buildings; but the interchange of ideas during the outings was of immense benefit to all, and they were the means of building up valued friendships.

Mr. E. W. MOUNTFORD, past president, said he had received numerous letters and telegrams from members all over Great Britain, who would have wished to have been present, but were prevented by various unavoidable causes, and these all expressed esteem and appreciation for Mr. Searles-Wood.

STREET ARCHITECTURE.

A paper on this subject, illustrated by numerous engravings and photo-lithographs, and by drawings lent by Messrs. J. J. Stevenson, Ernest George, Hargreaves Raffles, Needham Wilson, and others,

and by a large number of lantern views, was read by Mr. H. H. STATHAM. Street architecture, the lecturer pointed out, in the proper and limited meaning of the word, was the result of the necessity of planting buildings as closely as possible together in towns, to save space and in consequence of the value of land, coupled with the necessity of having definite and continuous lines of communication between the buildings. Street architecture consisted, therefore, of buildings which architecturally had only a front and back and no sides (except in the instances of the buildings at the corners of the streets), and the fronts of which formed a continuous series of buildings in different occupations and for different purposes, but structurally united into one long mass. This was the essential characteristic of street architecture, and this was what made it a special architectural problem. In towns which had grown up where there was plenty of space and where land was of little value, what was called a street, as in some of the Brazilian and Mexican towns, as well as in some of our country villages, was only a series of houses built in a row, but each with ground all round it; but the problem of street architecture was not touched in this case. In the ancient walled cities a crowded street architecture and very narrow streets were forced on the inhabitants by the necessity of providing for their increasing numbers within the limits of the walls, a house outside the walls being liable any day to be looted by marauders. In modern unwall'd cities there was more elasticity, in regard, at all events, to width of roadway; people were not belted in with fortifications, and the marauders attacked them from the centre rather than from without. Yet there was as strong a desire to get into a modern city, by practical means, as there was to get into the old walled cities by assault; and between this and the natural rate of increase of population within the town there was always that demand for new dwellings which induced the building owner to place his houses close together in order to profitably utilise every foot of ground, besides effecting the economy of substituting party-walls for external walls. One of the greatest mistakes commonly made in regard to street houses was the treatment of them as if the street front alone were worth consideration, while the backs might be as plain and ugly as one pleased. There was room for a very characteristic variety in the style of treatment of the front and back. The back of the house had more the look of separation and privacy than could be possible in the front, and therefore admitted of a more playful and individual treatment; it was less called upon to conform to any general style or character pervading the whole row of houses; it was more the tenant's private piece of house wall, the back-ground to his garden, and might reasonably be treated with more freedom from constraint than the front. Passing on to consider the street front, the most important question of all was the much-vexed one—should a series of buildings of one class be combined into one general design, or each be free to receive its own separate treatment? Of course, where a building of a special class was inserted in a row of buildings of another class, there could be no doubt so far. If a bank front occurred amid a row of dwelling-houses, or of ordinary shops, people expected to know which was the bank from its special appearance. But in the case of a row of houses of about the same size and rental, were they to be treated each in its own way, or to be combined into what was called a "terrace," in which the separate houses were subordinated to a uniform general design? The question turned on the character and plan of the site. In a formally laid out square, the design of the houses should be formal and grouped. A geometrically laid out square, with its lines true and parallel, whether it were a strict square or an oblong, was an artificial and formal creation, and required, to give it its full effect, artificial and formal buildings. If the houses were to be irregular, there was no use in planning the square geometrically. When you came on to such an open space as a market-place, the irregular and picturesque element dominated the site; picturesque and irregular houses were quite in keeping, and what one might expect to find there. But in a large formally laid out square, stateliness was the prevailing element, and should be carried out in the buildings surrounding it. The same principle applied to a certain extent to the architecture of a street. Where a street was a wide one laid out perfectly straight, and especially if it led up to any important building

as an architectural termination to the vista, there was a good deal to be said in favour of designing it as one whole, not necessarily in a mere repetition of houses of the same design, which was always dull, but in a symmetrical arrangement of blocks of contrasting design. A certain individuality to the houses in detail could always be given by varied treatment of the gables, doorways, entrances, and other details. What applied to geometrically planned squares applied also to geometrically laid out curves in streets. When they came to ordinary streets, in which a grandiose effect was not specially called for, there variety of treatment, without any fixed or general design, was both more interesting and more expressive of the actual facts of the case, more especially in a street of shops. The call for variety, and the excuse for it, were indeed greater in the case of shops than of dwelling houses. For social reasons, dwelling houses in the same street, or at all events in the same row, were generally designed for the same class of inhabitants. There was, therefore, necessarily a certain similarity in their general size and appearance. But such houses might be varied in design very considerably, and with very good effect, without appearing to quarrel with each other. Of this kind of treatment they had had a good many examples in some of the new residential neighbourhoods in the west and south-west districts of London, in various streets of red-brick houses which, without always presenting the highest architectural interest individually, were nevertheless pleasing and satisfactory in effect when viewed *en masse*, and not without a good deal of interest in detail. In streets of shops and business buildings there was, on the other hand, a decided call for variety, especially in shops; for these were buildings each separate one of which was for the carrying on of a special business in a special material or production, so that there was every suggestion, in the very use of the tenements, for varied and individual treatment. In a business street they might have a long row of shops each devoted to a different trade, among which will be interspersed in one place a bank, in another an insurance office, in another a block of offices for professional men, and so on. It was quite impossible to regard such a street as suitably treated by any arrangement of groups of tenements in symmetrical blocks; variety was absolutely essential, or the whole thing became a blank and meaningless sham. The result was a number of buildings shouldered closely together, each of which (except at the street corners) presented one face only for architectural treatment, and each claimed a distinct and individual treatment—and here arose the difficulty: first, what could be done in the way of architectural effect and expression with one front only—sometimes a narrow strip of building; secondly, how could this be done without clashing with the architectural treatment of the next door tenement? In regard to this latter point, street architecture had been allowed rather too much to take care of itself. Architects were accustomed to design their own street block, marked off on the drawing paper as a space of so much width, without much regard to what was, or was to be, on each side of it. The lecturer suggested that in any street building where it was impossible for the architect to have any control over what came on each side of it, the real design of the front should be kept somewhat within the bounding lines of the property, so as to leave at each side a little width of blank wall as a neutral ground, where the walls of the two contiguous fronts might meet as flat planes, without any projecting architectural details to clash with each other. The general principle to be observed was to treat one's own design freely and in one's own way, but without extending it to the limit of the site, where it would be liable to interfere with, or be interfered with, by the adjoining building. The question of the method of terminating the upper portion of a street building, depending more or less on the method of roofing, was one of the most important in regard to the effect of a street; and here they were concerned more with the general effect of the whole street than with the particular building. Whether one building was to be terminated with a gable facing the street was not of so much consequence as whether all were to be so treated. The effect of the varying outlines of skylines was often purchased at a heavy, almost a prohibitive, practical cost. A series of gables meant increased practical difficulty in keeping roofs water-tight and getting the water off them, and it meant moreover either a large amount of wasted space in the roofs, or it

meant small and uncomfortable rooms in the attics, with low side walls and partially sloping ceilings. The gabled street was picturesque, but unpractical; and if the best street building were wanted for practical purposes, they must be content to let it go, at least as a general ordinance. Indeed, it was probable that, with modern habits of fireproof building and new facilities with iron and concrete, the idea of the usefulness and convenience of flat roofs to town houses would more and more press itself on the mind of the reflecting architect and (so far as such a thing existed) the reflecting public. Even then the buildings need not therefore all be the same height; the sky line might be broken by square masses instead of pointed masses, and a rich effect might be got by decorative balustrades, which in that case would be things of real practical use. In regard to the methods of giving expression and interest to an individual strip of street front, there were two distinct classes of treatment: the modelled surface and the flat treatment, the latter depending for effect upon material, colour (more or less), and spacing of the openings; the former on modelled architectural features. It might be questioned whether, for a smoky city, modelled surfaces were not introduced a great deal too much. Apart from this consideration, the width of street had something to do with the matter. In a narrow street the upper portion of the front could never be well seen; what was most prominently under notice was the ground story, and in such a case it was there that the decorative treatment should be, not up above. There was no reason, in a building for a narrow street, why the decorative treatment should not be placed where it would be seen, in the ground story, and the rest be left plain. In the modelled front the effect was got by the treatment of the wall spaces, and the windows were merely openings where the wall treatment stopped; in the flat order of front the windows in their shape, size, and spacing, were themselves the prominent features, and the chief agents in imparting architectural expression. But in either case the great source of expression was concentration of features in accordance with the actual requirements of the building. The question of style did not, of course, affect street architecture specially, more than any other architecture. There was, however, one question as to the method of grouping the windows, of some importance in regard to the expression of a street building—namely, the question whether the main piers should be treated as vertical features to be emphasised, either as pilasters or as arch piers, and the windows be grouped between them, or whether the wall should be regarded as a wall all in the same plane pierced with windows where required. The former was the strongest construction; but its æsthetic fitness was a very different matter. The separate treatment of the pier emphasised the vertical line of the front, and whether this was desirable or not depended entirely on the proportions of the front, and therefore of the lines of the adjoining buildings. But the question depended also on the purpose for which the building was intended. The question of material was partly artistic, partly practical. Brick was the favourite material at present. It had much to recommend it; warmth of colour, richness of texture, and it resisted a town atmosphere well; but it was a great soot and dirt collector, and the new brick streets would have a very different aspect in 50 years' time. People had been preaching about glazed and washable materials; but the remedy would perhaps be worse than the disease in some respects, even if the cost were not prohibitive. Terracotta had been used with great effect in a good many recent street buildings, though it was rather a temptation to over-ornamentation and want of reticence. He himself felt a weak and perhaps over-conservative leaning towards stone as, after all, the most dignified of all materials for the best class of buildings; only for towns it ought to be carefully selected and not carved too much. The usefulness of cement, properly treated, seemed to be overlooked. The partial employment of cement on a brick building, as a means of getting contrast of tone, might be of very good effect. The employment of strongly coloured materials in glazed surfaces had been advocated as a means of giving a new beauty of colour to our streets. But in a whole street built in highly-coloured glazed materials, ever washable and ever new, what discords of colour there would be! There would have to be colour by-laws and a colour-test of vision applied to the district surveyors who were to enforce them.

High-class decorative design, in the way of symbolical figure subjects, accompanied by decorative accessories, was perhaps rather an addition to street architecture than a part of it. There had been a few attempts at it, but they had not been followed up, partly no doubt on account of the cost of obtaining good artistic design of this class. Of the materials for such decorative work there was nothing like mosaic; it blended with architecture naturally. Tiles had too much glitter; and sgraffito was hardly suitable to a town atmosphere, and would only give us two flat tints. Sculpture was the form of ideal decoration which most of all blended with architecture and became almost a part of it, and if there were less money expended in carving imitation Gothic and Classic caps on fronts, there would be more to be spent in modelling a figure or two which would give a higher interest to the building.

The PRESIDENT, in inviting discussion on Mr. Statham's paper, remarked that none could have failed to have derived benefit from the lecturer's suggestive criticisms and able generalisations. The chief lesson to be learned was that we should look for an idea in a street building, not that we ask ourselves was it in any classified style, but what was the *motif* underlying the treatment of this strip of building. He would emphasise the great importance of recessing on a street front. The decorative value of a paintable surface was not sufficiently regarded; every time Regent-street was repainted its architecture, such as it was, was renewed in all its pristine beauty. Mr. Statham was a dangerous man to differ from, as he carried a club in one hand and a rapier in the other, but he could not agree with his advocacy of small panes of glass for business premises. Street architecture was a great subject, and he hoped Mr. Statham would pardon him for saying it required a great man to deal with it.

Mr. S. FLINT CLARKSON, past-President, proposed a vote of thanks to Mr. Statham, remarking that his paper had been full of novel suggestions. He had emphasised the difficulty that was felt in treating a lofty street frontage in a narrow street. Sometimes relative breadth to the composition could be gained by treating the party-wall between two properties as the centre line of a gable. The late Mr. John Gibson, who had a wide and long experience in designing banks, held that this class of building should always have a large Order. His work, Childs' Bank, Temple Bar, was periodically cleansed by a steam hose, and thus retained to a great extent its original freshness of appearance.

Mr. MAURICE B. ADAMS said he had much pleasure in seconding the vote of thanks to Mr. Statham for his interesting paper, and for the labour he had displayed in bringing together so many illustrations of his subject. He doubted whether the President was altogether right in his condemnation of small panes of glass. For himself, unless a monumental treatment were adopted, he regarded them as far preferable to single sheets of plate-glass, on which, however, most clients insisted for street frontages. The lecturer, and also the President, had urged the desirability of recessing portions of the façades where possible; but here, again, utilitarian considerations prevailed with most clients, and the surrender of space meant a large monetary sacrifice. Still, where large-minded clients existed, and these features were not over-done, both recessing and the introduction of small panes were desirable variations of frontage lines. Mr. Norman Shaw, in his well-known New Zealand Chambers in Leadenhall-street, had shown a simple and satisfactory mode of treatment of these features. Many business premises in London which originally were well designed were spoiled in effect by the rampant advertising upon them; if some limit could be put to the large letters and other extraneous features, it would be a great advantage from the standpoint of street architecture.

Mr. G. H. FELLOWES PRYNNE, in supporting the vote of thanks, remarked that one of the worst features of London streets was the feeble treatment of important angles, such as Westminster Palace Hotel, and several of the other buildings within sight of Westminster Abbey and the Houses of Parliament. He entirely disagreed from the President as to the effect of employment of large sheets of glass, which destroyed the proportions of buildings. He had not heard any allusion to the lofty buildings now erected in the United States and Canada.

Mr. A. S. FLOWER also supported the vote of thanks, which was carried unanimously, and was briefly acknowledged by Mr. STATHAM.

THE SURVEYORS' INSTITUTION.

AT the meeting of this society, held on Monday evening last, the discussion of the paper by Mr. Ryde, on the Agricultural Rates Act, 1896, was resumed by Mr. W. Eve, who, after joining in the thanks accorded to Mr. Ryde for the paper, said that one of the questions which incidentally arose was, whether the rates ultimately fell upon the owner? He knew of two neighbouring parishes in which the rates were respectively 9s. and 5s. 6d., and the difference in the letting value of similar houses in the two parishes was conclusive proof that it was out of the owner's pocket that the rates eventually came. He regretted that the Act could not have been made to apply more exclusively to poor and distressed districts where it was wanted, and not to accommodation land and nursery gardens at high rents as well. He knew of accommodation land let as high as £8 an acre, which would benefit to the extent of about 16s., while a great deal of poor land on which tithe was payable was rated at not much over 5s. This land with rates at 2s. 6d. in the £ would be benefited by the reduction of the burden from 7½d. to 3½d. per acre. With regard to exempting glass-houses under the Act, he thought that if a water company's filter beds, concreted and bricked, could be called, as it was decided they could be, "land covered with water," glass-houses might well be considered "agricultural land covered with glass." There was some difficulty involved in the question of "land used as a park." If a grass farm in the neighbourhood of a mansion fell into the owner's hands, he would, although he worked it as a farm, not be exempt, because it would be a park under the act, and not agricultural land. Another difficulty was that sporting rights, increasing the ratable value of land, were to be added to the buildings and other hereditaments which were not exempt, but the farm buildings were often in one parish and a large part of the land in another.

Mr. Howard Martin said that in the paper it was argued that it was anomalous that, while under the Public Health Act land covered with greenhouses was treated as nursery-garden ground, under the present Act farm buildings were not treated as agricultural land; but greenhouses were almost always erected by the tenant, while ordinary farm buildings were erected by the landlord.

Mr. T. Powel (chairman of the assessment committee of the Hollingbourn Union) said that, among other points which he thought deserved notice, was the fact that, under the old rating Act, a man was entitled to deduct tithe from the assessment of his farm. But the present rent of the farm, probably one-fifth of the rent agreed upon some years ago, was the basis of assessment, and when the farmhouse and premises, worth some £50 a year were deducted, there remained little value in the holding on which to claim relief under the Act.

Mr. W. W. Glenny (chairman of Assessment Committee of Romford Union) said that in his own union the assessment committee and the surveyors of taxes, by working harmoniously together, reduced the difficulties under the Act to a minimum. He thought the Act would prove to be a valuable one, and although the relief to poor lands was small, even the smallest relief was acceptable. He held that a man who was enterprising enough to cover his land with glass, in order to compete with foreign production, was worthy of every encouragement, and should have all the relief which this Act afforded.

Mr. J. D. Maxted (Chairman Bridge Assessment Committee) could not see why the arguments which were used for justifying the exemption of glass-houses did not equally apply to hop-oasts, which were frequently erected by the tenant, and which enabled him to compete with the growers in foreign countries where there was more sunshine.

Mr. R. M. Chart said: In the district with which he had much to do the industry of growing salads, &c., for the London market was a large one. The usual course of procedure was to make a heap of manure and to put lights over it. Then hot-water pipes were put in and concrete walls built, and later on the frames were raised into glass-houses. If glass-houses were buildings, and, therefore, not exempt under the Act, when did they begin to become so?

Mr. T. A. Dickson said that, in his parish, the great difficulty was to decide whether park land, let as a farm, was park or agricultural land.

Mr. C. Beadlo said that, in the Dartford union district, which he represented, there was some £50,000 (annual ratable value) of glass-houses, and in such a case the question of their exemption was an important one.

Mr. Walter C. Ryde, in replying on the discussion, dealt first with the question of glass-houses. Although the decision in the case of "Purser v. Worthing Local Board" had been held to settle the question, he felt there were many cases to which it did not apply. The case was decided under the Public Health Act, 1875, sec. 211; but although the words of that Act were almost identical with those in the Agricultural Rates Act, the two measures were drafted on different principles. The former defined certain classes of property which were to be exempt; but the latter distinctly named as exempt agricultural land, and equally distinctly, as *not* exempt, buildings. It was not, he thought, safe to argue that because identical words occurred in two Acts, the meaning of them in the later Act was the same as in the earlier. He instanced the word "allotments," which in one Act were limited to two acres, and in another not limited at all as to size. It was argued that the glass-houses should be exempted as agricultural land in order to encourage their erection; but would not the same apply to dwelling houses? If a man built a house for his own occupation, the surveyor to the assessment committee would value it, say, at 4 per cent. on the land and 5 per cent. on the cost of the house. Was not this an inducement to the building owner to spend as little as possible?—and if the argument held good, ought he not be encouraged by the remission of his rates? Mr. Ryde then proceeded to criticise somewhat severely the system by which previous Acts were, as in this case, incorporated into a new Act. He gave, as an example of the ill effects of this system, the case of the Local Government Act, 1888, which established the county councils, and in which was incorporated the "Municipal Elections Corrupt and Illegal Practices Act," which made it an offence to employ a paid agent. A certain candidate having in all innocence done so, on finding his mistake, applied to the Court of Queen's Bench for relief. All the very numerous formalities were observed, and the still more numerous notices served; but the Court refused the application. It was taken to the Court of Appeal, who, having been persuaded that a right of appeal existed, refused to be convinced that the Act was incorporated until the Attorney-General proved to them that it was. They then refused relief on the ground that the applicant should have known that the Act was incorporated. This showed the danger of these incorporations. The provisions as to the right of assessment committees to appear before the Courts in cases of appeal, the speaker confessed he could not understand the reason of. Notices of appeal were apparently to be served on a body who could do nothing after receiving them. He thought the question of when glass-houses became buildings could only be decided on the same principle as that on which it was determined whether machinery was a chattel or a ratable fixture. As to whether a ratepayer could appeal against the division of his assessment as between land and buildings, he saw nothing in the Act to prevent this.

Mr. Ryde having replied to further questions put to him by members present, the meeting then adjourned.

RECENT RATING DECISIONS.

A MEETING of the Auctioneers' Institute was held at the offices, Chancery-lane, on Friday evening, in order to hear a paper by Mr. Frederick Marshall, Q.C., on "Some Recent Rating Decisions." Mr. James F. Field, the president, occupied the chair.

Mr. Marshall commented on the remarkable circumstances that, although the Parochial Assessment Act was passed some 60 years ago, little had been settled as to the meaning of its provisions. On the face of them these provisions seemed plain enough—an occupier was to be assessed to the Poor-rate upon the rent which the property would be reasonably expected to let at from year to year. That was in substance, if not in precise terms, the wording of the Act; and in ordinary cases it would seem to be a rule not difficult of application. The valuer examined the property, and considered from his knowledge of the neighbourhood what it would fetch if it

were vacant, and offered to an annual tenant, the latter paying the rates and tenant's taxes, and that amount was the sum which, with certain specified deductions, the statute said he must fix upon as the net annual value. Of course, the case of railways, gas and waterworks, and similar undertakings was peculiar. There the owner was usually the occupier, and it rarely happened that there were other concerns of like character and value to compare them with. In those cases, therefore, it was no wonder that the proper method of assessment was arrived at slowly, and for many years with some degree of uncertainty. But in the case of parks, free schools, licensed houses, and other properties of a more or less public nature—properties which necessitated no complex calculations as to the profits made upon their occupation, and offered to the rating officer apparently the easily solved question only, "what rent would they fetch in the market" as the test of ratable value—it seemed singular that after 60 years of discussion in the law-courts we appeared to be almost as far as ever from having any rule upon which the surveyor could rely for ascertaining that value, and which would enable him to say at once this, and this only, was the test which must be applied. The history of this subject was curious. For the first 30 years of the period the rule prevailed that landed property held for public purposes was, on that account, not ratable. The *Mersey Dock* cases, decided by the House of Lords in 1866, put the rating of property of this kind upon a new basis. Although it was still held that there must be a beneficial occupation of the property in order to make it ratable, the important distinction was drawn that if the property was of value, although not pecuniarily profitable to the actual occupier, that was sufficient for the purpose. This doctrine was threatened, in 1876, in the *Droitwich Water*, the *Point Lynas*, and other cases, and the whole question was resumed and discussed on a broad basis three years ago in the *Erith and West Ham* cases. While rating valuers were considering the terms of this important judgment, the *Brockwell Park* case, decided by the Court of Appeal, seemed to leave them in the same state of uncertainty as they were years before. The judgment of the Court of Appeal in the *Brockwell Park* case was, he said, a return to the dictum of Lord Blackburn, in "*Liverpool v. Wavertree*," that the occupier was ratable at what a tenant would give as the rent who took the land, subject to the same restrictions as those under which the appellants held it. The Court of Appeal, apparently, came to the conclusion that, because under these restrictions no profit could be made, the County Council would give no rent for the park, and that, therefore, it was ratable at nothing. The case involved principles of the highest importance in rating law, not as it stood at present, seemed out of accord with the general current of authority. Discussing the claim of the London School Board that its buildings should be assessed upon especially favourable terms, Mr. Marshall remarked that the work of education was a prime necessity for the people, and whether the precise mode of furnishing it was by means of free public schools or private educational establishments mattered no more for this purpose than if bread were made at public or private bakerhouses. The schools were, as a rule, good useful buildings, arranged so as to conform to official requirements, and it was difficult to see why they should not bear the same proportionate share of the Poor-rate as a book-store or an hotel. True, the actual rent paid for them, in the shape of interest upon the outlay, might be comparatively small, but so it was in the case of a shop or warehouse which was mortgaged upon exceptionally favourable terms. However, the question of the application not only to board schools, but to baths, asylums, and similar buildings, of Lord Herschell's dictum "that no higher rent must be fixed as the basis of assessment than that which it is believed the owner would really be willing to pay for the occupation of the premises" was still an open one, and they would await with interest any cases in which there was an authoritative interpretation of it. A question equally interesting was the apportionment of premiums paid for licensed houses to rent on the one hand and goodwill on the other. With their practical knowledge they would be the best judges as to whether that proportion ought to approximate to half the premium or less. The question, of course, was how much ought to be excluded from the premium, on the ground that it was payment for goodwill, that was, for something which did not arise out of the

occupation of the premises. Upon this point Mr. Marshall discussed several cases, and quoted various dicta and definitions of judges.

There was a short discussion afterwards, and the meeting closed with a vote of thanks to Mr. Marshall, moved by Mr. John Hepper, of Leeds.

ADAPTABLE SPECIFICATIONS.—XXI.*

PAINTERS' WORK: FACTS AND MEMORANDA.

1. **OILS AND OTHER VEHICLES.**—Oils are divided by chemists into "fixed" and "volatile." "Volatile" oils are those which can be distilled without decomposition. They are very numerous, and are mostly of vegetable origin: a familiar example of them is oil of turpentine. "Fixed" oils, on the contrary, cannot be distilled without change. Amongst them are linseed-oil, rape-oil, poppy-oil, olive-oil, and the oils and fats of animal origin. All these oils have a tendency to absorb oxygen from the air, and from other sources. Some of the fixed oils solidify, and become hard and resinous by thus absorbing oxygen: for which reason they are named "drying-oils." It is these alone which are of service to the painter. Linseed-oil is by far the most important drying-oil, but poppy-oil, rapeseed-oil, and walnut-oil have the same property in a less degree. The "non-drying" fixed oils—such, for instance, as olive-oil, thicken slightly and turn rancid, by absorbing oxygen, but never actually harden. These, of course, would be useless for the painter's purposes.

Linseed-oil is expressed from the seeds of the flax-plant. "Cold-drawn" oil, produced without the aid of heat, is the clearest and most transparent kind. It should not be used till it is at least six months old, and even then it dries but slowly. It is of a light amber colour, which, for certain tints, is objectionable; but this colour may be removed by exposing it for some time to sunlight, when shaken up with twice its weight of a nearly saturated solution of sulphate of iron in water. Linseed-oil will dry more quickly after having been "boiled," as it is termed—that is, heated for some hours to a temperature of from 200° to 400° Fahr. The longer it is "boiled" the thicker it becomes, till, at last, it is no longer suitable for house-painting, but only for the manufacture of printing-ink and similar compositions. "Drying-oil," which hardens still faster than that which has been simply "boiled," is made by heating it with a small quantity of "litharge" (protoxide of lead), or of peroxide of manganese. These things, termed "driers," darken the colour of the oil considerably; but with certain pigments, which retard the natural drying of the oil, they are found highly serviceable. Another way of improving the drying qualities of linseed-oil, without boiling, is to add 1lb. of white-lead to every gallon of oil, and allow the mixture to settle for a week or more. This process lightens the colour of the oil, instead of darkening it. Acetate of lead is also a good "drier."

Poppy-oil forms a less tenacious coating than linseed-oil, and it dries more slowly. It has the reputation, however, of not darkening so much by time, and artists, therefore, frequently use it with white or light colours. Nut-oil is very slow in drying, and is now seldom used.

Oil of Turpentine is obtained by distilling with water the semi-fluid substance known as "crude turpentine," which exudes from various pines, firs, and larches. The residue, after the oil of turpentine has been removed, is common rosin. Pure oil of turpentine is a thin, colourless liquid, of characteristic odour. Its specific gravity is 0.865, and it boils at 312° Fahrenheit. It dissolves to a small extent in water, and in alcohol much more freely, while it will mix with fixed oils in all proportions. Like most of the materials used in painters' work, it is liable to most injurious adulterations—for instance, with ill-smelling and badly-drying fluids extracted from petroleum. These, when added to oil paint, keep it always soft and spongy. Their presence in turpentine may be detected by dipping into it a piece of writing-paper, and then holding this for a few minutes before a fire. Pure oil of turpentine will evaporate, and leave the paper in a fit state for writing on with pen and ink; but petroleum compounds make it permanently greasy. The lightest and most inflammable turpentine is considered the best. Turpentine is of great service in thinning oil-paint, and allowing it to work

more freely; and especially in producing dead or "flatted" surfaces. Oil-paint, on the contrary, has always a certain gloss about it; though it possesses a tenacity which is absent from paint mixed with turpentine alone.

2. **Pigments.**—If paint is to conceal the natural hues and markings of the surface it is applied to, the first necessity is to make it up with some opaque substance, or, in technical language, to give it "body." White-lead—that is, carbonate of lead—is commonly used for this purpose. It is a heavy, soft white powder, insoluble in water; but is generally sold in the state of paste, having been ground up with 8 or 10 per cent. of linseed oil, and considerably adulterated. The chief adulterants are sulphate of baryta (which is heavier than white-lead) and common whiting (which is lighter), so that a mixture of the two can easily be made so as to be of the same specific gravity as white-lead itself; the adulteration cannot then be detected by the difference in weight. The objections to white-lead are its poisonous nature—which is liable to bring disease and death to careless or uncleanly users—and the fact that where gas is burned, or where sulphur compounds from other sources are present in the air, it speedily changes from white to a yellowish brown. These compounds, in fact, sooner or later discolour all preparations of lead except the sulphate, and are better avoided even as "driers" or "siccatives." Zinc-white—an oxide of zinc—is free from these faults; but it has not so much "body" as white-lead, and will not cover so large a surface. It dries but slowly, and when used, lead "driers" must be avoided, and sulphate of zinc or peroxide of manganese used instead. There are various other whites—such as Griffith's white, "constant white," and "tin white," which are unaffected by sulphuretted hydrogen.

The white which is to form the "body" of the paint having been decided on, it remains to select the colours which are to be mixed with it. For durability, none can surpass the natural earths. They were used by the Egyptians from the earliest times, and still remain in their works as perfect as ever. But they are not "loud" enough or staring enough to satisfy the modern house-painter, who obtains from the manufacturing chemist more brilliant, but fortunately much less durable, pigments. Of yellows and browns which will last, the principal are yellow ochre, Oxford ochre, Roman ochre, raw sienna, brown ochre, raw umber, burnt sienna, and Vandyke brown. Cadmium yellow is an artificial product, believed to be permanent. Lemon-yellow is another which is stated to resist the action of light, damp, foul air, and lime. Indian yellow is fugitive when exposed to light, and soon destroyed when used as an oil-colour. Naples yellow blackens with damp and foul air, and also with colours containing iron, such as Prussian blue and Antwerp blue. Chrome yellow is showy, untrustworthy, and a great favourite with the less educated type of British workman. Of reds, light red and Venetian red are permanent. Indian red slightly darkens by time. Vermilion, when pure, is considered permanent; it is much adulterated, and imitations of it are in the market which are perfectly worthless. Madder-lakes are amongst the best of vegetable colours; but the common lakes, made from cochineal, are extremely fugitive. Of blues, smalt and cobalt blue will last, but are apt to acquire a green tint by time. Prussian and Antwerp blue are easily decomposed. Blue ochre is good, but scarce. French ultramarine is, perhaps, the "loudest" of all "loud" colours, and therefore highly popular. Some authorities call it permanent, but experience, happily, does not confirm the statement. Blue-black is dull, but durable. Of greens, green ochre is quiet in tone, but can be relied on. A durable cobalt green can also be obtained. Other greens can be made by mixing the blues and yellows. Arsenic greens, such as "emerald," "Scheele's," and "Vienna" are highly poisonous, and are liable, either as dust or as vapour, to diffuse into the air of apartments coloured with them. Brunswick greens contain chrome yellow, and are consequently untrustworthy. Of blacks, "drop-black" is a jet black, which may be used ground in turpentine, with a little Japan gold-size to fix it. Lampblack is used for common work. The difficulty of selecting permanent pigments has, as Mr. A. P. Laurie remarks, "been enormously increased of late years by the introduction of many which consist of some solid, heavy powder, such as chalk or barytes dyed with aniline dyes." These are emphatically

things to beware of, although in one case—that of the madder-tints—those prepared from artificial alizarin are said to be as lasting as the natural ones.

3. *Execution of Oil-Painting.*—This varies according to the material to which the paint is to be applied. This may be new woodwork, old woodwork which has been painted before, wall-plaster, new or old, Keene's or similar descriptions of cement, and iron or other metals. The first thing on new woodwork is to take care that the work is well dusted. Dust, produced in part by the joiner's free use of glass-paper, lies in the hollows and crevices of the mouldings; and this, unless it is thoroughly cleaned out, mixes up with the paint on the brush, and makes all the surfaces rough. After careful dusting, the next thing is to "kill the knots." Unless this is effectually done, resin may ooze out of them and show in yellow spots, even through numerous coats of paint. Red-lead, mixed with strong glue size and used hot, is an effectual remedy for this evil; but it forms so thick a layer over the knots as to make the finished surface uneven. "Patent knotting" is therefore commonly used in preference: this is made of shellac and wood naphtha. Large knots, and any that are very full of resin or turpentine, should be cut out and clean pieces of wood inserted in their place. Nail-holes and similar cavities should be filled up with glaziers' putty, or, in the best work, with "hard stopping." Each coat of paint after being applied should be carefully rubbed down with fine sand-paper as a preparation for the next.

The first coat should contain more oil and less white-lead (supposing white-lead to be the white employed) than any of the subsequent ones. The paint should be laid on evenly and well crossed, and finally laid off softly, and not with hard pressure, so as to avoid brush-marks. If too much pressure is used in completing any coat, the paint will be visibly covered with lines and ridges. The second coat should be made up with about 5lb. white-lead to each pint of a mixture consisting of two parts of oil to one of turpentine. After this has dried, and has been rubbed down with fine sand-paper, the third coat is to be applied. This should contain, like the last, about 5lb. of white-lead to a pint of "thinners"; but the latter should be composed of two parts of turpentine to one part of oil. With these proportions the paint will dry quickly; so quickly, indeed, that it is safest to paint it, where practicable, in narrow vertical strips, so that one can be joined to the next before its edge has hardened. The fourth coat may be painted with oil colour alone, without turpentine. This is especially necessary if the fifth or final coat is to be flatted. As a flattening coat has very little cohesion in itself, it is important to support it by laying it on a ground of pure oil paint, which will be strong and tough. To do this effectually the oil paint should be fresh, and not fully hardened when the flattening coat is applied to cover it. It is well to put the fourth coat on one day, and the flattening coat the next day, so that the two may combine, and then the flattening coat will wear almost as well as one of ordinary oil paint. The flattening colour requires more white-lead, in proportion, than any of the previous ones. It should be mixed, if possible, half a day before it is required for use. The oil with which the white-lead was ground up will then have time to rise to the surface, and should be poured off, and the paint must be thinned to the proper consistency with pure turpentine.

The Repainting of Old Woodwork requires more care than it generally receives. If the old work is in tolerable condition, it may be enough to rub it down first with pumice-stone and water. Porous, open-grained pumice-stone is best for this purpose, and a little ground or powdered pumice-stone should be used with it. When the rubbing down is complete, every particle of the pumice-stone must be washed off with clean water. Holes and crevices are afterwards to be filled up with hard stopping before the painting begins. If, however, the surface of the wood should still be very uneven, it requires an extremely thin coat of oil paint to be rubbed all over it, and when this is dry it is to be covered with distemper filling and rubbed down. Without a thin coat of paint this filling will not firmly adhere to the wood. Distemper filling is made with the very best whiting, mixed with parchment size or glue size. The proportions may be ascertained by trial. Too much size will make the "filling" so hard that sand-paper scarcely affects it; too little will leave it so soft that it

crumbles away. The flat surfaces are to be covered with the "filling," and this, when it has set, is to be rubbed down level with fine sand-paper on a flat piece of wood. The less "filling" there is finally left on the wood—except in the holes—the better. When there is too much of it the subsequent paint is liable to crack, which is the danger to be guarded against in most "filled" or artificial surfaces.

If the old work has stood for many years, and has had a great many coats of paint, mere rubbing down with pumice-stone will not be enough. The old paint should then be removed entirely. This is sometimes done by scraping; but is effected much more quickly by brushing it over with a hot saturated solution of ordinary washing soda made into a thin paste with quicklime. This is left on for about a quarter of an hour, after which it will be found that the layers of old paint can be removed by hot water. A solution of caustic soda, which is practically the same thing, or of caustic potash, can be used instead; but these are more expensive. After any of these processes, the work should be washed over with vinegar, and the vinegar washed off with clean water. Holes and cracks are stopped, the surface rubbed down, and the work painted as if new.

Before painting on new wall plaster a great point is to get rid of small inequalities and bits of loose material. To do this the wall should be well rubbed down, either with a flat piece of wood, a large piece of pumice-stone, or with sand-paper. Cracks, if any, must be cut out and stopped with plaster of Paris mixed with a little finely-sifted masons' putty. This stopping should also be applied if necessary to fill up between the plaster and the top edges of the skirtings and in all similar places. When dry, the stopping is to be rubbed down to the level of the general surface by sand-paper folded over a small piece of board. The walls are next to be well dusted, and not only should this be done, but before the painting begins the floors and the scaffold-boards should be cleaned to prevent dust from rising. The floors, too, should be covered up to protect them from paint. The most effectual way of doing this is to paste thick brown paper all over them. The first coat of paint on wall plaster is usually made up with linseed oil and white lead, about 4lb. of lead being needed with a pint of oil. It is commonly tinted with a little Venetian red. The subsequent coats may be made up like those above described for new woodwork.

CONSTRUCTION OF STEEL SPIRES AND STEEPLES.—VII.

IT may be scarcely necessary to remark that the fewer the number of joints in any metallic structure, the nearer will it approach to that perfection which is represented by simplicity, homogeneity, stability, and durability. It follows, therefore, as a corollary to our observation, that the longer any or all the component members are the better. So far as the actual production of all rolled iron or steel sections is alone concerned, the increase in length, owing to the greatly developed efficiency of our rolling mills, is literally enormous compared with the same dimension a quarter of a century ago. From 12ft. to 16ft. was regarded as a very good length for rails, and all rolled sections of the ordinary scantlings. At present steel rails are rarely under 27ft. or 30ft. in length, and some 100yds. of track, consisting of rails 60ft. long, have been laid as an experiment on a well-known American railway. It frequently occurs that there are two serious objections against employing the "longest length" of any particular section that might be otherwise procurable from the manufacturers. The one is that the difficulty, and consequently the cost, of transporting, manipulating, and building up long and heavy steel members of a truss or girder, increase in a much higher ratio than what would be warranted by the advantage gained by a diminution in the number of joints. The other objection is, that whenever sections of any form surpass certain scantlings and certain weights, an extra charge is made, when they also surpass a certain length. As an example, let us take the case of steel plates, which will vary in thickness from $\frac{1}{4}$ in. to $1\frac{1}{2}$ in., but in ordinary trusses and girder seldom exceed 1in. For each thickness of plate there will consequently be a maximum weight, a maximum area, a maximum length, and a maximum breadth or width. Let W equal the maximum weight in pounds, A the maximum

area in square feet, L the maximum length, and B the maximum width, both dimensions in lineal feet. Putting T for the thickness of the plate, and P for the weight per cubic foot, we shall always have—

$$W = (A \times T) \times P \dots\dots\dots (1)$$

It should be pointed out here, while A , L , and B are the maximum dimensions procurable for steel plates of various thicknesses, A is not equal to the product of $L \times B$, as might be reasonably supposed.

As this statement is somewhat paradoxical, it will require some little explanation. The maximum weight of a plate of any given thickness is fixed by the exigencies of manufacture and production. In the value given for W in equation (1), which is general for any plate, the value of P is constant, and so is the value of T for each plate of any given thickness; so that obviously for every fixed maximum weight there is a correspondingly fixed maximum area. This maximum area varies for each plate of different thickness, but is constant for each especial dimension. As a matter of fact, the relation of A to L and B is expressed by the equation—

$$A < L \times B \dots\dots\dots (2)$$

Since, as already stated, the value of A is constant for each thickness of plate, and also as A is a quantity of the second order, it must be equal to the product of some two other numbers or quantities. Let L_1 represent the length, and B_1 the actual dimensions of any plate required in designing, then, whatever may be the absolute values of L_1 and B_1 , we have always—

$$A = (L_1 \times B_1) \dots\dots\dots (3)$$

Although the minimum thickness of the steel plates has been stated at $\frac{1}{4}$ in., yet the rule will hold for the thicknesses of $\frac{1}{8}$ in., and even less. When plates, however, are below the former fraction, they are termed sheet-steel, and are proportionally rather higher in price. Owing to their thinness, greater care is required in the rolling and manufacturing process.

As it is both advisable and convenient for architects, engineers, and all those engaged in constructive designing to be provided with lists of the different sizes of plates, bars, rods, and other sections of steel procurable in the open market, we append an example in the annexed Table. All the sizes mentioned are taken from the list of the well-known Butterley Iron Company.

TABLE I.

Thickness.	Area in sq.ft.	Length.	Width.
$\frac{1}{4}$ in.	72	33ft.	6f. 0in.
$\frac{3}{8}$ in.	94	40ft.	6f. 8in.
$\frac{1}{2}$ in.	130	45ft.	8f. 0in.
$\frac{5}{8}$ in.	140	45ft.	8f. 6in.
$\frac{3}{4}$ in.	130	40ft.	9f. 0in.
1 in.	125	33ft.	9f. 0in.

If, therefore, it were required to ascertain what was the greatest length of a plate 4ft. in width and $\frac{1}{4}$ in. in thickness procurable, we obtain from equation (3)—

$$L_1 = \frac{A}{B_1},$$

from which, substituting the values of A and B_1 ,

$$L_1 = \frac{130}{4} = 32\frac{1}{2}\text{ft.}$$

It will be observed that in no case can either L_1 or B_1 be greater than L or B . A very safe rule for ordinary sections of steel is that they can be rolled up to 30ft. in length without any additional cost per ton. Thus the rafter selected in the present design will come under the above category, although it will in reality be several feet less. It has been stated that it is not necessary to carry up the full section of the T-steel beyond the lowest second panel length of the truss, as the stresses decrease towards the apex of the spire. A favourable position for jointing the rafter will be in the centre of the lowest third panel, which will make the T-steel, which is 6in. by 4in. by $\frac{1}{4}$ in., exactly 25ft. in length. There are several methods available for effecting the reduction in the net sectional area of any member of a framed structure to meet a corresponding diminution in the stress upon the same member at any particular part of the framework—first, by altering the thickness, which is the general plan adopted, so long as the correct proportion is maintained between that dimension and the other scantlings of the section adopted. The ordinary tension bars in a lattice or trellis-

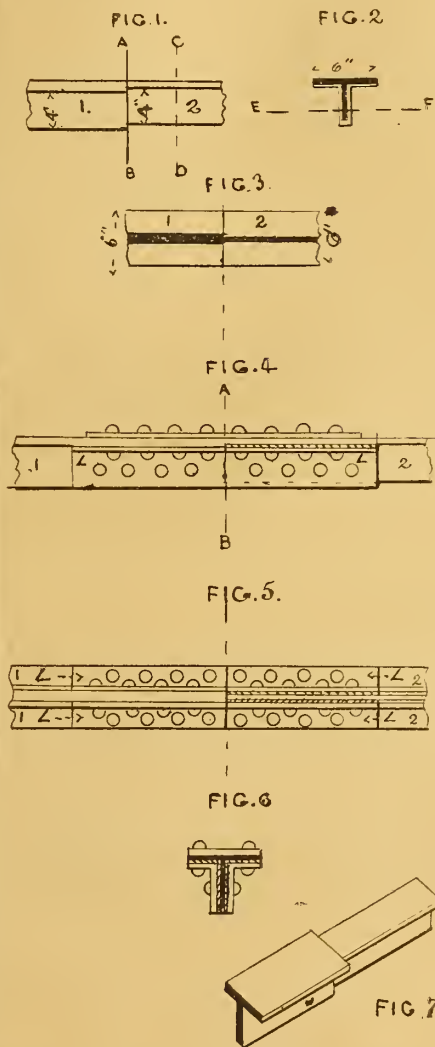
bridge girder are a well-known instance. At the centre of the girder where the stress upon the diagonal bars under a tensile stress are comparatively small, even when they are subjected to a rolling load, a bar, 4in. by $\frac{3}{4}$ in., will be gradually augmented in thickness until it reaches the scantling of 4in. by $\frac{3}{4}$ in. as the point of support is approached. Or, commencing at the abutment where the stress upon any bar, whether tensile or compressive, is a maximum, in order to better suit the example before us, the sectional area is reduced to a minimum at the centre.

There are certain practical limits to—in the present instance—the reduction of the simple thickness of the section. According to the breadth of a plain bar section, which must be considered solely in tension, there must be a minimum thickness allotted to it, or it would not possess even the comparatively small amount of lateral rigidity necessary to maintain it in stable equilibrium. This statement holds *a fortiori* for bars subjected to a compressive stress, because, as demonstrated in a previous article, they are in a condition of unstable equilibrium. Again, the diminution of the mere thickness of a plain bar section does not reduce its effective depth *per se*, although its rigidity, which is a function of the depth, is impaired by a disproportionate ratio between the two dimensions. But a reduction in the thickness of a T section diminishes both its lateral and vertical sectional area. For example, the rafter of the half-truss of the design of the T-steel is reduced at 25ft. from its junction with the steel base of the spire from 6in. by 4in. by $\frac{3}{4}$ in. to 6in. by 4in. by $\frac{3}{4}$ in.

In Fig. 1 is shown an elevation of the joint to be effected between the two different sections of the T-steels, and Fig. 2 is a section of the same joint through the line CD in Fig. 1. If the rafter in Fig. 2 be inverted, a horizontal section through the line EF will show the junction in plan in Fig. 3. It will be seen, therefore, that while the width of the table part and the length of the tongue of the section are not altered, the total depth and the sectional area, whether gross or net, are altered. The difference in depth between the sections 1 and 2 on each side of the joint line AB in Fig. 1 is equal to the difference of their respective thicknesses. In cheap and inferior class of steelwork, it is by no means an uncommon event to observe that a joint of this description is built up of mere strips of plate which happen to fit in both over the table and over the rib of the section, and whether they hold a rivet or two more or less than the proper number is not considered of any importance. No filling pieces are inserted, but the covering strips are just "jumped" to suit the inequalities of the two sections to be united, and the whole arrangement becomes one of unscientific, unsystematic, and rule of thumb patchwork. There is only one method of properly effecting a joint of this description, or in fact of any other kind. In the first place, all the cover-plates and wrappers on both sides of a joint should range flush on both the outside and the inside. They should never be bent or cranked in the plane of the joint they have to cover. It is true that an angle steel wrapper is, by the nature of its section, bent; but each rib or flange, by the very action of bending, is thus brought into the same plane as the joint it has to cover, although it may be, and usually is, at right angles to the joint covered by the other and neighbouring rib. Although steel sections of all shapes and sizes are rolled with unequal sides—that is, with unequal different lateral dimensions—their use is not to be recommended, unless in examples of considerable magnitude, and in which special conditions call for special methods of treatment. A similar objection attaches itself to the employment of much smiths' work. It cannot be too carefully borne in mind that every description of bending, cranking, twisting, or distortion of steel-work, by which is meant the deflection or deviation of any part or parts of any section from their normal planes, should not be allowed to exceed the absolutely unavoidable minimum. In the first place, all operations of this character add considerably to the expense of the work; and, secondly, the material itself, even when of the best quality, is invariably more or less damaged by a process which has been aptly termed "being knocked about" in the course of being put together and built up. It may be stated that in every "specification" for the erection of either iron or steel structures, all "welding" should be strictly prohibited. Some years ago it was a common practice to weld on the

heads of bolts the eye-ends of tie-bars and suspension-rods, instead of forming them out of the solid piece. The introduction of improved machinery, as well as the adoption of a superior class of roof and bridge truss and girder work, together with the specification prohibition alluded to, have generally put an end to these vicious processes, although they are not yet quite extinct.

In the higher panel lengths of our spire a still smaller tee-steel will be adopted than that marked "2" in the accompanying illustrations, in which the thicknesses of the two sections are the differential quantities; but in the smaller sections the uniform thickness will not be reduced below $\frac{3}{4}$ in., as that is the minimum dimension, and



therefore the necessary reduction in the sectional area will be effected by decreasing the dimensions of both the table and tongue of the T-steel. In Fig. 7 this arrangement is shown. It is unnecessary to give a detailed drawing of the method for securing the joint of the pair of unequal-sided sections, as the cover-plates will be of a similar design to those shown in the preceding figures. It will be advisable, and also save the trouble of cutting small pieces from them, to make the cover-plates, whether of plain bar or angle section, of the same width and depth as the larger tee-steel throughout the whole length of the joint. Small filling-pieces must therefore be inserted between the upper and lower or outside and inside wrappers, in order to make a thorough good job of the joint. When completed, it ought to appear as if the two different sections were of one and the same size—that is, of the larger one—throughout the whole length of the cover-plates, both vertically and horizontally. It must be admitted that when a small sectional area of metal is required the T-shape is at some disadvantage with respect to the angle section. A certain depth must be given to the tongue of the T, or there will be no room for the rivet holes required in putting the different parts of the structure together. It not infrequently occurs that the whole of the metal needed

is supplied by the table part of the tee, and consequently that in the tongue is simply so much superfluous material. When the conditions of the case are of this character it is preferable to employ angle steel, as will be pointed out when the diagonal tracing of the design is treated of.

THE BUILDERS' BENEVOLENT INSTITUTION.

THE forty-ninth annual dinner of the friends of this institution took place on Thursday, the 3rd inst., at Carpenters' Hall, London-wall. Mr. Henry Holloway (president) occupied the chair, supported by the Master of the Carpenters' Company, Messrs. Trollope, T. Blashill, F.R.I.B.A., Colls, Bird, Rowland Plumbe, E. W. Mountford, Dove, G. Burt, Nightingale, John Slater, Fletcher Moulton, Q.C., Daniel Watney (president of the Surveyors' Institution), J. T. Bolding, T. Sterling, C. Bussell, Shepherd, Lough, and a numerous company.

The Chairman, in proposing the toast of the evening, "Success to the Builders' Benevolent Institution," said that the charity was founded to provide a small allowance for builders and their widows, and who, after the age of 60 years, had need of help, so as to keep them out of the workhouse. It was now 49 years since the institution was established, and during that time 270 cases had been relieved, and only those who were brought into contact with poverty were aware what such an allowance as they were able to give was to those who were so reduced. The allowance was not large, being 15s. a week to each male and 10s. to each female pensioner. A sum of £2,000 per annum was required to keep the institution going; of that amount, under £700 came by way of subscriptions, the remainder being raised in connection with the annual gathering, with a small income from investments. Every precaution was taken to see that the applicants were worthy of support; the money was carefully dealt with by an efficient committee. From his connection with the Institute of Contractors it was his duty to make some public repudiation of some of the statements made by certain representatives of the London County Council and the Press. It had been stated that one reason why the Works Department had been established was because of a certain "ring" on the part of the contractors to do what they liked with the works of the County Council. He was in a position to give a most emphatic denial to that statement; such a "ring" had never existed, nor was it thought of. When the charge was first made the Builders' Association corresponded with Lord Rosebery, the then Chairman of the County Council, challenging him to have an independent inquiry. The reason why the builders would not tender for the County Council work was simply because of the unfair conditions put into their contracts, which no man having regard to his position as a contractor could possibly sign. It was stated that by means of this department, although the work cost more money, a better quality of work would be done, there would be less sub-contracting, and the men would get better pay and be under more satisfactory conditions. Now, this touched him keenly. His firm had done a considerable amount of work for the County Council, and he was in a position to challenge these statements. The work was not done better; the men preferred to work for private firms, and there was less sub-contracting carried on by the contractors than by the Works Department of the County Council. Why the Works Department had not been a success he would not attempt to suggest, except to say that some of those present were not at all surprised; in fact, they anticipated it would be so. Returning to the claims of the charity, 12 candidates would present themselves for election this month. The committee, owing to the liberality extended to the institution last year, had a little money in hand, and, if they could raise anything like a similar amount, they had made up their minds to elect the 12 applicants. The chairman coupled with the toast the name of Mr. George Plucknett, J.P. (hon. treasurer), whose advanced age prevented his being with them that evening.

The toast was very cordially received. Mr. F. J. Dove gave the toast of "The Worshipful Company of Carpenters." For many years the company had kindly given the use of their magnificent hall for these annual gather-

ings, besides subscribing liberally to the charity, and spending large sums on technical education.

The Master of the Carpenters' Company (Mr. Jacobs) replied, and expressed his pleasure at seeing so large an assembly. Last year the company expended £2,929 on charity and £4,092 on technical education.

Mr. Howard Colls gave the toast of "The President," and bore testimony to Mr. Holloway's great services to the trade, the Chairman making a suitable reply.

Mr. W. Shepherd proposed "The Architects and Surveyors," adding that he was glad to see so many representatives present. There could be no question, he contended, that the profession of architecture now occupied a much higher position than in years gone by, and they had only to look at the great cities of this country to see the evidences of the advancement of architecture in their own memories. Then, again, the surveyors were a well-organised body, with plenty of means at their disposal, and they were now building as fine a home for themselves as could be claimed by any other professional body in the Metropolis.

Mr. Rowland Plumbe replied for "The Architects." He considered that there was far too much litigation between builders and architects' clients; but he was proud to say that, during an active practice of over 35 years, he had never had occasion to bring in any legal services for the settlement of such matters.

Mr. Daniel Watney (president of the Surveyors' Institute) responded for "The Surveyors," and referred to their intimate relations with the building trade.

Mr. Fletcher Moulton, Q.C., gave "The Vice-Presidents, Committee, and Stewards," Mr. A. Ritchie, J.P., replying for "The Vice-Presidents," and Mr. J. T. Bolding for "The Committee and Stewards."

During the evening Major Brutton announced donations amounting to £929, of which £800 appeared in the president's list.

THE ULTIMATE DISPOSAL OF SEWAGE.

AT a meeting of the Society of Engineers, held at the Royal United Service Institution, Whitehall, on Monday evening, Mr. S. Herbert Cox, president, in the chair, a paper was read by Mr. George Thudichum on "The Ultimate Purification of Sewage." The author stated that the object of the paper was to meet the numerous inquiries that have been recently made by local authorities, engineers and others, regarding the biological filtration method of sewage purification, and to compare this method with treatment by land irrigation. During the past twelve years, work in this direction had been carried out by the Metropolitan Board of Works and the London County Council. It was shown by Mr. Dibdin that any process adopted for the purification of sewage must be subordinated to the requirements of the micro-organisms. The author urged that sterilisation was a mistake, since as soon as antiseptic action was neutralised by dilution, putrefaction was set up. Efforts should therefore be directed towards fostering one class of organisms. Later, it was established that direct oxidation, by contact with air, could not be induced in the absence of microbes; previously sterilised sewage could be aerated for any length of time with air passed through a red-hot tube without exhibiting any change. When unsterilised air was admitted, oxidation accompanied by putrefaction immediately took place. An attempt to hasten decomposition by adding micro-organisms to sewage failed, in so far as producing oxidation without putrefaction was concerned. The general experience of the author went to prove that all sewage effluents, produced by chemical means, are finally purified only by a putrefactive process, unless artificially aided. The sequence of facts above recorded led naturally to the attempt to effect purification by supplying the sewage to the organisms, previously established and furnished with the necessary conditions. No special organism was at that period sought to be differentiated. The impossibility of effecting the ultimate purification of sewage by chemical means led to the general adoption of sewage farms. The Sewage Utilisation Commissioners and the Rivers Pollution Commissioners agreed that this was the only proper treatment. Irrigation farms have, however, proved unsatisfactory as a whole, as evidenced by the numerous attempts to produce a better method. Amongst

these attempts filters of various kinds are very prominent. The Massachusetts State Board of Health instituted experiments in 1887-90, and established the fact that under certain conditions 97 per cent. of the organic matter in sewage could be removed by a process of filtration. The quantity that could be treated in this way did not, however, exceed 60,000 gallons per acre per diem. At this point the Main Drainage Committee of the London County Council took up the question, to ascertain whether work on the biological lines already established could not be extended so as to be of practical use. The final result was the successful treatment of one million gallons per acre per diem. The special conditions needed were found to be properly adjusted alternate supplies of food and air to the organisms in the body of the filter. The oxidisable organic matter present is reduced on an average by 80 per cent. The whole quantity of effluent that has been purified by the one acre filter-bed at the Barking outfall is 500 million gallons. The filter is sweet and clean, and apparently able to continue indefinitely. Norenewal of material has been necessary. The author pointed out that the depth of the existing filter must not be taken as a necessary factor in its efficiency; recent records tended to show that cubic contents, and not surface, should be considered, as the work is all done in the body of the filter. The depth possible is probably only limited by the necessity for free air supply. The conditions militating against the success of an irrigation farm were then pointed out. The power of control is wanting; the farm is dependent upon seasons, and fails entirely in very wet or very frosty times. The period of contact of the sewage with the land is variable. The principal objection is the necessity for applying sewage to the land irrespective of the condition of the latter or of the requirements of the crops. Also nuisance, more or less pronounced, is almost universally created. In the case of the artificial filter, all necessary conditions are fully under control, and no climatic influences affect the result. Even if temporarily impaired by accident or bad management it can be easily restored, possessing in itself the power of recuperation. It is suggested that where farms already exist, the filter system should also be adopted, and the filtrate, which contains nitrates and other fertilising ingredients, should be applied to the land only when benefit would be derived from its use, and should at other times escape directly into a river or stream. The attitude of the inspectors of the Local Government Board in refusing to recommend the granting of loans for sewage-disposal purposes, unless irrigation be included in the proposed scheme, was criticised by the author and condemned. Mention was made of various places—Wolverhampton, Sutton, Aylesbury, Exeter—where the method of filtration adopted in the Barking experiments has been successfully followed.

VENTILATION OF PUBLIC BUILDINGS IN ABERDEEN.

THE problem of the due ventilation of public buildings in Aberdeen appears to be receiving considerable attention. Last week we quoted from the *Aberdeen Free Press* the experience of the authorities of Marischal College in that town. A later issue of the same journal now states that similar difficulties have been met with in some of the Aberdeen Board Schools, and that "visitors in certain schools, after a classroom has been in use for two or three hours, detect that unpleasant odour that tells of insufficient freshness somewhere, but it might be too much to expect any mechanical or other system of ventilation to wholly obviate that. In any case, the present system fails to do so, but where the classrooms are not overcrowded and the children are cleanly, no complaint is made as to the condition of the atmosphere. The heating of the rooms forms an equally important part of the scheme as the maintenance of a pure atmosphere, and it is here that trouble is found. The difficulty consists mainly in maintaining an equable and satisfactory temperature, and especially in very cold weather, in all the rooms of a school. If, for example, the air be sufficiently warm for classrooms near the heating apparatus, it may be too cold for the classrooms furthest away. This is thought to be due to one of two causes, or a combination of both. In the first place, the air in passing through the heating coil may be only partially heated, and pass into the main duct in a

partially-heated state. Then, it is the view of some that in travelling along the ducts the air loses some of its warmth, and by the time it reaches the most distant rooms its temperature has become lower than when it enters the nearer classrooms. In any case, this is the experience, and in one school visited it has been found impossible to send up the temperature of certain distant rooms to within ten or twelve degrees of the rooms near the apparatus. In another school, practically no heat was being derived in certain rooms, and other means of heating have had to be resorted to in supplement of the main system. These certainly appear to be extreme cases, but they illustrate the difficulty. It is part of the system that if the supply of warm air be too abundant for any one room, the branch duct to that room may be partially closed, so as proportionately to cut off the supply. But, then, the warm air is the fresh air, and to diminish the supply of one means diminishing the supply of the other, so that there is somewhat of a disadvantage in resorting to that expedient. There is, however, a practical method of meeting the difficulty of equalising the warmth of the air sent into the various rooms, which has been found in certain of the schools to work satisfactorily. That is the introduction of secondary heating coils into the main duct, over which the air must pass on entering the secondary branch ducts, and be, so to speak, re-acted upon before passing up to the schoolrooms. How far these secondary coils should be used in combination with the main coil, or how preferable it would be to use the secondary coils entirely without the primary coil, is a point on which engineers are not of one opinion, and which it is not the province of this article to discuss. But it all shows how largely the heating and ventilation of public buildings are yet in the experimental stage. As still further denoting the same fact, it may be mentioned that the other night the heating and ventilating sub-committee of the School Board, in considering as to the heating of the next new school, remitted it to the Board's superintendent of works, along with Mr. Smith, who, as an engineer, may be assumed to have a practical knowledge of these things, to draw up plans of proposed modified arrangements for heating and ventilation to be brought forward as a report to the school buildings committee. Reference has been made to the amount of fuel used in the heating of the extended buildings of Marischal College. It is but fair to add that by the same system the schools under the Board are heated at a comparatively small figure, as will be seen from the following statement of the schools, with the number of school places, and the amount of fuel used last year:—Girls' High School (700 places), 48 tons; Broomhill (1,300 places), 46 tons; Causeway-end (1,352 places), 31 tons; Ferryhill (1,189 places), 33 tons; Holburn-street (940 places), 34 tons; Middle School (1,164 places), 36½ tons; Skene-square (1,309 places), 34 tons. The figures for other four schools which are under a different mechanical system, are as follows:—Ashley-road (1,310 places), 40 tons of fuel; King-street (1,478 places), 24 tons; Marywell-street (663 places), 16 tons; Rosemount (888 places), 25 tons. These figures do not include the amount spent for gas to drive the engines necessary for the propulsion of the machinery."

FACTORY CONSTRUCTION AND FACTORY ACTS.—XII.

By GEORGE H. BIBBY, F.R.I.B.A.

[CONCLUSION.]

FOR the purpose of enforcing the provisions of the Factory and Workshop Acts of 1891 and 1895 it became necessary that about 134,000 factories and workshops should be inspected. The work to be done is enormous if the provisions of these Acts are to be fully carried into effect by the sanitary authorities.

A full and correct idea of what may be requisite in the way of providing reasonable means of escape for workpeople employed in large or irregularly constructed factories cannot, in the case of large buildings, be accurately or satisfactorily obtained in the absence of proper plans of the buildings, and these should certainly be prepared by the officials of the sanitary authorities, unless the owners of the factories are in a position or are willing to submit their own plans, and the question has arisen as to the equity of charging the



FIG. 23.

ratepayers with the cost of preparing plans of a badly-constructed factory.

It is very clear that if the owner of a factory is found to be in possession of a building which is unsafe for the workpeople he can be compelled (under the provisions of the Acts of 1891 and 1895) to make such alterations as may be found necessary, and at his own cost, and, if so, why should not the cost of the plans prepared by the officials of the sanitary authority fall upon the owner in such cases, and not upon the ratepayers?

In the alteration or reconstruction of factories, to bring them into conformity with the provision of the Acts of 1891 and 1895, the most serious items for consideration are usually the staircases. The re-erection of these in fire-resisting materials is frequently advisable, and the difficulties of the matter to the owners or occupiers are not merely financial, but often involve considerable loss and inconvenience by reason of the disturbance of the factory workers by the builder's men.

In many factories it has been found very difficult to provide suitable doors for the exit of the workpeople, which, while arranged to open outwards, are yet so contrived that the owners of the factories may not thus afford facilities for dishonest workpeople to quit the premises with stolen goods or material. In such cases as these a door such as that shown on Fig. 23 would be useful; it is contrived to open in the direction of exit by pressure on the bars, and is manufactured by Messrs. James Hill and Co., of Queen Victoria-street, E.C. (specially for factories); it resembles in its arrangements the automatic bolts frequently used for theatre exit doors. In theatres the conditions are somewhat different to those for factories, as the question mainly is the safety of the people; therefore it would appear to be desirable that the automatic door-bolts of factories should act in combination with a bell, for the purpose of indicating every attempt to leave the premises.

The work of improvement in the construction of new factories and workshops is obviously a much easier matter for the members of sanitary authorities than the alteration of old factories. In the former case, all buildings to be erected for such purposes must be planned for the purpose, and to the satisfaction of the public authorities, before a certificate could be properly granted; but in the case of old factories, where expensive

machinery and appliances exist, the suggestion and working out of proposed alterations are frequently a source of great difficulty and may, under exceptional circumstances, be almost impossible to carry into effect without a complete reconstruction of the factory.

Further than this, large numbers of the members of sanitary authorities (who alone in the provinces are charged with the duty of seeing that factories and workshops are provided with proper means of escape for the workpeople employed therein) are themselves the owners of factories and workshops which may be deficient in the matter of exits, and whose interests in the premises would not infrequently influence them against undertaking expensive works of reconstruction of their factories, however necessary these might be considered by all other parties.

The passing of the Factory and Workshop Acts of 1891 and 1895 is but a further instalment of the long series of reforms for the advantage of workpeople which have been introduced from time to time during the last 50 or 60 years. Professor Thorold Rogers in his work, "Six Centuries of Work and Wages," stated: "Parliament has, indeed, within the last 60 years done much in abrogating severe and repressive laws, in giving freedom to labour, in restraining the greed which employed immature labour, in disabling women from certain degrading employments, in constraining employers to deal fairly with their workmen, but it has, indeed, by no means completed its duties to the public." The first reforms were for the advantage of the workpeople, while those of later date are for the improvement of the structural condition of the factories and workshops wherein, frequently, the factory "hands" pass one-half of the period of their existence.

The improvement and reconstruction of factories and workshops in the provinces will probably be a much slower affair than in the Metropolis, where a powerful administration (the London County Council) is charged by the Acts of 1891 and 1895 with the responsibility of directing owners to improve the structural condition of their factories and workshops; in the country, not every sanitary authority has in its employment an adequate number of officials, qualified by architectural experience, to judge of the fitness of factories under the various contingencies of their use, while in certain manufacturing districts the sani-

tary authority might obviously be hampered in all efforts for reform by the adverse influence of a majority composed of factory owners.

The officials charged by any sanitary authority with duties under the Acts of 1891 and 1895 should certainly always be persons with a sound architectural training and of considerable professional experience, and, when dealing with old factories (that is, factories erected before the year 1892), be personally and directly empowered by the authority they represent with the duty and responsibility of notifying to the owners of factories, badly or insufficiently constructed, the structural improvements in their opinion necessary, and at the same time submitting to their sanitary authority a copy of such notice.

Should the owner of any factory object to cause the works to be executed he might, in the first instance, submit such objection to the sanitary authority, who would thereupon consider the notification of their inspecting architect and the owner's objection thereto.

If the owner did not concur in the decision of the sanitary authority he would then, under the Acts of 1891 and 1895, be able to take the matter before an umpire, whose award would be final.

That the valuable time of a committee or of a sanitary authority should be taken up by the consideration of every trifling structural alteration required to a factory or workshop, would be very much a subject for regret when so very much could be arranged by a competent inspecting architect on the spot; and, further than this, if every factory or workshop, however small, is to be brought before a sanitary authority, plans also must be prepared to explain to its members the position of affairs. All this unnecessary trouble might be avoided where the factories and workshops are of simple plan, or small, and where almost verbal notification of suggested trifling alterations would satisfy all requirements; for the inspecting architect would, in many cases, perceive at a glance the structural defects of a factory or workshop, and be able on the spot to suggest obvious remedies: that the inspecting architect conducted the duties intrusted to him effectively and honestly would be easily ascertained by the authorities concerned, and it is very highly probable that many members of sanitary authorities would gladly avoid the necessity of passing direct judgment upon their neighbours' buildings, and prefer to leave, at all events, the less important factories and workshops to be dealt with, so far as conveniently might be, by their inspecting architects, whose stipends should be commensurate with the special knowledge required of them, and the position of trust which they should certainly occupy.

GOTHIC WOOD-CARVINGS.*

MR. BATSFORD has produced a very tastefully-bound folio of some details of Gothic wood-carvings, shown by a series of 34 loose plates, intended for the use of technical classes, by Mr. Franklyn A. Crallan, late instructor in wood-carving at the Municipal College, Derby. The style chosen is chiefly Late Decorated and Perpendicular, and brief letterpress notes furnish particulars of the work shown. These studies assume the character of working drawings shaded up in pencil, some being produced, it would appear, partly by rubbing, and then filling in by hand where this method necessitated perfecting to complete the patterns. Small-scale outline key-diagrams in some cases give the position of the parts represented at large, and among the best is the head of a door from St. Lawrence's Church, Norwich, to which a double plate is devoted. The poppy-head from St. Nicholas' Church, King's Lynn, supplies a typical example from one of the richest districts in East Anglia, and it is, moreover, better drawn than some other samples. The author has evidently spared no pains to do his subject justice, though he says that the drawings given were not intended originally for publication. The object of their being issued is to further the author's "endeavour to awaken a more widespread appreciation for a branch of art which has languished for many years. Of late, interest has certainly revived, though it remains unintelligent, few people knowing good work from indifferent or

* Details of Gothic Wood-Carving: being a series of drawings from original work, chiefly of the 14th and 15th centuries; with explanatory notes. By FRANKLYN A. CRALLAN. London: B. T. Batsford, 94, High Holborn. 1896.

bad." Nevertheless, Mr. Crallan suggests, a few lines below, that carving classes about the country should restore and beautify the churches in their own districts. It is well that this proposal is in some degree modified by a further suggestion respecting the necessity of securing skilled advice where "extensive and elaborate schemes of decoration or restoration" are contemplated. Instances of this important character necessitating a large expenditure of money do not for the most part get put in hand now without the advice of some competent architect; but it is just where Mr. Crallan's recommendation stands some chance of being adopted, as in small churches and poor parishes, that the 'prentice hand would be allowed to do the utmost damage, and we sincerely trust that no such misuse of technical teaching will be permitted, wherever, at any rate, it can be stopped. We have no desire whatever, on the other hand, to see any work of the kind carried out through what the author calls "the ordinary channel of the carving manufacturer," whose productions are quite dreadful enough in their way; but we are equally sure that the "excellent example set by a few carving classes" would be most disastrous, and do far more damage than "imitation oak paint" put on by ignorant churchwardens, and so much deplored by Mr. Crallan. At any rate, the lead colour or graining can be pickled off; but the technical school popinjay at once and for ever would tool away all the interest of the little historic work still left us by the iconoclast or the restorer. The author may not intend all this; but his advice, if followed, would inevitably lead to such results. His drawings will, we daresay, be useful to students in carving classes, but the modeller, rather than the draughtsman, is the most efficient guide.

NEW ARCH CENTRES.

IN the construction of masonry arches and vaults, it is not always possible to erect ordinary centres, as when the arch is near the surface of water. A writer in the *Annales des Ponts et Chaussées* illustrates two kinds of false-work which have special features, and have been used at Bordeaux. The contractors supported the masonry upon a cylindrical platform or lagging of iron plates about 3½ in. thick, suspended from three pairs of lattice-arched girders above, and clear of the arch of masonry. At equal distances on panel points 2 in. suspended rods ran down through the vault lagging and cross-beams, supported from screw-nuts on plates across the tops of girders. These rods passed through holes cut in the arch stones, normal to the intrados. The centres were easily removed by unscrewing the nuts from the lower end of the suspending rods. The *Engineering Record*, which describes this system of centring, illustrates the plan by elevations and cross-sections of the plan. Another method is also illustrated, in which the intrados of the arch of masonry are carried by iron lattice-girders below the soffit in the usual position of centres. Six girders were framed together, though each acted as a simple truss instead of an arch. The two trusses at each end were connected and increased by iron plates, and formed two four-sided or rectangular watertight caissons of cylindrical curve to suit the arch. These floated the whole false-work into position at high water. They, in fact, formed two caissons of the depth of the arch and of its whole width, segmental in form, corresponding to the arch, connected together, and having between them the other trusses. The straight iron girders were inserted in the masonry piers, and the trusses were landed upon them and made stable by admitting water through valves. The vault was then built, and the centres were afterwards struck by slackening the screws in the usual way. The first-described method is really an overhead centre, by means of which the real masonry arch is suspended, while the second plan is really a floating centre below the arch to be constructed, the ends being floated into position, and the centring and lagging constructed between them. Both plans are ingenious methods of forming centres for bridge vaults which are too close to the water surface to admit of the usual plan being used.

RESISTANCE TO WAVE-ACTION — SEA WALLS AND JETTIES.

MODERN French engineers appear to favour the plane fronts for resisting wave-action. The curved profile, so generally believed to be less

exposed to violent waves, is not held in favour. M. Laroche, engineer-in-chief to the National School of Bridges and Roads, observes: "Practice seems to have shown that for great jetties exposed to violent seas, the curved form of exterior front does not palliate the shock of waves at least during the continuance of real tempests." Curved fronts, he says, appear to have advantages only in moderate weather. M. Guillemain says: "The opinion of M. Laroche agrees with that of the greater number of French engineers, and all breakwaters which have been recently built in France and in Algeria, with rare exceptions, have received plane fronts rather than curved." There are some situations where the curved profile has proved itself desirable. Mr. R. Fletcher, Assoc. Am. Soc. C.E., observes: "On rock bottom, at or not far below low water level, provided the lowest courses are well dowelled and clamped together, and the joints of the front made watertight as low down as possible—such a profile is advantageous." A smaller cross-section is required, as relief from direct impact is afforded by the deflecting curve. Many theories have been broached by mathematicians and others. Some, like Rankine, have proposed a stepped profile or front: others, like Emy, have advocated a profile of cycloidal curvature. Mr. Scott Russell thought this profile the best for some kinds of wave-action, but useless for others. Engineers at present seem divided in their opinions; many advocate curved fronts, others inclined, and even vertical faces. The concave cycloid profile has been thought by many (as by Scott Russell) to be the best form for a sea wall, as it approximates to the line of "least resistance." A sea wall generally wears away at the foundations or lower courses, which is no doubt caused by the suction and downward motion of the water at the foot of the wall. The vertical-faced wall is always found to give way at the foot, and hence the necessity of slopes or a curved profile. A greater and more varied experience of sea walls, built with planed curved fronts, and exposed to various kinds of wave action, may one day enable us to determine the most effective form to resist sea waves during a gale. As to the material, all are agreed, or nearly so, that monolithic concrete work, carried down to the bed of rock, with all crevices and fissures filled up by cement grout, is the best and most durable.

STRUCTURE AND DURABILITY OF BUILDING STONES.

THE monthly meeting of the Sheffield Society of Architects and Surveyors was held on Tuesday evening at the School of Art, Arundel-street, Sheffield. Mr. R. W. Fowler, F.S.I., vice-president, occupied the chair. A lecture on the "Structure and Durability of Building Stones and Bricks" was delivered by Dr. H. C. Sorby, LL.D., F.R.S., F.S.A., one of the honorary members of the Society, illustrated with numerous lantern-slides. The lecturer called attention to the great importance of this question, and said that its extreme difficulty and the knowledge of such various subjects were probably the reason why so little is known and why few, if any, specimens illustrating it can be seen in any public museum. Judging from the excellence of much of the work of the Romans in this country, more attention seems to have been given to this subject by them than by us now. The decomposition of a stone depends mainly on its chemical composition and mechanical structure. Some rocks contain little or nothing that can be dissolved out or chemically changed by the action of the air and rain-water, and are so solid that the freezing of what little water they can absorb does no harm. Some, indeed, become harder and better. Others, on the contrary, lose certain constituents, which are dissolved out, or are broken up by chemical changes; whilst others have not sufficient cohesion to resist the disruptive effect of the freezing of the water contained in microscopical cavities. A number of lantern slides were then exhibited, some of which were from the very first microscopical sections of rocks ever prepared. These illustrated some of those microscopical characters which play an important part in resisting or favouring decomposition. About four years ago the lecturer made many experiments in order to determine the relative volume of the internal microscopical cavities in various building stones. Some rocks are almost quite solid, whereas others contain one-third of their volume of cavities which can absorb water. Though certain special circumstances may completely

alter the result, yet, other things being the same, a relatively large volume of cavities seems to lead to a more rapid breaking-up by the repeated freezing of absorbed water. The tensile strength of various kinds of stone probably has received little attention, but has great influence on the disruptive action of repeated freezing and thawing. This variation in tensile strength is quite sufficient to explain the effect of the direction of the bedding in relation to an exposed surface. In some cases the stone itself resists well, but readily breaks up into angular fragments when the carbonate of lime has been dissolved out by the rainwater from the numerous microscopical veins. There are, however, so many peculiarities in different rocks that almost each kind requires special consideration, and some years of difficult research would be required before a better plan could be found than that recommended by Vitruvius more than 1,900 years ago—viz., to expose the stone to the weather through a summer and winter, and reject as unfit for use any that show signs of change, a plan that would not suit cheap builders. The lecturer then considered the case of special building stones of remarkable durability, used in various parts of the country, illustrating the subject by specimens of lantern slides of well-preserved constructions of early date. Unfortunately, many of these stones were used up and exhausted some hundreds of years ago. He then remarked on the difference between modern mortar and that made by the Romans with fresh slaked lime and pounded well-burnt bricks, which in many cases is as good now as when new, some 1800 years ago. This led to the consideration of bricks, many of those of Roman make being as good as new, whereas so many modern bricks are worthless after a comparatively few years. The explanation of this is probably because the Romans, following the advice of Vitruvius, tempered their clay through a period of from three to five years, whereas, according to what some practical brickmakers say, many are now made from clay that has never been tempered at all. The result is that the soluble salts are included in the bricks and break them up by efflorescence and by destroying the cohesion. The result is seen in Cambridge, where the bricks in the oldest work are still in good condition, whereas the modern bricks, though more uniform in colour and shape, are sometimes much decomposed, though not one-tenth the age of the others.

A vote of thanks to the lecturer was moved by Mr. F. Fowler, treasurer, seconded by Mr. E. M. Gibbs, and supported by Mr. C. J. Innocent, hon. secretary, and acknowledged by the lecturer.

CHIPS.

Mr. Alfred Waterhouse, R.A., LL.D., will distribute the prizes to the students of the Architectural and Engineering Schools at the Polytechnic, Regent-street, W., on the evening of Tuesday week, the 22nd inst.

The Favell Memorial fund has reached the total of £8,875, and it has been decided to erect a church to seat 700 people in Brocco-bank, Sheffield, in memory of the late Archdeacon Favell.

On Wednesday week the Bishop of Chester consecrated the church of St. John the Baptist, at Crewe. It has been built on a site of land in Stalbridge-street, off Edleston-road, and has been designed with a view to future extension. It affords accommodation for 500 worshippers, and about £3,500 has been spent on its erection; but the ultimate expenditure will reach another £1,500. The work has been carried out by Mr. Cotterill, Crewe.

The Hampshire County Council are about to appoint a county surveyor in succession to the late Mr. John Robinson, who died in October last. The salary offered is £500, with travelling expenses, and an annual allowance of £120 for clerical assistance. Applications must be sent in to the council at the Castle, Winchester, on or before Monday, Jan. 4th.

In the case of James Brickell, Trinity-gardens, Hermit-road, Barking-road, Plaistow, E., builder, the order of discharge from bankruptcy has been suspended for two years and four months, ending March 11, 1899; and in that of Charles Gregory Chapman, Fernor-road, Stanstead-road, Forest-hill, S.E., builder, the discharge has been suspended for two years, ending Oct. 23, 1898.

Major-General Crozier, R.E., has held a Local Government Board inquiry at Stroud, Glos., into an application by the urban district council for sanction to borrow £4,000 for the provision of new public offices. The plans submitted to the inspector showed provision for council-chamber, offices, stores, fire-station, &c.

N.A.P. WINDOW CASEMENTS.

THE danger, cost, and general inconvenience caused by the necessity of cleaning the outside of ordinary outward-opening casements, have created a desire for a casement which would combine the ventilating advantages of one which opens outwards with the cleaning facilities of one opening inwards, without sacrificing those weather-tight qualities which are imperatively necessary.

The N.A.P. Window Company, Limited (159, Victoria-street, Westminster), deservedly well known for their reversible fittings, &c., for sliding sashes, have perfected a number of satisfactory casements, any one of which appears to comply with the above-mentioned requirements. Their construction is of a simple character, and consequently their manufacture should not entail any very considerable extra cost as compared to the price of ordinary casements. Having regard to the largely increased demand for metal casements which the prevailing styles of architecture have created of late years, the inventions in question should meet with a highly successful reception.

CHIPS

A scheme for extending the pier and building a pavilion, at a total estimated cost of about £5,600, has been approved by the ratepayers of Bognor.

Additions are being made to the Blackpool Hospital. Special consideration has been given to the ventilation, which will be carried out on the Boyle system.

As a memorial of the lord mayoralty of Liverpool by the Earl of Derby, a committee have commissioned Mr. W. Q. Orchardson, R.A., to paint his portrait for subscribers. The painting will be hung in the Walker Art Gallery, and a replica will be presented to the Countess of Derby.

The upper portion of the tower of the parish church of Cardynham, near Bodmin, has just been rebuilt at a cost of £750. The work has been carried out by Mr. Hobbs, contractor, of Callington, under the direction of Mr. Edmund Sedding, of Plymouth. At the same time, the five old bells have been recast, three new ones added, and the peal rehung in a new cage by Mr. Blackburn, of Salisbury.

On 2nd December, 1846, Mr. Wm. Thomson, now Lord Kelvin, was admitted an ordinary member of the Philosophical Society of Glasgow. The fiftieth anniversary of the occasion was celebrated by the Society on the 3rd inst. This celebration took the form of admitting Lord Kelvin an honorary member of the Society, the unveiling of a bronze bust of Lord Kelvin, gifted to the Society by subscribers, and the presentation to Lady Kelvin of a replica of the bust. The bust is the work of Mr. A. M'Farlane Shannon, sculptor, Glasgow.

Viscount Wolsley was presented on Tuesday with the freedom of the city of Perth, and afterwards unveiled a monument erected on the North Inch in honour of the Nineteenth Light Infantry, a regiment in which he served for several years. The monument is Egyptian in style, and rises to a height of 30ft. It consists of a pedestal 8ft. in height, and 11ft. square, having drinking fountains on all four sides; above this is the die, 6ft. high, and over this is a block on which the Sphinx, the emblem of the regiment, is carved, and this again carries an obelisk 15ft. in height.

Mr. Stephen Adam, Glasgow, lectured, on Thursday night in last week, before the Edinburgh Architectural Society, on "Stained-Glass: its History and Methods, Mediæval and Modern." Mr. A. R. Scott presided, and there was a large attendance.

It will be remembered that five men were suffocated in a sewer at East Ham some time ago, and the widow of one of them, a Mrs. Digby, brought an action against the district council to recover compensation; but Mr. Justice Cave held that there was no evidence of negligence to go to the jury. The point was argued on Tuesday in the Court of Appeal, before the Master of the Rolls and Lords Lopes and Rigby, when counsel said the judge had held that the defendants took the same precautions as other sanitary authorities, and "refused to accept the evidence of experts with their fads and theories." Lord Justice Rigby observed that "fads" was the wrong word to apply to scientific men's theories. Judgment was reserved.

The chief inspector to the Mersey and Irwell Joint Committee reported on Monday that, in regard to Royton sewage works, the amount to be ultimately expended would be no less than £76,000, which, on a population of 13,400, amounted to over £5 10s. per head. A sub-committee recommended, with reference to the amended scheme for the disposal of the Manchester sewage effluent, that steps should be taken to oppose in Parliament any clause of the council's Bill which would affect the powers of the joint committee. The consideration of the question was adjourned.

OBITUARY.

MR. WALTER THOMAS, A.M. Inst. C.E., M.S.A., of Southampton, died last week as the result of a fall backwards while trying to catch a ball while at play on the common in that town. At the inquest a verdict of "Accidental Death" was returned. Deceased, who was 43 years of age, was articled to Mr. James Lemon, M. Inst. C.E., F.R.I.B.A., then borough engineer and surveyor of Southampton. On the termination of his articles he was engaged as deputy-engineer to the Corporation of Warrington. Subsequently he held professional appointments at Lancaster and Manchester, and in 1879 became engineer and surveyor to the borough of Dorchester, which appointment he resigned in 1888, on gaining that of engineer and surveyor to the Corporation of Dover. He quitted Dover on resignation to return to Southampton for private practice, which he commenced in March of this year, having offices at No. 1, Above Bar. He was an active Freemason, and he was a life governor of the Royal Masonic Institution for Girls. He was an Associate-Member of the Institution of Civil Engineers, and had been a member of the Society of Architects since 1886. He leaves seven young children.

MR. GEORGE HANSON, builder and contractor, Rawtenstall, died at his residence, Grange-avenue, on Monday week, in his 59th year. Mr. Hanson began as a stonemason, and after marriage went into partnership with Mr. Joseph Fletcher. The partnership, however, did not last long, and Mr. Hanson went to America. After some months he returned to Rawtenstall and commenced business on his own account. Since that time he has executed some important work, having built the present Municipal Offices, St. Mary's Schools, St. John's Church, Cloughford, and St. John's Church, Stonefold. He also constructed the Rawtenstall Cemetery.

The central schools, Maesteg, Glam., are being warmed and ventilated throughout by means of Shorland's patent Manchester grates and patent Manchester stoves, the same being supplied by Messrs. E. H. Shorland and Brother, of Manchester.

The Coventry City Council have received a report from the General Works Committee, who propose a reorganisation of the surveyor's department:—That Mr. E. J. Purnell, the present city surveyor, become engineer to the waterworks, at a salary of £200 a year; that a new borough engineer be appointed, in succession to Mr. Purnell, at a salary of £500 a year. The same committee presented a report on the Baginton sewage scheme, prepared by Mr. Mansergh, the engineer. The estimated cost is £156,500. The committee recommend that application be made to the Local Government Board for their sanction to a loan of that amount. Both reports were unanimously adopted.

Before Mr. Justice Wright and a common jury on Friday, Mr. Finch, builder and decorator, of New Southgate, brought an action for slander and false imprisonment against Mr. Hardaway, proprietor of the Railway Hotel in the same place; the slander complained of being an alleged imputation that there was something suspicious in plaintiff's offering for sale a set of billiard balls after similar articles had been stolen from the hotel. An important witness being absent, Mr. Justice Wright suggested that counsel should consent to the jury's being discharged and the case resumed before himself alone at the earliest convenient opportunity. This was agreed to, and the case was accordingly adjourned.

The Brentford magistrates decided, on Saturday, an appeal by Mr. H. P. Davies, a solicitor, of Ealing, against the Grand Junction Waterworks Company's assessments of his house. The water-company in 1894 revived a special charge of a guinea per annum for water supplied for garden purposes, which had been originally made in 1885, but then abandoned after some litigation. The appellant now asked the justices to reduce his domestic assessment by the value of his garden, and the Court decided in his favour, reducing his assessment from £100 to £80, but agreed to state a case for a superior court.

At a meeting of the urban district council for Westbury, Wilts, held on Friday, the surveyor presented the plans and estimates of the cost of carrying out the proposed waterworks for the towns of Westbury, Westbury-Leigh, Chalford, and Ditton Marsh. He recommended the construction of a reservoir capable of holding 180,000 gallons, and that the pumping be done by gas-engines worked by Dowson gas. He estimated the cost of the works, including the money already spent and the purchase of the necessary land, at £7,612. After a discussion, the plans were adopted.

COMPETITIONS.

BELFAST.—The names of the competitors who have been selected to take part in the final competition for the City Hall have now been made known. The authors of No. 30 are Messrs. Malcolm Stark and Rowntree, 329, West George-street, Glasgow; No. 22 was sent in by Messrs. R. G. Watt and Tulloch, Belfast; and No. 43 by Mr. James Miller, 223, West George-street, Glasgow. We understand that Messrs. Watt and Tulloch have declined to take part in the final competition.

BOOTLE.—At the meeting on Friday of the Bootle School Board the Building and Finance Committee reported the receipt of 15 sets of competitive plans from architects practising in Liverpool and district for the board's new school to be erected in Gray-street, North Bootle, to accommodate 1,000 children, and that they had engaged the services of an architect as adviser at a fee of 20 guineas with hotel and travelling expenses, and they were awaiting his report before coming to a decision.

CHURCH SCHOOLS, ST. GEORGE, MANOVER-SQUARE.—In this recent limited competition, the assessor, Mr. J. Macvicar Anderson, F.R.I.B.A., has placed first the plans of Mr. Philip Appleby Robson, of Palace Chambers, Westminster. The school is for infants, junior mixed, boys, and girls, and is estimated to cost £10,450.

EDGEMOND, SALOP.—Mr. A. E. Lloyd Oswell, A.R.I.B.A., of Shrewsbury, has made his award as assessor upon the plans sent in of designs for the agricultural school buildings to be erected at Edgmond, Salop, in connection with the Harper-Adams bequest for agricultural education. His award is as follows:—(1) "Via," Mr. Henry Leather, 92, St. Mary's-street, Cardiff; (2) "Agricola," Mr. H. W. Pye, 1, Verulam buildings, Gray's Inn, London; (3) "O.K.," Mr. G. Nicholas, 2, South-square, Gray's Inn, London. There were 25 competitors.

FOLKESTONE PUBLIC BATHS.—At the monthly meeting of the Folkestone Corporation, the design submitted in competition under the motto "Bona Fide" was accepted, the author being Mr. Reginald Pope, of Radnor Chambers, Folkestone.

PURDYBURN, BELFAST.—The Board of Control for Lunatics, Ireland, have this week received plans, in competition, from Belfast architects only, for a new asylum at Purdyburn, near Belfast, to accommodate 1,000 patients. Unlike most asylums, the new institution is to be in two distinct blocks, quite unconnected, although upon the same estate. One portion is intended for chronic epileptic and semi-acute patients, while the other is to be for the sick and infirm, and for acute and observation patients. The total cost will probably be not less than from £100,000 to £120,000, even in Ireland, where prices are less than in England.

LLANDILOES.—In the competition for water-supply schemes, Mr. E. Radford, the assessor, has reported to the town council that 17 designs were sent in. The three best were those sent in under the mottoes, "Verax," "Aquarius," and "Thorough." "Verax's" scheme proposed to pump the water from the alluvial deposit at the junction of the Severn and Dulas across the river into a large open reservoir to hold 3,173,000 gallons, from which reservoir the water would gravitate through 4in. mains, and be distributed in the town. The total estimate was £9,021. If the reservoir were reduced by 1½ million gallons, the estimate would be reduced by £2,700. The scheme of "Aquarius" provides for an impoundage reservoir to hold 7½ million gallons. The total estimate was £5,656. "Thorough's" scheme was for an impoundage reservoir on the Avon Brochan. The estimate was £5,600. The assessor advised the council to divide the premium of 50 guineas equally between "Verax" and "Aquarius." They would find that the "Verax" scheme would be the most economical, and the one they would probably find best to adopt. The names of the three competitors referred to were disclosed as follows:—"Verax," Mr. H. Bandcroft, Manchester; "Aquarius," Mr. Frederick Beasley, Westminster, London; and "Thorough," Messrs. Conyers, Kirby, and Son, Newport, Mon. It was decided to pay the assessor his fee, but not to pay the premium until the council had time to consider the plans. After considerable discussion, a committee was appointed to go into the schemes and report back.

The town council of Glasgow decided at their last meeting to raise the salary of Mr. Macdonald, the city engineer, from £700 to £900 per annum.

ARCHITECTURAL & ARCHÆOLOGICAL SOCIETIES.

EDINBURGH ARCHITECTURAL ASSOCIATION.—The opening meeting for the present (the 39th) session of the Edinburgh Architectural Association was, through the courtesy of the Board of Manufactures, held in the Geographical Rooms, National Portrait Gallery, Queen-street, last (Thursday) evening, when Mr. R. Rowand Anderson, LL.D., delivered the presidential address. Dr. Anderson took as his subject, "The Mediæval Town Halls of Italy, Germany, Belgium, Holland, and France." He traced the rise of municipalities under Rome, and passed on to consider their extinction and their revival in Northern Italy as trading and industrial communities. He then showed how the spread of trade and commerce led to the rise of towns on the sea coasts and on the internal trade routes of the Middle Ages. The French Hotel de Ville was, he pointed out, different in origin from those of the rest of Europe. The most important town halls were built during the 14th and 15th centuries. In conclusion, the president exhibited and described a series of limelight lantern views of the principal town halls of Europe.

YORKSHIRE ARCHÆOLOGICAL SOCIETIES.—Some months ago an effort was made to establish in Leeds a headquarters for the various scientific societies in the city. As the result of combined action on the part of the Yorkshire Archæological Society and the Thoresby Society, the scheme has been satisfactorily launched. The Yorkshire Archæological Society was founded thirty years ago. It has a large number of members, and possesses a valuable library acquired by bequest. In 1889, those who were specially interested in the history of Leeds and its neighbourhood formed the Thoresby Society, which has also issued publications, and has an increasing number of members. Ten rooms in the Old Medical School in Park-street have been secured, and are being fitted for the purposes of the societies, and will be opened shortly. The principal room is the library, 40ft. long, with an open timbered roof, and a gallery along one side. In this room meetings of the societies named and other societies can be held. It is hoped that several other societies will here find a home.

CHIPS.

Sir David Salomons has promised to build a theatre to accommodate 400 persons at Tunbridge Wells, in celebration of the Queen's long reign.

The Eccles Town Council, after a long discussion, decided on Monday to adopt revised plans for the extension of the town hall, prepared by Mr. Bagot, architect, the estimated cost being about £5,000.

The city council of Bath adopted on Tuesday a scheme for the improvement of London-street by setting back seven houses on the north side, at an estimated cost of £10,625.

The opening of the new organ which has been lately built in St. Stephen's Church, Tovil, Maidstone, by Messrs. P. Conacher and Co., of Huddersfield, took place on Monday afternoon.

Plans prepared by H.M. Office of Works have been passed for the extension of the Plymouth General Post-office. The new building will cover the area now occupied by St. Andrew's Hall, the question of the price of the land going to arbitration.

There has just been placed in Christ Church, Morningside, Edinburgh, a stained-glass window to the memory of the late Dr. Bremner. The window, which is a two-light one, shows an aged warrior kneeling at the end of his life's work, with one hand upon the Bible, looking upwards, and hearing in the other hand the banner of the Cross. The Shield of Faith, the Sword of Righteousness, and the Helmet of Salvation form a connecting feature in the second light. The window is placed on the north side of the church, and has been executed at the studios of Messrs. A. Ballantine and Gardiner, George-street, Edinburgh.

The chief damage done by the gales of Friday and Saturday nights was at Brighton, where the old Chain Pier was swept away, a breach made through the West Pier, and great injury caused to the electric railway to Rottingdean, opened a week previously. The destruction of the Chain Pier, although sudden, was not unexpected, for two months ago it was condemned as unsafe by the borough surveyor, Mr. F. C. J. May, and it had, indeed, since been advertised for sale. It was built in 1822-3, from designs by Sir Samuel Brown, and was one of the very few structures of the kind in which the platform is carried on the suspension principle.

Building Intelligence.

BRADFORD.—On Saturday afternoon, Captain Greville, M.P., laid the foundation-stone of the East Ward Conservative Club in Bradford. The building has been designed by Mr. Frederick Wild, architect, Bradford, and will face Otley-road, Farmer-street, and Albert-street. It will extend from Otley-road through to Heap-lane. The style is a modification of Queen Anne. The windows have moulded jambs and moulded and carved pediments, and the building is surmounted by a mansard roof, with wrought-iron crestings and finials. The total cost of the club, including the site, is estimated at a little over £5,000. The entrance to the club will be from Farmer-street by a vestibule, from which the principal floor will be gained by a broad staircase. On the first floor are a billiard-room for three tables, 50ft. by 25ft., with lavatory and serving-rooms; smoke-room, 20ft. by 16ft.; reading-room, 25ft. by 20ft.; card-room, 23ft. by 11ft.; and a committee-room, 17ft. by 17ft. A feature in connection with the reading and smoke room will be a folding partition, by means of which the two rooms can be easily converted into one large hall. On the second floor will be located the curator's rooms. On the ground floor provision is made for five lock-up shops, and there is a room 50ft. by 25ft., with ante-rooms for small assemblies, &c. The contractors are as follow:—Excavator and mason, Mr. James Pratt; carpenters and joiners, Messrs G. Demaine and Sons; plumber, Mr. Lewis Brook; plasterer, Mr. H. H. Hargreaves; slaters, Messrs. Hill and Nelson; ironfounders, Messrs. E. and W. H. Haley; painter, Mr. G. J. Walton. Messrs. H. Leggett and Co. will supply the marble chimney-pieces, stoves, ranges, &c.

EDINBURGH.—The new chimney at the Edinburgh Gasworks, New-street, which has been in course of construction since November, 1895, has just been completed. The chimney, which is 250ft. high, is situated 116ft. due south of the old stalk, and the excavation for foundation was taken out 32ft. square and to 23ft. 6in. below the retort-house floor level. At that depth suitable rock was met with. In order to distribute the weight equally over the surface of the site, Portland cement concrete was put in 7ft. 6in. deep and 32ft. square. At the base the brickwork consists of 15 footing courses built solid for a height of 4ft. in cement mortar with Whitehill composition bricks, except in the centre and under the flue openings, where firebricks bedded in fireclay were used. There are four flue openings, each 7ft. high by 4ft. wide, arched over. Only three of these can be utilised, but the fourth one was inserted to give the stalk an equal bearing, and was afterwards built up. The chimney proper immediately above the footing courses is 22ft. 6in. square outside, the inner portion being wrought in a circle 16ft. diameter. The thickness of the walls at this part is 3ft. 3in., and this is continued plumb to 2ft. above the retort-house floor level, where a splayed course of pink Hailes stone forms the first offset of 4½in. From here the pedestal has a gradual taper of 1 in 100 to a height of 43ft. 6in. above floor level, where a cornice of Prudham stone 18in. deep is placed, the thickness of the walls in this section being 2ft. 10½in. From the top of this cornice the chimney is built circular, inside and outside, to the finish, the external diameter being 20ft. 11in. at the commencement, tapering with a "batter" of 1 in 55 to 14ft. 9in., 35ft. 3in. below the summit. This uppermost division is carried up plumb, and ornamented with Prudham stonework, and the whole surmounted by a cast-iron cap weighing 21 tons made in 48 pieces bolted together with internal flanges. To assist in binding the work together hoop irons laid on edge are inserted at every six feet in the height. The chimney is faced with red bricks. Within the walls of the shaft a lining of firebrick set in fireclay is constructed. The Dyle's patent lightning conductor, which is of copper, was supplied and fitted up by Messrs. Dixon and Corbitt and R. S. Newall and Co., Limited, London. The chimney, designed by Mr. Robert Mitchell, the engineer to the Commissioners, has been built by Messrs. R. Bruce and Son, contractors, Green-side.

FULHAM.—A new fire brigade station has just been opened in Fulham-road. It has been built from plans by Mr. Thomas Blashill, F.R.I.B.A., superintending architect to the London County

Council, and has accommodation for one officer, 12 married men, about six single men, and one coachman. The engine-room contains a steam fire-engine and a hose-tender and escape, and there is stabling for four horses, the doors of which immediately open into the engine-room. The single men are all housed upon the ground floor, and their quarters consist of a mess room, dormitory, and lavatories and bathroom attached. There is a recreation room adjoining these quarters, for use generally by the firemen in the station. There are also the coachman's quarters on this floor adjacent to the stables, and one other set of quarters. A yard is provided for washing the engines, having an entrance in the Shotten-dane-road. The upper floors comprise quarters for the men, with bathrooms, and there is a large flat as playground for the children. In the basement there is a washhouse and a hot closet for drying clothes, and coal and wood stores. The principal front is built in red bricks, with Portland stone dressings. The main roofs are covered with Broseley tiles, and the centre portion is surmounted by a cresting in lead work. The lookout tower rises to a height of 80ft. from the ground, and is octagonal in plan.

LEICESTER.—The annual dinner of the Leicester and District Building Trades Federation of Employers' Associations was held on Thursday evening in last week at the Bull's Head Hotel. Mr. G. Hardington took the chair, and amongst those present were Messrs. R. R. Starkey, O. A. Ellis, Cornish, G. Nichols, W. E. Starkey, G. R. Poyner, O. Clarke, J. H. Kellett, A. Chambers, W. Chambers, J. M. Fergusson, A. Fergusson, J. Pipes, T. Herbert, Stimson, Rolleston, Elliott, Horspool, Newbery, Tyers, H. Clarke, G. Collins, T. Richardson, J. Buswell, W. Harlow, W. Shipley, Rudkin, Widdowson, and others. "The Federation of Employers' Associations in the Building Trade" was given by Mr. Owen Ellis. The Chairman, in responding, said the Leicester Master Builders' Association could claim to be the father of the federation, for it was in existence for some two years before the latter was started. The federation had not done all that it was intended it should, or all that they had tried to do; but it had brought about a better feeling between the contractors and sub-contractors. Dealing with the federation as it affected the workmen, the chairman said that so far as his experience went he had never found any desire on the employers' part to pay low wages. Mr. R. B. Starkey proposed "The Town and Trade of Leicester." Mr. Chambers, replying, said the building trade had never been better than it was now.

It is suggested that a wrought-iron chancel screen should be erected in St. Michael's Church, Coventry, as a memorial to the late Francis Alfred Skidmore.

A house of mercy and convalescent home are about to be added to the Convent at Lawnside, at Dundee, from plans by Mr. T. Martin Cappon, of Dundee. The new building will provide beds for 32 girls.

The committee formed to commemorate the distinguished services of Dr. McLaren, who has completed half a century of ministerial work, and has officiated as minister of Union Chapel, Manchester, for thirty-eight years, have decided that the most fitting memorial would be a portrait, to be preserved in the custody of the city corporation. Sir George Reid, the president of the Royal Scottish Academy, was commissioned to paint the portrait; he has now completed his task, and has produced a three-quarter-length figure, standing erect, with hands crossed behind him.

The committee of the Shropshire Horticultural Society have decided to intrust the commission to execute the statue of Charles Darwin, to be erected at Shrewsbury, to Mr. Horace Montford, a native of the city. The statue will be a seated figure in bronze, 6ft. 6in. high, mounted on a granite pedestal 4ft. 4in. in height, with steps 1ft. 2in., making in all a monument 12ft. high, at a cost of £1,000. It is proposed to erect the statue in a prominent position in front of the Public Free Library, formerly the free school building where Darwin received a portion of his education.

The fire which broke out in the tower of St. George's Church, Hanover-square, on the night of November 18, was not extinguished before it had reached a portion of the organ. As it has been found that the water used to quench the flames had the effect of ruining the rest of the instrument, the rector and churchwardens have just ordered a new Hope-Jones electric organ, at a cost of £1,816, to be built on the same principle as the one just destroyed.

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ILLUSTRATIONS.

THE HALL OF THE DRAPERS' COMPANY.—DECORATION OF THE M'EWAN HALL, EDINBURGH UNIVERSITY.—NEW CHURCH, BELFAST.—COFFEE TAVERN, BURNHAM, SOMERSET.—HOUSE, BLACKBURN PARK, DIDSBURY.—HARDWOOD HOUSEHOLD FURNITURE.—SKETCH IN A STAIRCASE HALL.—BUSINESS PREMISES, NEWPORT, MON.

Our Illustrations.

CITY GUILDS: NO. XXX.—THE HALL OF THE DRAPERS' COMPANY—COURT ROOM.

WE have already, on July 10 last, given an interior view of the Hall of this Great Company, and we then printed some account of its buildings and records. The grand staircase appeared in our issue for July 24, and to-day a double-page photographic view is given of the court-room, with its tapestries and the celebrated whole-length portrait of Mary Queen of Scots, and her son, James I., hanging over the chimney-piece. It is ascribed to Zuccheri, and traditionally is said to have been thrown over the garden-wall during the Fire of London, and never afterwards reclaimed. Another account ascribes the ownership to Sir Anthony Babington, confidential secretary to Queen Mary. He deposited it in the custody of the Drapers' Company, it is said, for safety, but never recovered it. At the end of the court-room is a valued picture of Lord Nelson, by Sir William Beechey. The sumptuously-designed wainscot work, with its delicately-detailed friezes, in this apartment was executed by Mr. John Dibblee Crace, and the spacing of the panelling was determined by the tapestries and paintings which it enshrines. The ceiling and frieze are heightened by gilding and colour. The view given was photographed specially for the BUILDING NEWS by Mr. J. T. Sandell. The architect of the company's hall was the late Mr. Herbert Williams. The premises are situate in Throgmorton-street, E.C.

DECORATIONS OF THE M'EWAN HALL, EDINBURGH UNIVERSITY.

THE suitable decoration of this grand hall formed the subject of long and anxious discussion. Eventually the M'Ewan trustees placed the work unreservedly in the hands of Mr. W. M. Palin, who has been engaged for three years on this important undertaking. The effect produced is that of a mass of rich and luscious colour, such as the Venetians gloried in, and which elicited the admiration of the late Lord Leighton, himself, above all things, a decorative artist. To begin with the dome, which is most elaborately treated. It is divided architecturally into 15 ribs, thus necessitating but one arrangement of design for the decorator. These ribs he has divided into four panels, three of which are filled with ornament on gold separated from each other by a blue-black and gold band. The lower and largest panel contains a seated female figure double life size against a background of gold mosaic. This gives fifteen figures seated in the half-circle of the dome. Thirteen of these are named, and represent the arts and sciences. Reading from

the left they are—"Astronomy," "Mathematics," "Poetry," "History," "Divinity," "Philosophy," "Medicine," "Oratory," "Jurisprudence," "Fine Arts," "Music," "Biology," and "Physics." The figures are all in action, and hold with dramatic effect some instrument or implement appropriate to the name they bear. The ensemble which the artist has striven for has been the reproduction on a large scale of the effect of an enamelled jewel. This he has done by painting the whole of the background of gold, which scintillates by the fretwork of ornament upon it, or by using for the draperies of the figures colour representing precious stones. The lines of the circular light of the dome are indicated in gold, while round the inner edge of the dome itself is a wide blue band, having in gold letters this motto, taken from Holy Writ: "Wisdom is the principal thing; therefore get wisdom: and with all thy getting get understanding. Exalt her, and she shall bring thee to honour." On the west wall, over the top of the platform opening, and on its sides, is an immense painted panel, which measures 100ft. across, and narrows as it ascends to the apex. The subject is the "Temple of Fame," and in it we have 80 to 90 figures, on a scale of 9ft., representing philosophers and students standing in groups holding converse together, or ascending steps to a raised piazza, where is arranged an architectural background of colonnade and temple. The apex of the composition is formed by three goddesses, double life size, representing Science, Art, and Literature, seated on a throne. Underneath this panel are two lunettes decorated in monochrome, and four very large panels, measuring about 25ft. in height. In the right-hand panel is a large fresco representing Minerva as the tutelary deity of the university receiving the gift of the building to the university; and in the group of figures the artist has introduced a portrait of Mr. M'Ewan. The left-hand panel is an important subject composition representing "Fame crowning Success," being, as it were, the consummation of the idea of the Temple of Fame. In both panels there is an architectural background, the firm lines and perspective of which give an appearance of greater size to the hall. The two side panels each contain two female figures, those in the right representing "Perseverance" and "Intelligence," and in the left "Imagination" and "Experience." The whole scheme of figure decoration forms a frieze round the base of the building, the colour springing up through the cherubs introduced in the upper part of the composition of the lower panels, then carried up by the lunettes to the "Temple of Fame," and round the dome by the figures. The frescoes were painted by the artist on canvas, which has been attached to the walls, and in the colour scheme allowance has been made for the mellowing influence of age. Only the roof of the apse has yet been treated, the decoration of the side panels being postponed till after the organ has been built, and it is seen what scheme of colour or design will be most suitable. We illustrate four of the figures above described, and at an early date we intend to publish some more examples of this capital work.

NEW CHURCH, BELFAST.

MESSRS. PHILIP TREE, F.R.I.B.A., and Ivor Price are the joint authors of this, the second premiated design in the late competition for a new church at Belfast. The plan shows the internal arrangements of the building, the western porches being marked by two smaller towers, the large one being located over the crossing.

COFFEE TAVERN, BURNHAM, SOMERSET.

THESE premises, which have been erected on the site of the old Masons' Arms, are situated at the junction of Victoria-street, Regent-street, and Alfred-street. They have been built for Mr. J. B. Braithwaite, jun., of London, from designs by Messrs. Clark and Moscrop, of Darlington. Mr. Jas. Keats, of Burnham, was the builder. On the ground floor are a bar, bar-parlour, public tea-room, manager's room, kitchen, and ladies' and gentlemen's lavatories, &c. On the first floor are billiard and reading-rooms, club-room, sitting-room, and committee-room, also a bathroom and lavatory, which has been purposely fitted up for the accommodation of cricket and football clubs. On the second floor are several bedrooms. The premises are built of local red bricks, with Bath stone dressings, and covered with the Coalbrookdale Co.'s tiles.

HOUSE, DIDSBURY, NEAR MANCHESTER.

THE above residence has been designed for an eligible building site having a south-easterly aspect, upon the Blackburn Park Estate, and will have a frontage to the main road between Manchester and Wilmslow, five miles south of the city. The accommodation comprises drawing, dining, and morning-rooms, entrance and staircase halls, ample domestic conveniences, four principal bedrooms, and four other bedrooms on the second floor. The walls will be faced externally with Ruabon bricks or tile hung, or with specially burnt local grey bricks. The dressings will be of stone and terracotta. The house has been designed by Mr. Joseph Swarbrick, M.S.A., of Manchester, under whose personal supervision the work is to be executed.

HARDWOOD HOUSEHOLD FURNITURE.

THIS page of sketches shows four pieces of simple decorative furniture of good design, by Mr. A. W. Simpson, of Kendal, who has made them. The Gun Cabinet is in fumigated oak, and suggests by its two carved panels—with the line under adapted from Goldsmith—the dedication of its use to purposes connected with sport, the interior being designed to accommodate guns in their cases. The length is about 3ft. The handles and hinges are in hand-wrought copper, executed by Mr. R. L. B. Rathbone. The spaces below the cupboard are for gloves, the cabinet being intended for a hall.—The Afternoon Tea-Table has been made both in oak and mahogany. The two side leaves slide in, the edge of the leaf being moulded to correspond with sides. This table stands a little over 2ft. high, and is 20in. by 20in. on top.—The Studio Chair is in polished walnut, and was intended for the designer's own work-room; the arms are broadened considerably in front to hold a cup of tea, book, or writing materials.—The Sideboard is in oak, fumigated and waxed; the carving is very low relief, and almost smooth to the touch. The front edge of the top is slightly rounded on plan, with small bracket under centre. The hand-wrought copper hinges are by Mr. Rathbone. In all these pieces unnecessary excrescences and dust-traps are studiously avoided, simplicity being Mr. Simpson's chief aim, and we must add that he has succeeded in imparting interest to his work as well.

RESIDENCE, PROSPECT AVENUE, HARTFORD, CONN.

WE illustrate to-day a sketch of the staircase hall in the above residence for Mr. Geo. W. Pomroy. The staircase is finished in white enamel, with cherry treads and handrail. A feature of the hall is a nook under landing, containing a fireplace and lighted by leaded windows. Over the nook at the landing there is a stained-glass window, 5ft. by 10ft., giving an abundance of light to the room below, the dimensions of which are 15ft. by 23ft. The house has been recently completed by Mr. F. R. Comstock, architect, of Hartford, Conn., who sent us the sketch from which our illustration was made. We hope shortly to publish an exterior view of the house.

PREMISES, NEWPORT, MON.

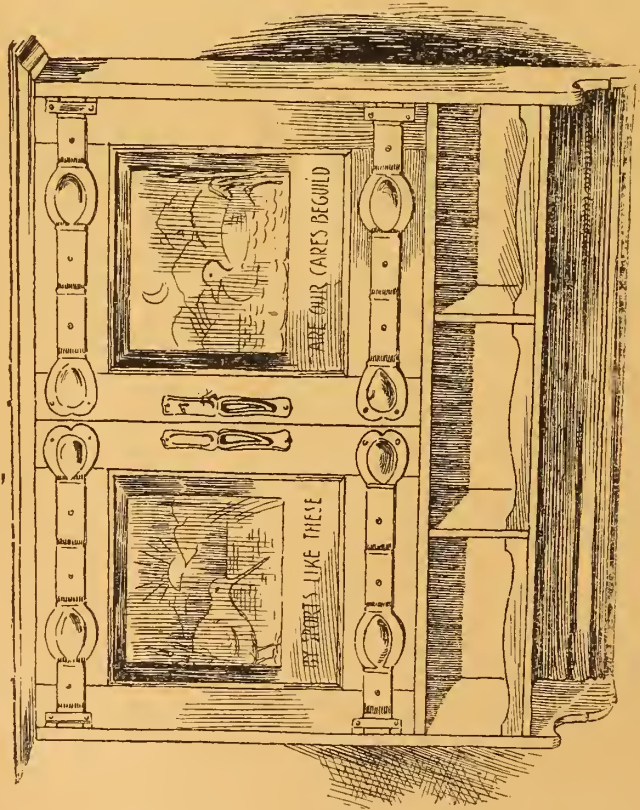
THESE premises have recently been erected in Dock-street, Newport, Mon., for Messrs. W. Hancock and Co., Ltd., brewers, Cardiff, Newport, and Swansea, from designs prepared by Mr. W. L. Griffiths, architect, Newport. They comprise the Steam Packet Hotel, two shops, and two floors of offices. The materials are Forest stone and red-sand bricks. The contractors' work was satisfactorily carried out by Mr. W. A. Linton, Newport, Mon.

New board schools are approaching completion in Gladstone-street, Ilkeston. Mr. C. W. Hunt is the architect, and Mr. W. F. Shaw the builder.

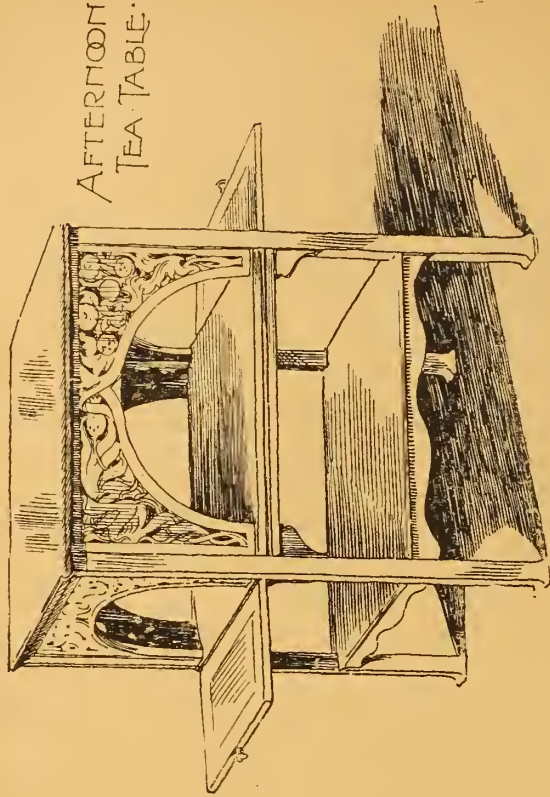
Plans have been passed by the district council for the erection of over 400 houses at Herne Bay. The town is extending eastward.

A work of church decoration was recently dedicated at St. Thomas's parish church, Seaforth. The chancel has been for some time in the hands of Mr. Frampton, of London. On the south wall is a large fresco, 22ft. in length, representing "The Conversion of St. Thomas," executed in wax medium. On the east is depicted the Lord in glory, but still bearing the marks of the Passion. On either side of this are frescoes; that on the north represents "The Tree of the Knowledge of Good and Evil." On the other side is the Tree of Life in the Paradise of God.

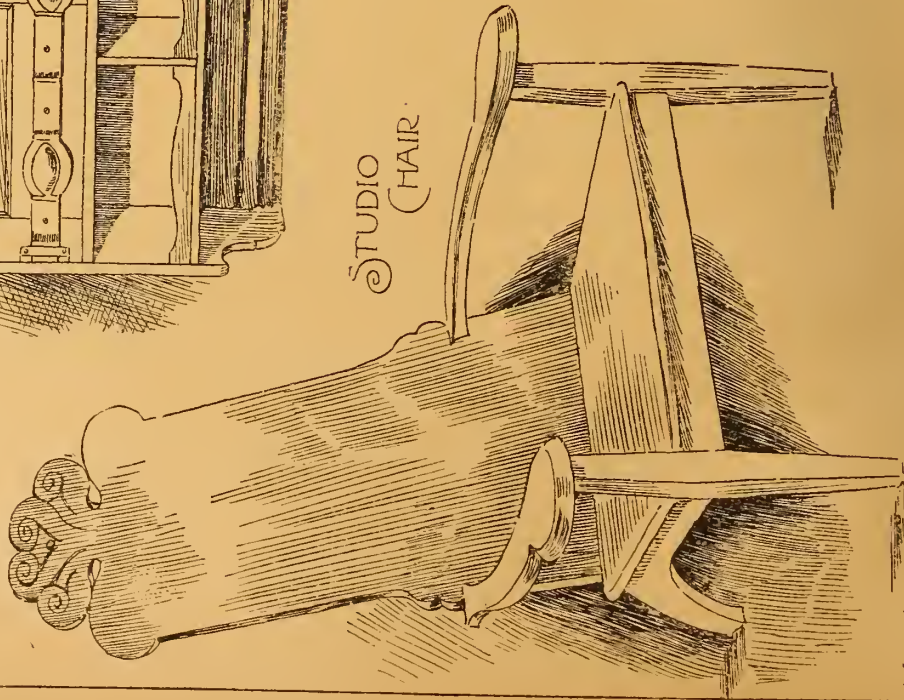
A
GUN CABINET.



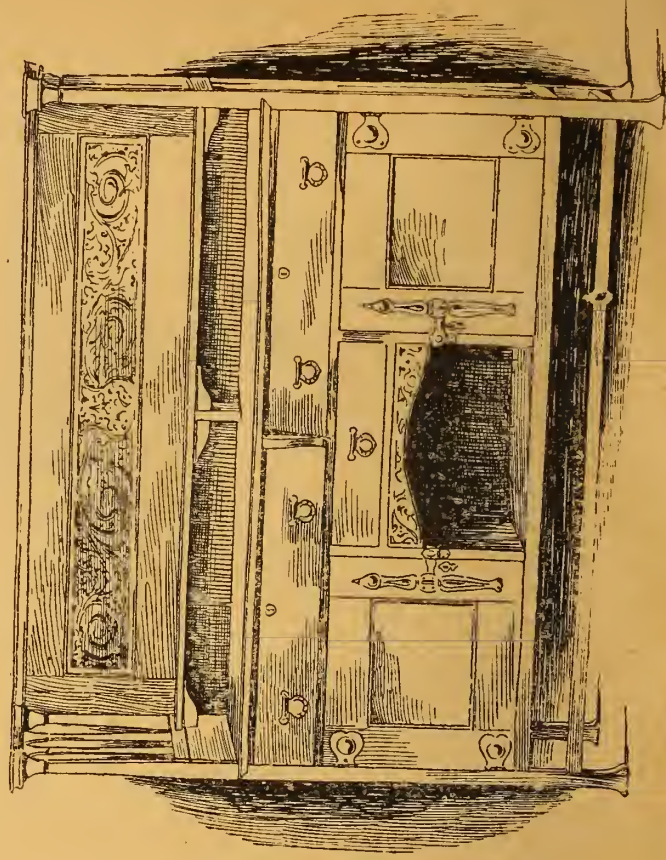
AFTERNOON.
TEA TABLE.



STUDIO
(CHAIR



OAK
SIDEBOARD



HARDWOOD HOUSEHOLD FURNITURE

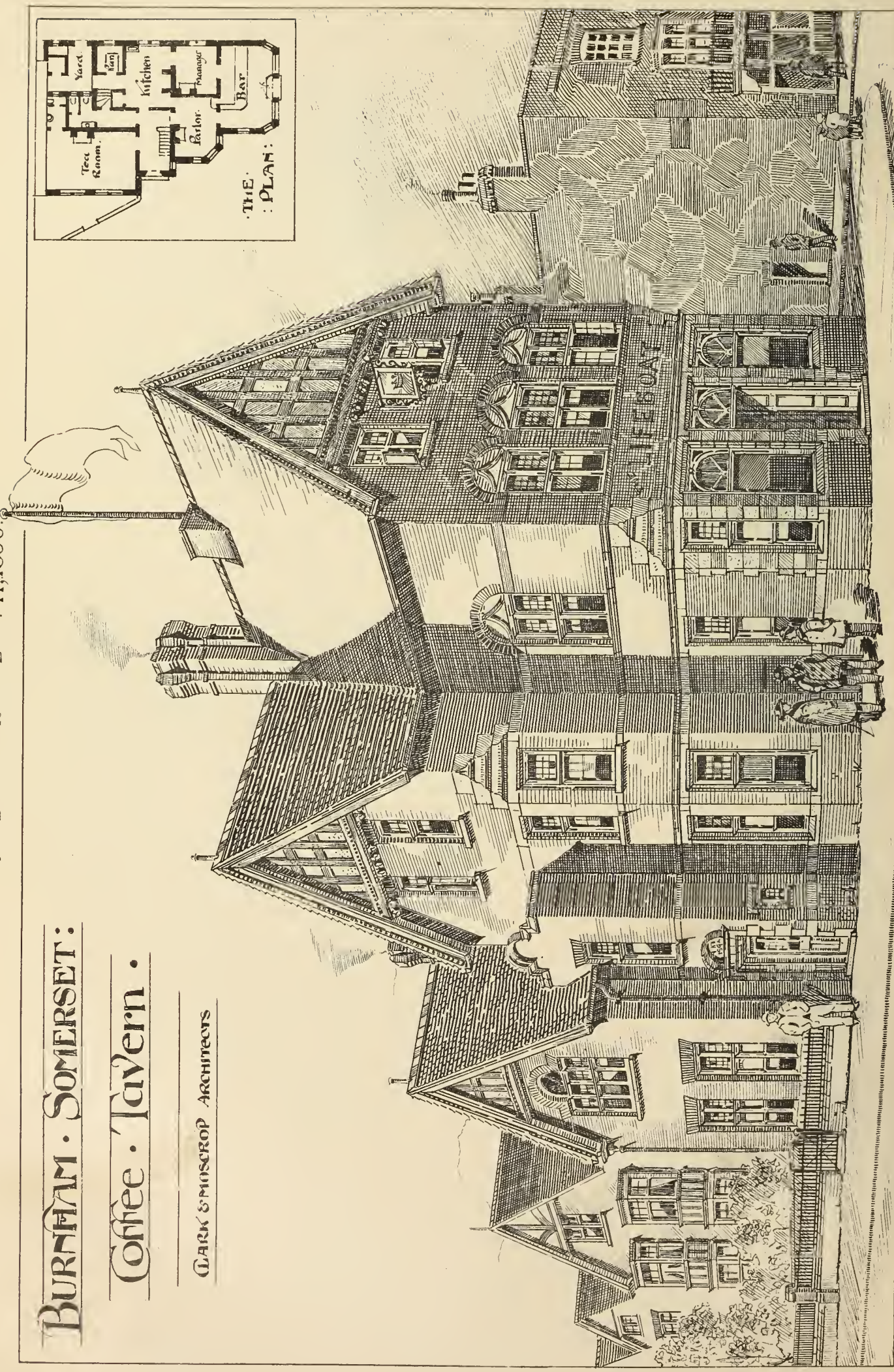
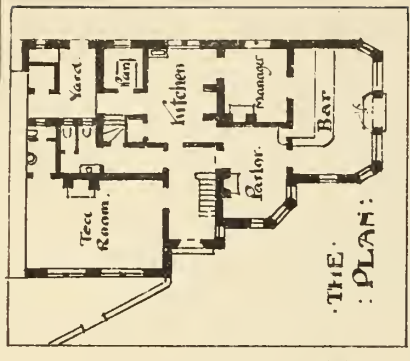
DESIGNED & EXECUTED BY
ARTHUR W. SIMPSON
KENTON

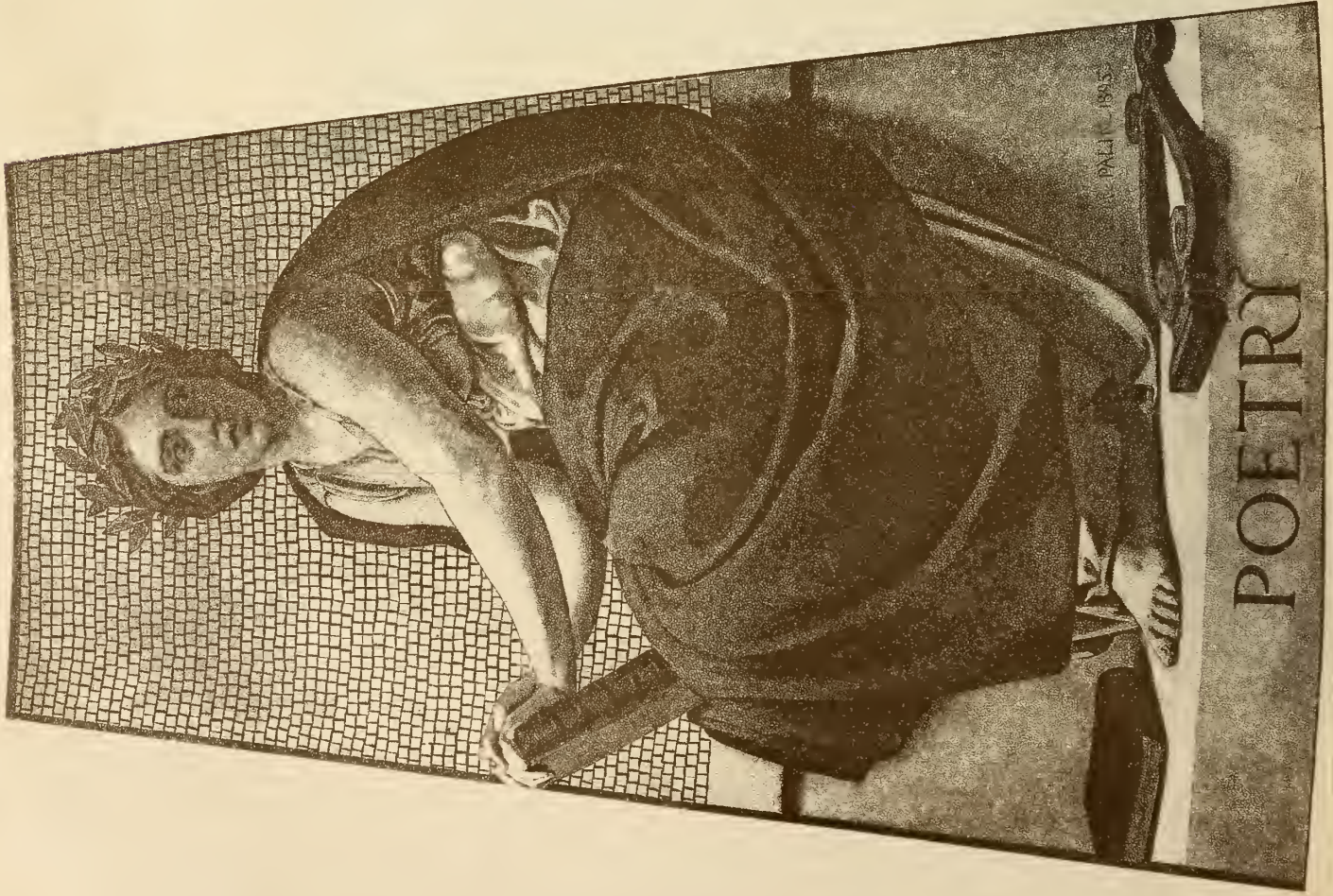
THE BUILDING NEWS, DEC'R 11, 1896.

BURNHAM · SOMERSET :

Coffee · Tavern ·

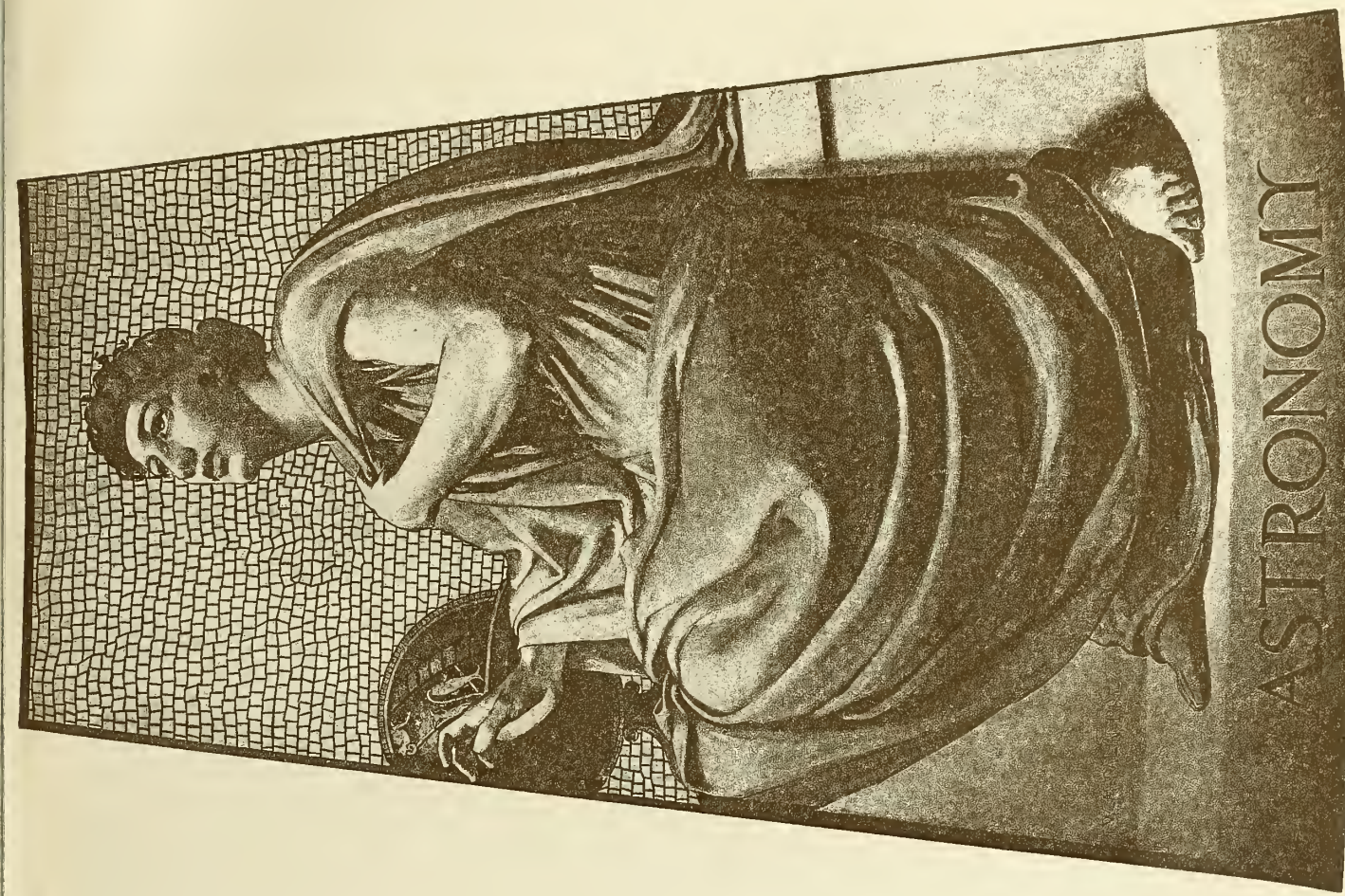
CLARK & MOSCROP ARCHITECTS







PHYSICS



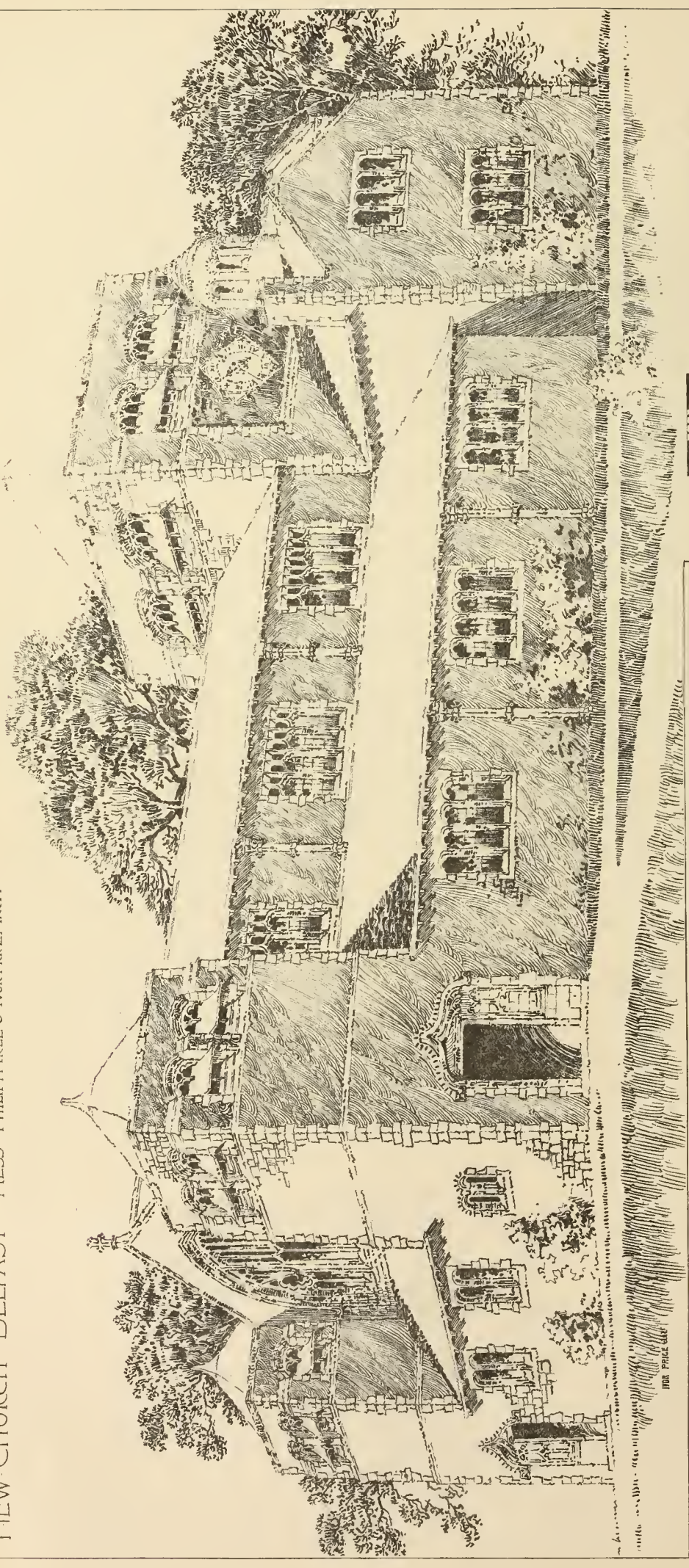
ASTRONOMY



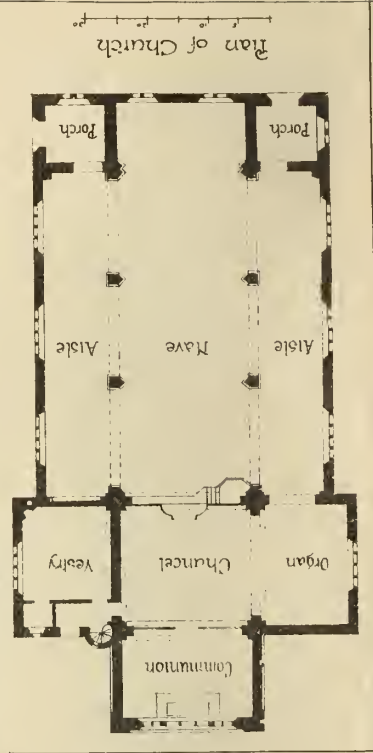
PHOTOGRAPHED WITH A SANDELL PLATE

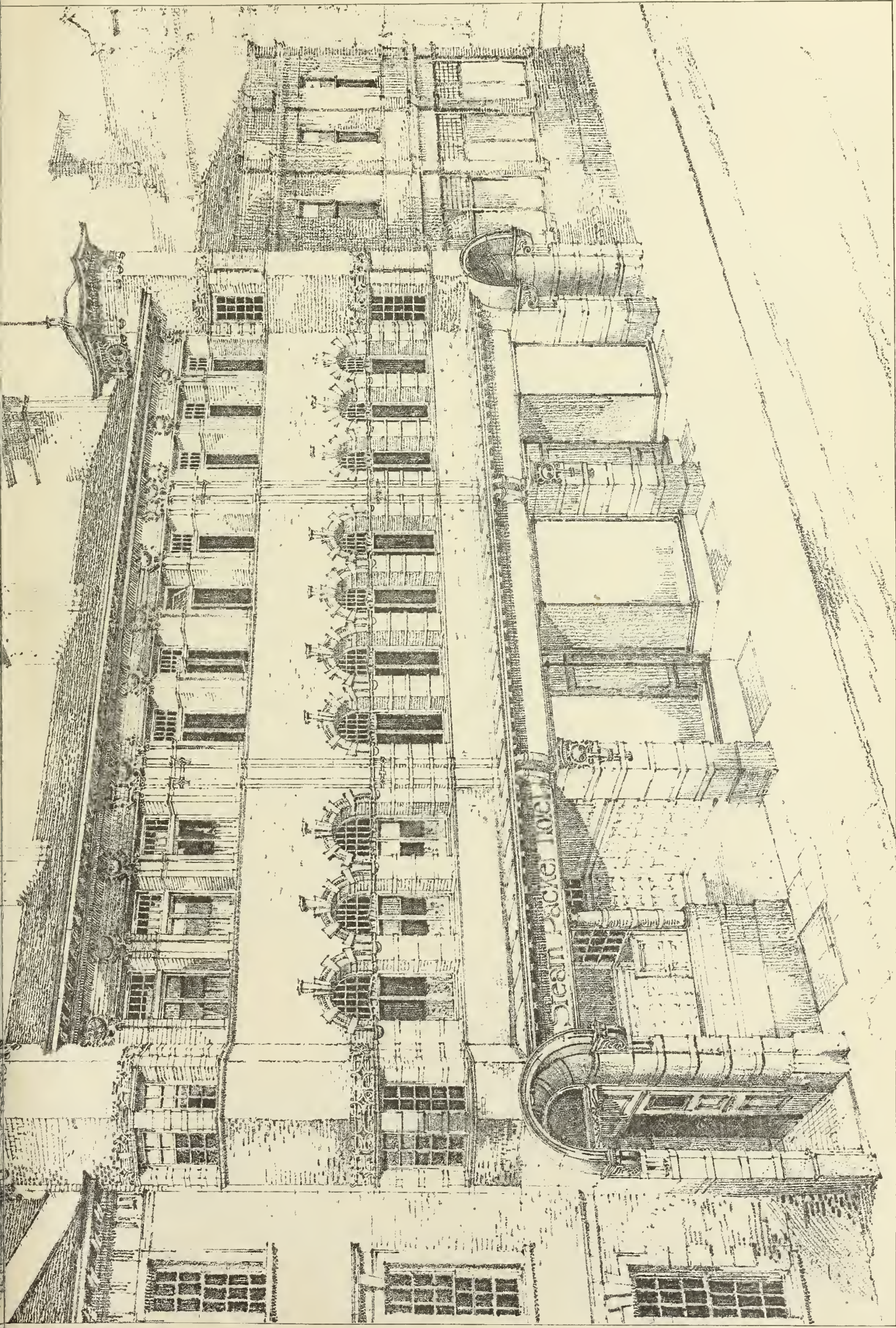


NEW CHURCH · BELFAST · MESS^{RS} PHILIP TREE & IVOR PRICE ARCH^TS

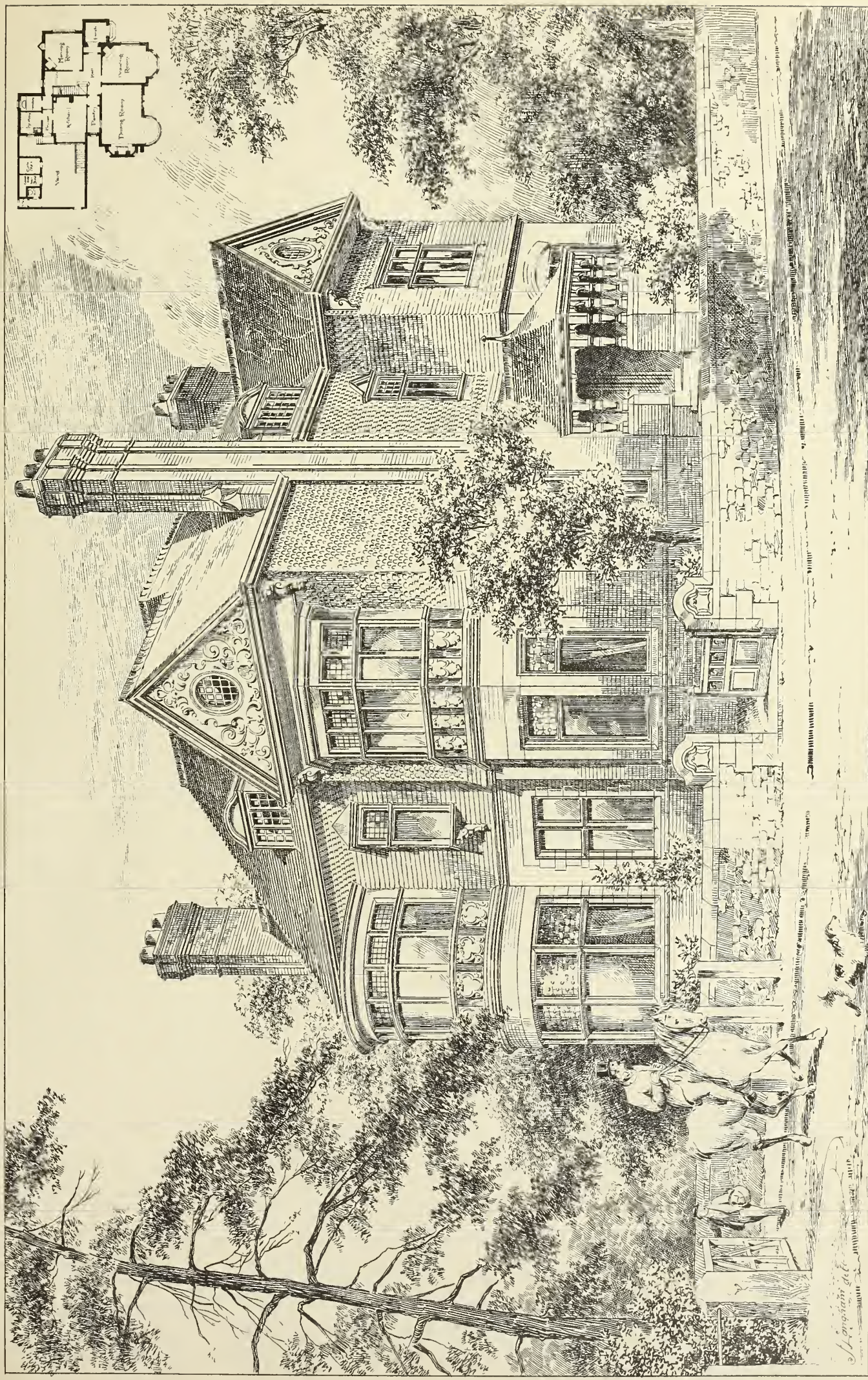


BUSINESS PREMISES · NEWPORT · MON · W. L. GRIFFITHS ARCH^T





"PHOTO-TINT" by James Akerman 6 Queen Square London W.C.

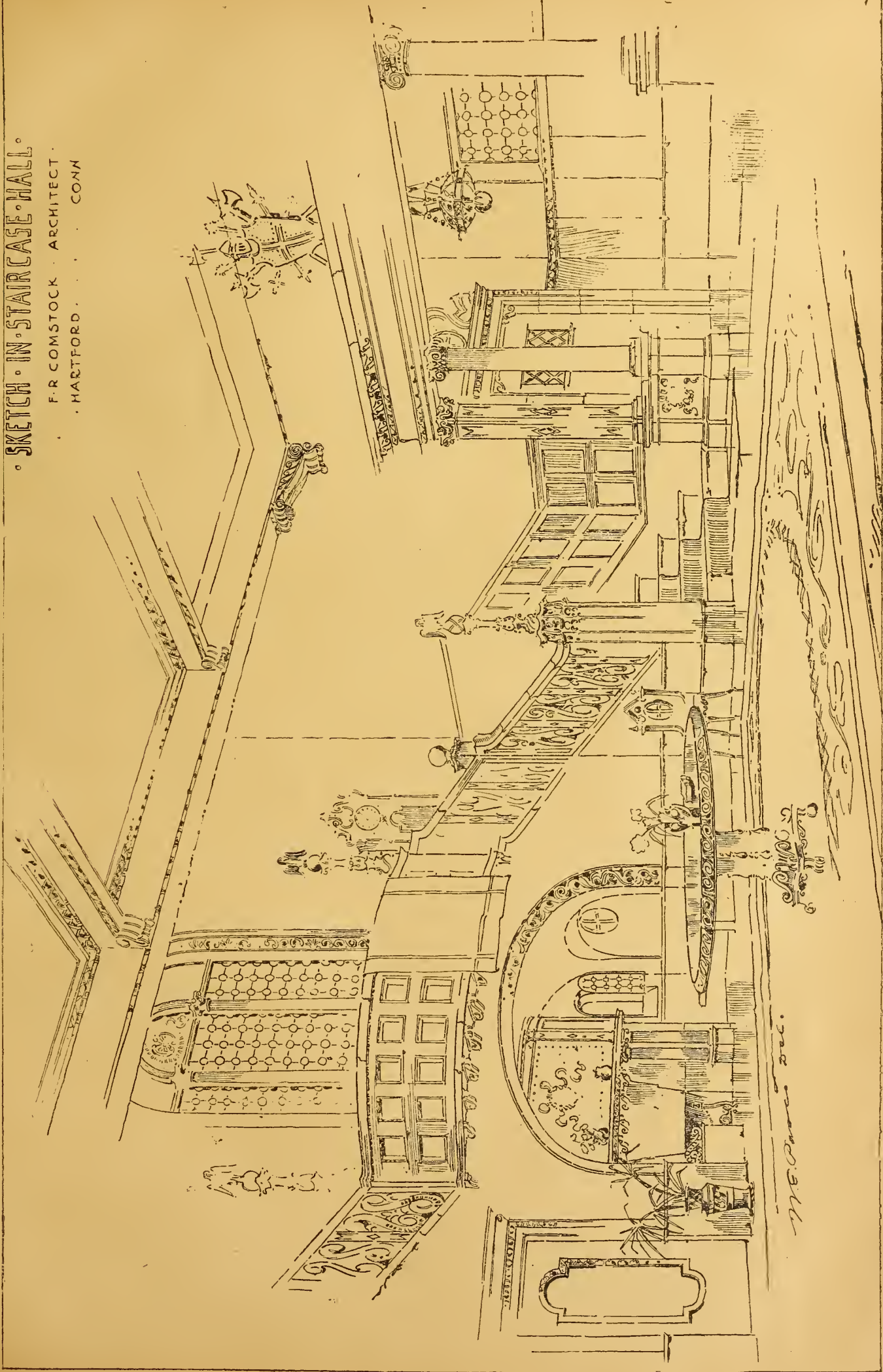


HOUSE BLACKBURN PARK DIDSBURY JOSEPH SWARBRICK ARCHT

Photo Lithographed & Printed by James Alderman & Co. Queen's St. W.

° SKETCH ° IN ° STAIRCASE ° HALL °

F. R. COMSTOCK · ARCHITECT ·
· HARTFORD · · · · · CONN



W. C. P. 11

W. C. P. 11

STATUES, MEMORIALS, &c.

GLASGOW UNIVERSITY. — On Tuesday week two memorial tablets were unveiled at this university, which have been erected, the one in honour of the late Lord Sandford on the main stair of the university, the other at the head of the stair, to commemorate Professor Veitch. The memorial tablets have been designed in the style of the Italian Renaissance. They both comprise portraits in half-relief, worked in white alabaster with a background of gold mosaic. The medallions are placed in richly carved frames, and are surmounted by entablatures carried by pilasters; the Veitch memorial differing mainly from that to Lord Sandford in the cornice being finished with a pediment, in the middle of which the arms are placed. The Sandford tablet has the arms in the centre of a carved panel below the medallion. The inscriptions are on the pedestals which carry the upper part of each design, and which in their turn are supported by corbels and a central ornament. The tablets are throughout of polished alabaster, the panels in the pilasters, frieze, &c., being filled with Powell's mosaic, chiefly consisting of delicate gold patterns on a red ground. The arms are in the same material, while the inscriptions are cut in slabs of deep-red marble. The designs are by Mr. J. Oldrid Scott, F.S.A., F.R.I.B.A., of Spring Gardens, S. W., and the work has been executed by Mr. Bridgeman, of Lichfield.

In the course of the demolition now in progress of the Great Red Lion, just by the clock tower, at St. Alban's, a piece of brick-built domestic architecture of the Middle Ages has been exposed to view. Part of a framed wooden structure of the fifteenth century can now be seen on the north side of the Red Lion, precisely as it was erected.

On St. Andrew's Day, a new organ and five new stained-glass windows were dedicated at St. Andrew's church, Humbledon. The organ, which has been built by Mr. J. Egan, of Well-street, London, has been designed by Mr. J. T. Lee, A.R.I.B.A., London, the instrument itself being supplied by Messrs. Brindley and Foster, of Sheffield. The new windows, which were also designed by Mr. Lee, have been executed by Mr. Egan, and illustrate "The Life of Victory." The vestry has been built by Mr. G. C. Smith, of Oakham, who also about a year ago refloored the nave, and this, with the new seating accommodation, was also formally opened on the same occasion.

Mr. John Henry Wilkinsou, plumber, 1, Rampart-road, Woodhouse, Leeds, was killed on Friday, while inspecting an unoccupied house at 243, Hyde Park-road, with a view to finding out what repairs and renewals were necessary before the house could be occupied. While stepping out of an upper casement on to the sloping top of a bay window his foot slipped, and he fell into an area about 30ft. below. He was a heavy man, and, alighting on his head, was rendered unconscious, and died almost immediately.

The parish church of St. Mary, Dumfries, has just been enlarged by the addition of a chancel and entirely reconstructed internally, at a cost of about £2,500. The chancel, which is approached by marble steps, contains seats for the choir, and an organ-chamber is built on one side. The Communion table is raised on a dais of white marble and tiles. The pulpit rests on a polished block of red granite, with carved freestone capital. In the chancel has been inserted a five-light Gothic window, filled with a stained-glass representation of the Ascension. Reopening services took place on Sunday.

Messrs. Monk and Newell, contractors, Liverpool, have been intrusted with the erection of the new station at Llandudno Junction, and the works were commenced last week. The present station at Llandudno Junction will be converted into a goods depot, and a loop-line will be constructed to Llandudno. The new arrangement will prevent the blocking of the railway at Llandudno Junction, now too frequent and prolonged during the tourist season.

The following dissolutions of partnership are announced:—G. Highton and A. Ardron, architects and surveyors, Bedford, and Victoria-street, Westminster, S.W., under the style of Highton and Ardron; H. H. Leonard and S. C. Clarke, quantity surveyors, Bishopsgate-street Without, E.C., under the style of Leonard and Clarke; C. T. Lucas (now deceased), Sir T. Lucas, Bart., J. Aird, M.P., C. J. Lucas, A. C. Lucas, and A. G. Lucas, Great George-street, Westminster, S.W., contractors for public works, under the style of Lucas and Aird; C. T. Lucas (now deceased), Sir T. Lucas, Bart., J. Aird, M.P., C. J. Lucas, A. C. Lucas, B. P. Ellis, and J. Aird, jun., Belvedere-road, Lambeth, S.E., contractors, under the style of John Aird and Sons; C. T. Lucas (now deceased), Sir T. Lucas, Bart., J. Aird, M.P., C. J. Lucas, A. C. Lucas, A. G. Lucas, B. P. Ellis, and J. Aird, jun., Great George-street, Westminster, S.W., builders and contractors, under the style of Lucas Brothers.

WATER SUPPLY AND SANITARY MATTERS.

NOTTINGHAM.—The Nottingham Town Council will apply to Parliament next session for additional powers in connection with its waterworks. A well and pumping station are to be provided at Oxtou, and a covered reservoir will be constructed at Cockpit Hill, Arnold. Provision is made for the construction of an aqueduct, commencing at the intended Oxtou pumping station and terminating at Arnold in the intended Cockpit Hill reservoir. There will be a well and pumping station at Woodborough, with which an aqueduct will be connected, and which will terminate at the Cockpit Hill reservoir. A well and pumping station will be constructed at Broughton, and an aqueduct commencing there will terminate at Oxtou by a junction with the intended aqueduct at that place.

WALSALL WOOD SEWERAGE.—An inquiry was held at Brownhills on Friday, the 4th inst., by Col. J. T. Marsh, R.E., one of the inspectors of the Local Government Board, into the application of the urban district council for sanction to borrow £12,500 for works of sewerage and sewage disposal for the Walsall Wood and Sheffield portions of their district. The scheme was explained and details were given by the engineer, Mr. H. Bertram Nichols, C.E., of Birmingham. On the following day the inspector, accompanied by the engineer and the surveyor to the council, visited and inspected the Brownhills sewage farm and the various points of the districts proposed to be sewered. There was no opposition to the application.

CHIPS.

Mr. P. Glass, who claimed £7,000 from the corporation of Glasgow for a piece of ground necessary for the widening of Dalmarnock-road, has been awarded £2,601 by arbitration.

At the last meeting of the Rochdale Town Council, the increase of the salary of Mr. Platt, the borough surveyor, from £400 to £500, and the granting of an honorarium of £100 to him for special services, were agreed to without comment.

The Carnarvon Rural District Council, at its last meeting, signed a contract for the construction of waterworks to supply the populous villages of Penygroes, Talsarn, and Llanllyfni, in the Nantlle Vale. Mr. Thomas Bugbird, of Carnarvon, is the contractor, and the estimated cost is £4,000.

A new two-mannal organ (built by Messrs. Brindley and Foster, of Sheffield, at a cost of over £600) was opened at the New Jerusalem Church, Heywood, Lancs, on Thursday evening in last week.

New board schools are about to be built at Burnham-on-Crouch, Essex, from plans by Mr. F. Chancellor, F.R.I.B.A., of Finsbury-circus, E.C., and Chelmsford.

The church of St. Saviour's, Southwark, after undergoing restoration from Sir Arthur Blomfield's designs, including the rebuilding of the nave, will be reopened in February next, and the Prince of Wales has signified his intention to be present.

Restoration works have just been completed at Bucklesham Church, Suffolk, for the Rev. Canon Pretynian, of Orwell Park, and under the supervision of Mr. E. F. Bisshopp, of Ipswich, diocesan surveyor.

A window in the south transept of St. Peter's Church, Plymouth, is being filled with stained glass as a memorial to the late Rev. H. Fison. The work is being executed by Mr. Fouracres, of Stonehouse, Devon.

Sir Alfred Haslam, who recently presented the bronze statue of the Queen, erected at the City end of Blackfriars Bridge, E.C., has built a new institute for the use of the large number of employés at his engineering works at Derby. These were formally opened on Friday night, when Sir Alfred announced his intention of building a new aisle to St. Paul's Church, Derby, in commemoration of the Queen's reign.

The survey for a through line of railway from Agra to Delhi, a distance of about 124 miles, has been placed under the control of the Director-General of Railways for India, and will be known as the Agra-Delhi chord line survey.

The authorities of Bristol Cathedral are having a wrought-iron grille made to place before the recumbent effigy of the late Dean Eliot, as it is found that during the uave services people have no compunction about covering the face of the figure with a hat or throwing coats over it.

It is proposed to enlarge the existing workhouse at Barnsley by the addition of wards for harmless lunatics and imbeciles, and the erection of isolation buildings for fever and infectious cases. The first proposal was to incorporate some of the old buildings; but owing to the views of the Local Government Board, it is now proposed that entirely new buildings shall be erected.

The art gallery committee of the Southport Town Council have accepted from Mrs. Spencer Lees the gift of two paintings of Haddon Hall by her late husband, as a memorial of his long connection with the gallery.

Mr. Charles P. Cotton, C.E., chief engineering inspector to the Local Government Board for Ireland, opened an inquiry in the Town-hall, Carrickfergus, on Thursday in last week, concerning an application by the sanitary authority for sanction to a loan of £1,600 for a water supply to Greenisland district, and of £400 for the sewerage of the North-road district. Mr. S. P. Close, the engineer, explained the proposals.

The Prince of Wales will visit Longton on the 7th of January for the purpose of laying the foundation-stone of the Sutherland Institute, providing for a free library and technical schools on a site given by the Duke of Sutherland.

At a meeting of members of the Surrey Cricket Club on Monday, Sir R. Webster, M.P., stated that the new lease of the Oval granted by the Duchy of Cornwall was for 31 years, at a rental increased from £99 to £750. He also announced that it was intended to begin next autumn the erection of a new pavilion at an estimated cost of about £20,000.

In the case of Philip Charles Davies, Leppoe-road, Elm-park, Clapham, S.W., late Desresby House, Lyham-road, Brixton, S.W., Oakhill-road, West-hill, Wandsworth, S.W., and Hale End, Essex, builder, the discharge from bankruptcy has been suspended for three years ending Nov. 5, 1899.

The Dundee Town Council discussed on Friday at great length the question of salary to be paid to Mr. William M'Crae, who has been appointed to succeed his late brother as gas manager. A special committee recommended £450; but, after a long and acrimonious discussion, the salary was fixed at £350.

The Mersey Docks Board have decided to spend £72,000 in erecting a large shed, and making other improvements at Huskisson Dock for the accommodation of steamers of large tonnage.

The annual distribution of medals and other prizes to the students of the Royal Academy took place last (Thursday) evening.

On Monday morning week, an ostler at some stables at Bude, went to a building in the yard, and was greatly surprised to find there the dead body of Mr. James Bickford, for many years foreman mason in the employ of Messrs. Pethick Brothers, builders. Death, it proved, had resulted from natural causes.

A Local Government Board inquiry was held yesterday (Thursday) in the Council-chamber at Heywood, Lancs, as to the Corporation's proposals to borrow £35,000 for waterworks purposes, and £1,000 for fire-brigade purposes.

Major-General Crozier and Dr. R. Bruce Low, Local Government Board Inspectors, held an inquiry at Gloucester on Friday, into the application of the corporation for approval of the appropriation of £3,500 of the £20,000 received by them upon the sale of certain property to the Gloucester Railway Carriage and Wagon Company, to the purchase of 30a. 2r. 37p. of land, known as Vineyard Hill, on the west side of the city, for hospital purposes.

A memorial stained-glass window to the late Dr. Richard Ross was dedicated on Sunday in St. Andrew's Church, Hope-street, Belfast. The window is by Messrs. Heaton, Butler, and Bayne, of London, and consists of three separate lights, representing the parable of the "Good Samaritan."

On Friday, Colonel J. T. Marsh, R.N., Whitehall, attended at the public offices, Brownhills, Staffs, on behalf of the Local Government Board, to conduct an inquiry as to an application by the urban council for sanction to a loan of £12,500 for works of sewerage and sewage disposal for Walsall Wood and Sheffield.

The vestry of St. Leonard's, Shoreditch, summoned Mr. Staines, the owner of some property in Whiston-street, to the Worship-street Police-court, on Monday, for non-compliance with an order to carry out certain sanitary works. It transpired, however, that the order to prosecute was issued on October 19, before the proceedings of the committee had been sanctioned by the vestry. The magistrate said an *ex post facto* sanction by the vestry was not what was intended by the Act. He dismissed the summons, and allowed the defendant three guineas costs.

St. Columba's Protestant College, Rathfarnham, county Dublin, was destroyed by fire on Monday, the only portions of the building saved being the old dormitory, the warden's residence, and the chapel, which was isolated from the main block. A new wing, which cost £3,000, was completely burned out, and the college furniture and equipments have all been destroyed.

The Municipal Council of Paris have approved in principle of the proposal to construct a Metropolitan railway for that capital.

TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. All communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondents.]

It is particularly requested that all drawings and all communications respecting illustrations or literary matter should be addressed to the EDITOR of the BUILDING NEWS, 332, Strand, W.C., and not to members of the staff by name. Delay is not unfrequently otherwise caused. All drawings and other communications are sent at contributors' risks, and the Editor will not undertake to pay for, or be liable for, unsought contributions.

Cheques and Post-office Orders to be made payable to THE STRAND NEWSPAPER COMPANY, LIMITED.

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ADVERTISEMENT CHARGES.

The charge for Competition and Contract Advertisements, Public Companies, and all official advertisements is 1s. per line of Eight words, the first line counting as two, the minimum charge being 5s. for four lines.

The charge for Auctions, Land Sales, and Miscellaneous and Trade Advertisements (except Situation advertisements) is 6d. per line of Eight words (the first line counting as two), the minimum charge being 4s. 6d. for 40 words. Special terms for series of more than six insertions can be ascertained on application to the Publisher.

Front-page Advertisements 2s. per line, and Paragraph Advertisements 1s. per line. No Front-page or Paragraph Advertisements inserted for less than 5s.

Advertisements for the current week must reach the office not later than 3 p.m. on Thursday. Front-page Advertisements and alterations in serial advertisements must reach the office by Tuesday morning to secure insertion.

SITUATIONS.

The charge for advertisements for "Situations Vacant" or "Situations Wanted" is ONE SHILLING for TWENTY-FOUR WORDS, and SIXPENCE for every eight words after. All Situation Advertisements must be prepaid.

NOTICE.

Bound copies of Vol. LXIX. are now ready, and should be ordered early (price Twelve Shillings each), as only a limited number are done up. A few bound volumes of Vols. XXXIX., XL., XLI., XLVI., XLIX., LI., LII., LIV., LVIII., LIX., LX., LXI., LXII., LXIII., LXIV., LXV., LXVI., LXVII., LXVIII. may still be had, price Twelve Shillings; all the other bound volumes are out of print. Most of the back numbers of former volumes are, however, to be had singly. Subscribers requiring any back numbers to complete volume just ended should order at once, as many of them soon run out of print.

U. I. O. (Two very wide questions, which it is impossible to answer satisfactorily. Your best plan is really to go to a good architect, and when he knows what your warehouse is, and the requirements of your business, he will advise. Or you might consult Messrs. E. H. Shorland and Bro., of Drake-street, Manchester, as regards the heating.)

ANXIOUS. (We have not the list. The policy of the R.I.B.A. for years past has been to discourage the publication of matter relative to its business in the professional journals.)

RECEIVED.—R. and T. S. Co.—J. Mansfield.—S. J. A.—Reg. Plumb.—M. and R.—J. B. and Co.

"BUILDING NEWS" DESIGNING CLUB.

THIRD LIST OF SUBJECTS.

C.—A Small Village School for Parochial Purposes.—The buildings to be erected in stone by the roadside on a site only sufficiently large to accommodate the premises, the playground being on the other side of the way. The frontage line to set back 15ft. from the boundary next public pathway. The district is a hilly one in a stone country, and the fall of the ground line is 1 in 14 from N. to S., the frontage facing west. The large school-room is to be of 900ft. super. in area, and two classrooms opening out of it 350ft. super. each. A lavatory and one w.c. for each sex, with separate cloakrooms, but only one main entrance to the school required. A residence for the mistress is to be attached, having small parlour, good kitchen, and two bedrooms, with suitable offices and back entrance or side-way. A bell-turret to be made a feature of in stone. Roofs covered with big stone slates. Plain dwarf wall to inclose front garden space. Scape 8ft. to the inch, but the plans may be smaller if desired. Two elevations, plans, one section and view. Time for sending in drawings for this subject not later than January 9, 1897.

AN ARCHITECT WHO OCCASIONALLY BUILDS ON SPEC. (Your suggestion as to the utility of small house property to pay really in no way militates against the country cottage residences which we published last week, seeing that our conditions did not limit the frontage to 21ft. for a rental of £60, or double frontage of 38ft. to secure £75 on 50ft. plots, the restrictions which you indicate. We already have remarked upon the financial considerations governing house property; but architectural students do not as a rule make the most successful speculative builders. Experience with this class of work can alone secure anything like the returns which you describe. Send up the plans you speak of, and we will do our best to illustrate them. Good, sound gilt-edged investments are always a desideratum.)

DRAWINGS RECEIVED.—"Rock," "Nut," "Don't Know," "Cameo," "Smiler," "Hayes."

Correspondence.

NEW CITY HALL, BELFAST.

To the Editor of the BUILDING NEWS.

SIR,—As one of the misled firms induced to enter this recent competition, we presume we are amongst the unselected who have endeavoured to strictly adhere to the conditions issued, the principal one to our mind being the "City Hall" proper, not only described as the name of the proposed building, but particularly shown on the lithographed plans supplied to competitors.

If this hall had not been required, why was the competition inaugurated under the title "New City Hall," instead of, say, "New Municipal Buildings"?

We note in your report upon the discussion of the assessor's award, that a member of the corporation endeavoured to evade the omission of the "City Hall" in the selected plans by stating the conditions were only suggestions; but we contend the particular clause referring to the Central Hall is more than a suggestion—it is practically a command, perhaps legally expressed in ambiguous terms, so that there is now left a loophole for escape.

We cannot blame the corporation entirely in this matter, and of course dare not suggest that the appointed assessors have failed in their duty to the competitors who have honestly tried to fulfil the conditions of the competition, but we do suggest there is blame attached somewhere.

We cannot understand, when the assessors found that a better plan could be obtained on the site by omitting the "City Hall," why the competitors were not apprised of the fact, or, if the discovery was not actually made until the plans were under review, why another competition was not inaugurated amongst the competitors who had adhered to the conditions of the present competition.

The strictly honest course, we take it, would be to pay an honorarium to each competitor for the labour already expended in the plans submitted. We know it is very little use wasting either your or your readers' time in airing a grievance that practically only appeals to those who have wasted considerable time and thought, and consider themselves most unfairly treated; but in a competition of such public importance, and when the assessors are so well known and highly respected throughout the profession, one at any rate "expects to have a run for his money."

—We are, &c.,

"CITY HALL," AND NOT "MUNICIPAL BUILDINGS."

HONOURS EXAMINATIONS IN BUILDING CONSTRUCTION.

SIR,—The letter from Mr. Harold Busbridge, which you print in your last issue, is one which is sure to attract considerable attention, and considerable sympathy also, especially from other teachers of building construction under South Kensington and their students. At the same time, is there not a very different side to the question? Is it not possible that the examiners may be right in doing that of which he complains, upon broad general lines to which individual interests must bow? Some years since it was little "honour" to hold an "Honours" certificate, it was so easily obtainable. Now by the very considerable raising of the standard it has been rendered honourable. It ought to be something difficult to get—only obtainable, in fact, by brilliant men exceptionally well instructed.

It is on this last point, however, that of the instruction, that difficulty arises, and when complaint, if any, is justifiable. Brilliant men there are in sufficient plenty; but how, under present regulations, are first-rate instructors (amongst whom Mr. Busbridge is well known) to be expected to conduct an "honours" class? It is a question of payment, and the system of payment by results is that which is at fault. If only five per cent. of the candidates pass, clearly a small class, such as alone can be mustered for "Honours" in any but the larger centres, can only be expected to bring one grant to the instructor in several years;—from a class of 20 students only one success can be expected per annum. How can this possibly pay for a minimum of 30 evenings spent in tuition of "Honours" standard? A comparatively indifferent master can conduct a large "Elementary" class at the same time, and passing a large proportion of his students, earn a

satisfactory grant, of a total many times more than that secured by the "Honours" master. Thus, the higher-rate master must either pocket his pride, and teach the "Elementary" and "Advanced" classes, in order to earn a living, teaching his "Honours" class for nothing; or he must abandon the whole thing to weaker men. As a result, he frequently adopts the latter course; but neither is satisfactory to the Honours student. An underpaid master cannot be expected to do his work well, and while, for honour's sake, many do their best, in time they naturally become disheartened, and give it up. The subject demands attention, alike in the interest of the students and for the credit of South Kensington.—I am, &c.,

G. A. T. MIDDLETON.

SIR,—Seeing Mr. H. Busbridge's letter in yours of the 4th, referring to the above, I take the liberty of saying a word or two on the matter.

Having passed through all the stages of "Subject iii.," and obtained a medal in 1879, and having been in touch with the subject ever since, at this school and elsewhere, and knowing personally numerous students during that time, any experience gained I am pleased to put to general service.

The subject becomes all the more interesting through the Society of Architects wisely recognising the certificate issued by the department in this subject as evidence in their new scheme for examination of candidates for membership.

Replying, more in detail, to the letter named, I would say, first, the knowledge required includes more or less—(i.) architecture, (ii.) construction, (iii.) elementary mathematics, (iv.) mechanics (including "graphics"), (v.) chemistry, (vi.) geology, together with (vii.) sanitation. Also the student must have had practice in specifications and (slightly) cost. All this involves facility in drawing, sketching, making and finishing-up sheets, writing clear and concise descriptions, and last, design of simple buildings. It is not to be wondered, therefore, that general success is not common, as obviously it needs an all-round man to be proficient in such an array of sciences, not to mention the arts. Probably the kind of man Vitruvius had in his mind.

Then, secondly, students taking the subject, I find, usually may be classed as (a) draughtsmen, (b) architects' pupils, (c) builders' clerks, (d) foremen, and (e) journeymen. Classes (a) and (b) are generally able to draw, but lack practice in the work; (d) and (e) are practical to a degree, but badly off in drawing and theory; whilst (c) class are generally good at items involving descriptions, cost, &c. Often classes (a) and (b) fail through over-confidence; (d) and (e), though earnest, are employed in such a way as is not conducive to best results in finer work and study.

Thirdly, students frequently do not give enough time to study and preparation, have not gone fully through the earlier stages, or are not sufficiently well grounded in the more elementary subjects to grasp the real and full meaning of the symbols and language employed. They often lack application, "have not had time" for working up; lack of experience in actual work is often noticeable, little "homework" is often done, and absence is another defect.

Then, as to the classes themselves: the time for teaching is too short, and it is impossible to go through the numerous divisions of the subject in six or seven months, unless only "cram" is attempted. Fewness of pupils is a bane, and scarcity of apparatus, diagrams, books of reference, samples, &c., is sometimes deplorable—in fact, it is sometimes a case of making bricks without clay in this respect! This tends to a superficial knowledge of a "paper" sort.

I cannot add more now, but may do so another time, and refer to suggestions for study. It must be borne in mind, too, that the examination is not everything—the real question being: Are the students any better off after the study of the subject?—I am, &c.,

A. R. F. TREW, M.S.A.

Government School of Science and Art,
Queen's-road, Bristol.

SIR,—An answer to Mr. Busbridge's questions would be very welcome to many teachers and students, and if forthcoming may help to mend matters a little; but I think a great many failures arise through students overrating their own powers. I know of cases in which students have sat for honours two years in succession before

having obtained an Advanced certificate. Again, many students attempt too many subjects at once, with the result that scarcely any of them are done well.

Probably, another cause of falling off may be found in the fact that part of the work has to be done at South Kensington, although, in my opinion, this was a wise alteration, as all candidates have now equal chances; whereas, when part of the work was done at home, the honest worker stood nowhere when compared with an unscrupulous competitor.

There is one point, however, which somewhat puzzles me. Sometimes a student who has had but little experience of building matters, and a limited amount of knowledge, gets a pass, whilst others who are certainly better prepared in every way utterly fail.—I am, &c., HAROLD.

LISKEARD CHURCH TOWER.

SIR,—As I see that plans are invited for a new tower to the above-named church, may I, for the benefit of any who might think of competing, be allowed to state a few facts as to the existing tower?

Early in the present year I was asked to inspect and report upon the old tower. I was astonished to learn that, owing to a certain sum of money being left for rebuilding the tower, which money, if not used in this way within a certain period, was to go to Truro Cathedral, some of the members of the committee—the majority it now proves to be—were desirous of destroying the existing tower, and replacing it by a brand-new structure. Needless to say that my report was entirely adverse to the unnecessary demolition. Many of your readers will probably know the old tower, and remember its Norman details and carving which still remain in such a good state of preservation.

They will also remember its shamefully neglected state; but, dilapidated as its walls, roof, and floors now are, they are perfectly restorable, and it will be a shame if this interesting and ancient architectural monument is sacrificed simply to satisfy the craving of a few local townsmen for something new.—I am, &c.,

Geo. H. FELLOWES PRYNNE.

6, Queen Anne's-gate, Westminster, S.W.

GARDEN DESIGN.

SIR,—I find the following paragraph in the beginning of Mr. F. Inigo Thomas's lecture, as reported in the BUILDING NEWS:—

"Fashions have come and gone in gardens as well as in everything else, and until lately for well-nigh a century it has been the fashion to dispense with a garden altogether. That is to say, the substitute that has usurped its place is what in a better period would have been called a wilderness."

There is not a county in England in which one could not readily see that this is a complete misstatement, the very opposite being the truth—viz., that the gardens of our own century are hard and formal to a degree which drives the artist out of them. It is also untrue to say that the garden of our own time is a wilderness; many of the primmest gardens were made in our own day, as at Crewe Hall, Whitley Court, Windsor, and Osborne, including Paxton's extravagances at the Crystal Palace, Sir Charles Barry's at Shrubland Park, and Nesfield's at South Kensington. The only "wilderness" to be seen in these places is one of stone out of place. The old houses had not anything of the kind; the walls about them having some relation to use and need, as at Rockingham, Haddon, Ightham Mote, Powis, Berkeley, and many others; whereas the modern stone garden is only a built drawing.—I am, &c., W. ROMSON.

The Garden Office.

A committee of the town council of Edinburgh have carried through negotiations with the Northern Edinburgh Tramways Company, for the purchase by the municipality of that undertaking, the agreed upon price being £115,000.

A Local Government Board inquiry was held on Tuesday in last week, by Mr. F. H. Tulloch, M.I.C.E., in the council chamber, Southampton, relative to the application of the corporation of that town for sanction to borrow £48,800 for works of sewerage, £1,676 for works of private street improvements, £1,350 for laying new water mains, and £379 for works of paving. Mr. W. B. G. Bennett, borough surveyor, explained the scheme and plans.

LEGAL INTELLIGENCE.

A FILEY ARBITRATION CASE.—At the Pavilion Hotel, Scarborough, on Saturday, arbitration proceedings were adjudicated upon by Mr. Edward Ridley, Q.C., in which John Jaram, builder, Scarborough, and Samuel Dyer, architect, Bridlington, claimed damages from the Filey Urban District Council for injury to certain property at Filey belonging to them, owing, as alleged, to the negligence of the council's surveyor and sanitary inspector, Richard J. Stephenson. Mr. Jaram about a year ago erected several houses on the Foreshore-road at Filey. In carrying out an improved system of drainage the council took up an old drain and laid a new one, without, complainants alleged, putting down a bed of concrete. The plaintiffs contended that damage to the houses, which consisted principally of cracks, had resulted from the council's work, and they replied that the faulty construction was responsible. Mr. Winn, architect, Leeds, and Mr. Charles Gott, architect, Bradford, gave evidence that the damage to the plaintiff's property was distinctly due to the relaying of the drain. Amongst the other witnesses for the defence, Mr. Stephenson was called. He said that he did not think that the work would affect the property. He had not been a surveyor prior to being appointed by the Filey Local Board 15 years ago. Mr. Chitty: What was your occupation before you were appointed surveyor? Witness: A gardener. The Arbitrator: And you are not even a builder? Witness: No. In reply to further questions, witness said that he had taken up drains before in much the same way, and the work had been all right. Mr. Chitty: Do you mean to say that you started to open a trench 2ft. 6in. from the wall, weighing perhaps 50 tons, and never made inquiries about the foundation?—Yes. The Arbitrator: It was a gross piece of negligence, then—that is all I can say. The Arbitrator, in giving judgment, commented upon the evidence of Mr. Stephenson, declaring that he could not believe a part of it. His judgment was for the plaintiffs for £259 8s. 6d. and costs, including £15, which he considered the council was liable for in respect of three months' rent of the property.

NARBOROUGH AND ENDERBY GRANITE QUARRIES COMPANY (LIMITED).—A winding-up order having been made against this company, the statutory meetings of creditors and contributories were held on Monday at the Board of Trade offices, Carey-street. Mr. W. J. Warley, assistant Official Receiver, presided. The chairman said that a statement of affairs has been submitted showing liabilities £15,103, of which £2,970 were unsecured. The total assets were estimated at £5,491; but these were wholly covered by the debenture bonds, and, as regards shareholders, there was a deficiency of £4,245. These accounts were not, however, quite accurate, and the amount of the unsecured liabilities was subject to increase. In the absence of a quorum of creditors the meeting was adjourned *pro forma*.

DRAIN OR SEWER.—APPLEYARD V. THE LAMBETH VESTRY.—In the Queen's Bench Division, Mr. Justice Hawkins has given judgment in this action, reported by us in our issue of the 20th ult., p. 757. The writ claimed against the defendants a mandamus commanding them, pursuant to sections 69, 71, and 72 of the Metropolitan Management Act, 1855, and other Acts hereafter referred to, to repair, cleanse, and maintain the pipes or sewers which carry the drainage of Nos. 85, 87, 89, and 91, York-road, Lambeth, from "the point at which the drainage of more than one house is received into such sewers up to the point of discharge into the main sewer in York-road." The endorsement also claims a declaration that such pipes or sewers are "sewers" within the meaning of the said Acts, and vested in the defendants. After reciting the facts and arguments which were published by us so recently, Mr. Justice Hawkins continued: It was common ground that the liability to repair or reconstruct depends upon the solution of the question whether the sewage conduit (to give it a neutral term) is at the present day a "drain" repairable by the private owner, or a "sewer" repairable by the vestry, under the provisions of the Metropolitan Management Acts, 1855 and 1862. It is agreed that, if the conduit in question is shown to be a "sewer" within the meaning of section 250 of the Act of 1855, the vestry is responsible for its repair, their liability to repair it having been imposed on them by sections 68 and 69 of the same Act. By section 68 it is enacted that all sewers vested in the Metropolitan Commissioners of Sewers shall become vested in the vestry of the parish, and, by section 69, the vestry are to repair and maintain the sewers so vested in them. That this (if a sewer) was vested in the Metropolitan Commissioners of Sewers under section 7 of the Metropolitan Commissioners of Sewers Act, 1848, was unquestioned. The 250th of the Act of 1855 very clearly defines what shall be deemed to be "sewers" and what "drains" for the purposes of that Act. The Act of 1862 (which by section 110 is to be read with the Act of 1855 as one Act) by section 112 extends this interpretation to "any drain for draining a group or block of houses by a

combined operation laid or constructed before the 1st of January, 1856, pursuant to the order or direction, or with the sanction or approval of the Metropolitan Commissioners of Sewers." There is no pretence for saying that the conduit in question is a drain used for the drainage of one building only, but it is a drain for draining a group or block of houses by a combined operation. I find that the conduit in question is a "sewer" repairable by the vestry. I do not think it necessary to discuss the cases cited to me—"Kershaw v. Taylor" (1895), "Vestry of St. Leonard's v. Phelan" (1896), and "Reg. v. St. Matthew, Bethnal-green" (1896)—for they confirm the view I have taken, and there is not a word to be found in either of them militating against that view. There was judgment for the plaintiff for the mandamus and declaration as prayed for, with costs.

COMPULSORY POWERS UNDER THE PUBLIC HEALTH ACT.—BRENCKLEY V. TWICKENHAM URBAN DISTRICT COUNCIL.—This case came before Mr. Justice Chitty in the Chancery Division last week. The Twickenham District Council, by the Local Government Board's Provisional Orders Confirmation (No. 2) Act, 1895, was empowered to put in force, with reference to the lands described in the schedule thereto for the purpose of constructing a new street in the council's district, the powers of the Lands Clauses Acts for the purchase and taking of lands. Amongst the scheduled lands was "part of a garden" belonging to the plaintiff. The council having served the plaintiff with the notice to treat for the part of her garden, she now moved to restrain the council from taking further proceedings under the Lands Clauses Acts on the ground that, by virtue of section 92 of the Lands Clauses Act, 1845, she could not be required to sell part only of her premises. It was contended by the council that section 176 of the Public Health Act, 1875, did not empower the local authority to put in force any of the compulsory powers of the Lands Clauses Acts other than the procedure powers contained in sections 16 to 68 of the Act of 1845, and that section 92 could, by virtue of sub-section 5 of section 176 of the Public Health Act, 1875, only be incorporated in the Confirmation Act by means of some express enactment to that effect to be found therein, or, in other words, that, unless the Act confirming the provisional order specified the provisions of section 92, the powers conferred were the absolute powers of sections 16 to 68, unmodified by section 92. Mr. Justice Chitty held that the provisional order confirmed by the subsequent Act of 1895 contained on its face no modification of the compulsory powers of the Act of 1845, and that the restriction of section 92 remained unaffected. The Act of 1895 removed certain fetters, but did not contain any incorporation of the powers of the Act of 1845. But even if there were any incorporation, the defendants were not right in saying that such powers stopped at section 68 and did not go on so far as 92, or began at section 16 and did not include prior sections. In the latter case, according to the defendants' view, local authorities would be in difficulties; for in the case of vendors under disability the local authorities would not be obtaining, by means of their Acts, the benefit of section 9 of the Act of 1845 and the procedure thereunder. The present procedure had been in force for a great number of years, and the present point was now heard of for the first time. He granted an injunction, but the defendants were not to be restrained from taking the whole of the premises.

ARBITRATION AT SHEPHERD'S BUSH.—At the London Sheriff's Court, on Friday, before Mr. Under-Sheriff Burchell and a special jury, the case of "Richardson v. the Central London Railway Company (Limited)," an action to recover the sum £16,000 as compensation for the compulsory acquirement of four acres of land at Wood-lane, Shepherd's Bush, by the railway company in connection with their line from the City to Shepherd's Bush came on for hearing. The claimants, Messrs. Alexander and Walter Richardson, were the freeholders of 16 acres of land at Shepherd's Bush. The Central London Railway Company had compulsorily acquired four acres of the land for the purposes of their Shepherd's Bush terminus and generating station, and Messrs. Richardson claimed as compensation £8,000 as the value of the land, and £8,000 as depreciation of the remaining 12 acres by reason of the nature of the works and premises to be constructed by the railway company. A number of expert witnesses were called in, and eventually the jury gave a verdict for £7,010.

HEAVY DAMAGES FOR OBSTRUCTION TO LIGHT.—J. SALTER AND CO. V. RICH.—In the Queen's Bench Division last week, Mr. Justice Wright and a common jury heard this case, in which the plaintiffs, provision merchants in Plumstead-road, Woolwich, claimed damages from the defendant, the owner of an adjoining public house, the Sussex Arms, for obstructing their light; they also claimed damages for injury to their premises by reason of the defendants knocking a hole through the wall, and also for the temporary removal of a water-closet. The defendant denied there was any material interference with the light. He denied

that there was any damage, and pleaded that the contractor he employed had no authority to knock a hole into the plaintiffs' premises. The plaintiffs, Messrs. Salter, had a lease of the premises until 1903 at £60 per annum. The defendant, the owner of the Sussex Arms public-house, was altering his premises. The plaintiffs had a sitting-room window which looked out on to a wall of the defendant's. Two side walls ran at right angles to this window. The wall, according to the plaintiff's case, about 7ft. high, and according to the defendant's case, 9ft. 3in. The window ledge was 3ft. from the ground, the glass of the window being 4ft. 4in. high by 2ft. 5in. wide. The wall was 17ft. 6in. away from the window. The wall was raised to a height of 14ft. 3in., and during the alterations the plaintiff's water-closet, which stood against the wall, was knocked down and taken away; at the end of five weeks another was put up in its place. A girder was put through a wall of the plaintiff's house, but on the learned Judge pointing out that the defendant, having employed a competent architect and builder, could not be held liable for this, this part of the claim was abandoned. The case had previously come on for trial before Mr. Justice Cave, when the jury could not agree upon all the issues, and hence the case was now tried again. Evidence was given on behalf of the plaintiff that the sitting-room was light before the wall was raised, but that afterwards the room was dark, and it was necessary to have artificial light in the daytime. On behalf of the defendant evidence was given that the wall being raised did not materially affect the light in the room, the angle of light being about 64°. The jury found a verdict for the plaintiff for £175, and, in answer to the learned Judge, they said they would give 1s. of that for the removal of the water-closet. Mr. McCall said money had been paid into Court in respect of that claim. He asked for a stay of execution, having regard to the amount of damages given. Mr. Justice Wright said the damages were large, but could not be considered perverse. A stay was granted, with a view to an appeal, on condition that £50 was paid to the plaintiff and the balance brought into Court.

BURNT SAWMILL REFUSE.—At Worship-street, on Friday, Mr. Cluer decided a point raised by a summons under the Public Health Act, 1891, the sanitary authority of St. Leonard, Shoreditch, prosecuting the proprietors of certain sawmills in the parish for carrying on the business so as to annoy the neighbourhood by the emission of smoke and charcoal. It was said that the mills were worked by burning the small wood and sawdust of the works in the furnace, and that a large amount of wood-ash and charcoal was emitted from the chimney, such stuff descending in showers on the premises for some distance around. Mr. Cluer said section 21 of the Act under which the complaint was laid referred to the carrying on of any business, process, or manufacture. The burning of improper stuff in the furnace was not a carrying on of any trade, business, process, or manufacture, and the remedy, if at all, lay by injunction, or at common law as a nuisance. He dismissed the summons with five guineas costs.

CHIPS.

The school board for Stapleton, near Bristol, adopted at their last meeting plans by Mr. A. Trew, M.S.A., of Broad-street, Bristol, for a caretaker's house and cookery-room to be added to the East-village School, at an estimated cost of £680.

The Salford Corporation, at a special meeting held on Tuesday, decided to apply for power in the next session of Parliament to enable them to construct and work a grain silo on the Salford Docks.

Aberdeen Town Council have accepted tenders for the erection of the new Corporation lodging-house, the cost of which will be between £10,000 and £11,000.

The directors of the Liverpool School of Art have appointed Mr. Frederick Vango Burridge, A.R.E., late of the Royal College of Art, South Kensington, to the head mastership of the School of Art, Mount-street, vacant by the resignation of Mr. John Finnie, who has held the position for upward of 41 years. The selection committee received applications from a large number of qualified candidates, a large majority of whom were already head masters of well-known schools of art throughout the United Kingdom. Three candidates—viz., Mr. F. V. Burridge, A.R.E., Mr. W. Shroeder, head master of Chester School of Art, and Mr. F. Shelley, head master of Plymouth School of Art, were eventually presented to the board of directors for a final selection, with the result above stated.

Milngavie new Free Church was opened on Tuesday. The church is on a simple rectangular plan, with a tower 43ft. high at the south-east corner, with a bell-chamber in the upper part. The style is Gothic of the Early Pointed Scottish character. The area is seated for 384, and the gallery for 92, being a total of 476. The estimated cost of the church and hall is about £3,000.

Our Office Table.

THE correspondence as to the proper course to be adopted to preserve the upper portion of Peterborough Cathedral west front has been continued in the *Times* during this week. Sir J. C. Robinson writes that he formed one of the deputation from the Society of Antiquaries appointed to confer with the Dean and Chapter of Peterborough on Friday last. The deputation was received with the utmost courtesy; the views of the society were explained by Sir Henry Howorth, and the reply of the Dean was, says Sir Charles, equally explicit. The discussion lasted upwards of an hour and a half, and the entire situation was made perfectly clear. It appeared that, acting, as the authorities were fully justified in doing, on the advice of the eminent architect to whom they had committed the undertaking, the order had been given to commence the work forthwith, and that probably one of the gables of the west front would have been immediately pulled down but for the action taken by the Society of Antiquaries. The deputation, two of the members being professional architects, before the meeting, had carefully examined the dislocated stonework of the gables, &c., on the scaffolding erected for the purpose of shoring up. "The evil," Sir J. C. Robinson continues, "which undoubtedly exists, is entirely an internal one, and there is practically no outward evidence of it whatever. The Peterborough west front is, in fact, to all outward appearance in the most admirable and perfect state of preservation, imitatively fair and beautiful, literally without a patch or a blemish. There cannot, then, be two opinions as to the desirability of keeping up this noble structure in its intact state, and it will be admitted that only on the most certain and convincing evidence, and after an exhaustive consideration of alternative remedies, should the melancholy conclusion be arrived at that reconstruction would be inevitable. On this point professional opinion is divided; doctors disagree, in fact. This being so, both sides should be publicly heard, and this is what the Society of Antiquaries is striving to bring about." Sir Charles suggests that as the matter is almost as much an engineering as an architectural problem, eminent members of the engineering profession might be induced to offer their advice in the matter. The conference ended with the understanding that no immediate irrevocable steps would be taken, and that a reasonable delay would be accorded.

ADDITIONS continue to be made to the collection at the National Portrait Gallery, and already the building is manifestly inadequate to house all the representations of distinguished personages that it would be desirable to bring together. The trustees have received from the sisters of the late Lord Leighton, P.R.A., the well-known portrait painted by him of Sir Richard Burton, the traveller and Orientalist. This portrait, which has been exhibited in Paris, Chicago, Melbourne, Stuttgart, and elsewhere, will, by desire of the donors, be included in the forthcoming exhibition of Lord Leighton's works at the Royal Academy, previous to its being incorporated in the National Collection. The trustees have also accepted as gifts a marble bust of Sir Henry Holland, M.D., by W. Theed, R.A.; a portrait of Chief Justice Sir John Bankes; a portrait of Sir Henry Hallford, M.D., painted by Sir William Beechey, R.A.; a portrait of John Curwen, founder of the "Tonic-Sol-Fa" system of teaching music in elementary schools, painted by W. Gush; a small portrait of Field-Marshal Sir William Maynard Gomm, G.C.B., in his uniform as Constable of the Tower of London, painted by James Bowles; and a miniature portrait of Arthur Penrhyn Stanley, D.D., Dean of Westminster. The trustees have also acquired by purchase a small portrait of Dr. James Bradley, Astronomer-Royal; a portrait, drawn in pencil in 1855, of David Cox, the landscape painter; a portrait, attributed to Kneller, of Sir Samuel Garth, physician and poet; and a large drawing representing a group of the leading men of science in 1807-8, assembled in the library of the Royal Institution. This group was imagined by Mr. William Walker, the well-known engraver. The arrangement of the figures was designed by Sir John Gilbert, R.A., and the figures themselves drawn by J. F. Skill and finished by Mr. Walker and his wife, who was an eminent miniature painter.

THE London County Council, at their meeting

on Tuesday, resolved, by 61 votes against 54, to introduce into Parliament, in the coming session, eight Bills for the purchase, by the Council, of the several undertakings of the various Metropolitan Water Companies. The consideration of the report of the Highways Committee, recommending the purchase by agreement of the tramways, depots, and granaries within the county of London of the North Metropolitan and London Street Tramways Companies for £675,000 was resumed, and, after a good deal of discussion and the rejection of hostile amendments from the Progressives, the recommendation was carried by 55 to 39 votes. On the recommendation of the General Purposes Committee, a special committee was appointed to inquire into the allegations made in the Council by Mr. John Burns against Mr. Walter Emden, in connection with the supply of artificial stone used in the erection of the wall round the Victoria Embankment storeyard, under the Charing Cross Railway Bridge.

A CONFERENCE was held at the County-hall, Spring-gardens, on Friday, between the General Purposes Committee of the London County Council and the representatives of various associations interested in the preservation of buildings of historic and architectural interest. Dr. W. J. Collins, the vice-chairman of the Council, presided. A resolution, moved by Sir Robert Hunter, the chairman of the National Trust for Places of Historic or Natural Beauty, seconded by Mr. A. Waterhouse, R.A., was carried, expressing the desirability of preparing a register of such buildings; and another resolution moved by Mr. Philip Norman, representing the Society of Antiquaries, and seconded by Mr. Hilton Price, F.S.A. suggesting that the County Council should form a committee to carry out the object in view, such committee to be advised by experts, was also carried.

THREE years ago the London County Council decided to purchase from the Government, under the Housing of the Working Classes Act, 1890, a portion of the site of the old Millbank Prison in Westminster. The extent of the portion, which is at the rear of the Tate Gallery, now in course of completion, is 8 acres 3 rods, 23 poles, and the price at the rate of £2,500 per acre, agreed upon between the Council and the Treasury, amounts to £22,242. The committee of the Council which has charge of the matter now reports that the agreement with the Treasury is nearly completed, and adds: "It is proposed that the roads shall be about 50ft. in width, with trees on each side, and that the broad avenue between the two building sites on the western portion of the whole site will be about 100ft. in width, with four rows of trees. Accommodation can be provided on the site for about 4,400 persons. Accommodation for 1,500 persons must be reserved for those to be displaced from the Clare-market, Strand, scheme, and as this scheme will become law at an early date, it is very desirable that the erection of dwellings should be proceeded with as soon as possible. The cost of the construction of the roads and sewers on the site (including the provision of trees) and of forming the two necessary approaches will probably amount to £30,000."

A LECTURE was delivered before the Midland Institute at Birmingham, on Monday evening, by Mr. Alfred Darbyshire, F.S.A., F.R.I.B.A., upon "Some English Cathedrals." The lecture was illustrated by a series of lantern slides, taken by Mr. M. B. Copland, an amateur photographer, of Preston. With their assistance the lecturer pointed out the features of several typical cathedrals, showing the several periods of Gothic architecture in England, and then exhibited, in less systematic style, the beauties of a number of other cathedrals in which the styles were to a large extent mingled. Durham, Salisbury, Lincoln, Canterbury, Exeter, and Wells Cathedrals received special attention. In conclusion, the lecturer dwelt upon the animating spirit of Gothic ecclesiastical work, and the individuality characterising the English examples of it, and said it was an inheritance of which we might well be proud.

THE large use of iron in building construction has called attention to the value of some anti-corrosive preservative. A few valuable papers have been read on the subject, but there is still uncertainty amongst the profession as to the best paint or varnish. The employment of iron or steel beams as grillages on piles in a damp soil, generally imbedded in concrete, for the foundations of high buildings, has naturally given rise

to some doubt. The porous nature of concrete is certainly not a guarantee of security for the iron so placed under water or soil. In situations such as these the iron must become affected if not properly protected with a paint or coating of some kind, and serious results are anticipated in some cases if the iron should become corroded to any extent. The New Yorkists and Chicagoians have cause for alarm, since so many of their finest buildings rest on iron beams.

THE engineer's and surveyor's annual report published by the Willesden District Council, is interesting as a record of suburban development. Mr. G. Claude Robson, M.Inst.C.E., the engineer, points out that the addition to the public highways of over two miles is represented by the dedication of twenty new streets made by the owners of property under section 150 of the Public Health Act. These new roads are all at least 40ft. in width. Mr. Robson recommends wood-paving to many of the roads which have a large amount of traffic, like Willesden-lane from High-road, Kilburn; Church-road, Craven-Park-road, Harrow-road, &c. For the pavements, York paving is recommended in lieu of the tar paving. The report refers to new sewers, the Willesden Sewerage Bill, which seeks to impose upon the ratepayers an annual rate, and in other ways affect the interest of the council of this district. The ventilation of the sewers is another subject that is alluded to. Upcast shafts have been erected, and many open surface grids in the roadways closed, and a list of the shafts are given. The report speaks of proposed amendments to by-laws relating to new streets and buildings, and the proposed new by-laws. Other questions referred to are lighting, incandescent lamps, refuse destructors, constant water supply, &c. The report shows the progress made in this large and growing district.

AN accident of a deplorable kind to a high-speed elevator in the American Tract Society Building in New York City, which took place lately, will naturally give rise to uneasiness as to the safety of these appliances. The elevator was one of six, and was designed to give a speed of 700ft. per minute, with a water pressure of 950lb. per square inch. As it was descending, the elevator became unmanageable at the tenth floor, and descended with great speed, throwing the passengers in a heap, dislocating the kneecaps of one of them, and bruising others. The cause of the accident was the breaking of one of the steel stud-bolts holding down the cover of a check-valve in a pipe. The water escaped; but the speed, it is said, was not great enough to bring the governor on the car into play, which would have checked the descent. The *Engineering Record* points out the desirability of an acting device to stop the car, independent of the clutches if they fail to act, which the attendant could control.

THE project for building a tunnel under the East River, from New York to Brooklyn, after going through many vicissitudes, has taken what appears to be its final shape, and work on it is to be commenced at once. The company which is to construct the tunnel represents mainly the surface lines of street cars. The tunnel will extend from the neighbourhood of the City Hall, in New York, to a point near the stores of the Brooklyn Warehouse Company, a distance of 4,700ft., so that passengers who now cross the river by the Fulton ferries can be transported across without leaving their cars. A contract has been made with Messrs. SooySmith and Co. for the whole of the construction, and it is sanguinely supposed by the promoters that the tunnel will be opened for traffic in about eight months.

THE thirtieth anniversary of Mr. Harry Hems' arrival at Exeter, whither he was sent to carve the stonework on the Albert Museum then in course of erection in Queen-street in that city, and of his finding of the lucky horseshoe in the road opposite the station, was celebrated in the customary hospitable fashion on Saturday night at the studios of Messrs. Harry Hems and Sons in Longbrook-street, Exeter. One of the large rooms was cleared for the occasion, decorated with banners, flags, and evergreens, and converted into a banqueting-hall, and Mr. Hems was supported in the chair by his staff, numbering nearly 100, and by visitors. Mr. Frank Dyer, sen., the chief craftsman, occupied the vice-chair for the twenty-eighth annual time, and was supported by Messrs. Greville Chester Hems and Harry Turner Hems, junior members of the

firm. After supper, the Rev. W. S. E. Bird unveiled a mural tablet lettered in gold: "In honoured and perpetual memory of Fellow Craftsmen of Harry Hems and Sons, who died in harness. Although passed from our midst, by no means forgotten." Here followed the names of Stephen Chute and John Churchill, foremen of statuary, and of three other workmen who had died while in the employ of the firm. The tablet, which is of black slate, is affixed to the end wall of the studio. During the evening toasts and songs were alternated with selections by the 1st Volunteer Band.

CHIPS.

Personal estate of the value of £55,027 6s. 10d. has been left by Alderman James Robert Creighton, of the Suabs, Carlisle, twice mayor of Carlisle, a director of the North British Railway and a partner in the firm of R. and J. R. Creighton (formerly Creighton and Son), cabinet-makers and timber merchants, Carlisle. He was a brother of the present Bishop of London.

The town council of Halifax have adopted a scheme prepared by the borough-engineer, for adapting the old infirmary buildings to serve as a police-station and courthouse.

At the half-yearly meeting of the Lancashire Federation of the Building Trade Employers held at the Central Hall, Acresfield, on Tuesday week, Mr. William Shepherd, of Rochdale, introduced a scheme of accident assurance. There was some opposition to it, and the matter was referred to the Federation executive.

Mr. C. S. Adye, M.S.A., of Devizes, the county surveyor for Wiltshire, was thrown from his trap on Thursday in last week while driving to Trowbridge, and sustained a broken collar-bone.

The erection of the new R.C. Cathedral, at Bendigo, Victoria, has just been commenced by the contractors, Messrs. Cockram and Sons. Mr. Jas. Blair, architect, has been appointed as inspector of works. Granite relieved with a lighter stone will be used for the structure.

In consequence of a heavy fall of chalk below the ancient wall of Rochester Castle, on the Esplanade, the city surveyor has been instructed to erect a rough rag-stone retaining wall on that side of the Castle grounds.

Under the supervision of H.M. Office of Works, operations have just been commenced in adding a story to the India Office, so as to increase the storage accommodation for the Library and Records Department.

An inquest was held at Manchester, on Friday, on the body of James Francis Thompson, a joiner. Thompson was employed by Messrs. G. Hill and Co., electrical engineers, and on Monday was engaged with other men at the premises of Messrs. W. C. Jones, waste manufacturers, putting electric wires in the premises. They were standing on a scaffold to lay the wires along the ceiling. The shafting of some machinery, which was in motion, was near the plank on which they stood. One of the workmen saw some of the casing of the wires falling, and, on looking round, saw the deceased revolving round with the shafting, the wire tying him on to it. The machinery was stopped as speedily as possible, but when released Thompson was dead, both arms having been wrenched off. The jury found a verdict of "Accidental death."

The work of filling the panels at the Royal Exchange with frescoes by distinguished artists is making progress. The corporation of London have given Mr. Seymour Lucas, A.R.A., a commission to fill one, and the Merchant Taylors' and Skinners' Companies have selected Mr. E. A. Abbey, A.R.A., to supply their gift.

With reference to the Leighton House project, Mr. Alfred Waterhouse, R.A., has given a cheque for £100 towards a fund for repurchasing the sketches which were lately sold, in order that they may, if possible, once more occupy their former resting-place.

At the Guildhall Art Gallery this week there has been placed on view until the end of February a selection of about one hundred water-colour drawings of the principal masters of the Early English school. These interesting works have been lent to the library committee by Sir J. C. Robinson. They include some excellent examples from the time of Alexander Cozens in the middle of the last century down to Muller and Mulready, and some thirty-six masters are represented.

As a consequence of their recent visit to a number of the principal American cities, and an inspection of the various systems of tramway traction in use there, the general manager and engineer of Glasgow Corporation tramways recommend that the line from Mitchell-street to Springburn be immediately equipped for overhead electric traction.

MEETINGS FOR THE ENSUING WEEK.

SATURDAY (TO-MORROW).—Polytechnic School of Architecture, Regent-street, W. Visit to the New Birkbeck Bank, Southampton-buildings, W.C. 2.30 p.m.

MONDAY.—Royal Institute of British Architects. "Reports on the second series of Experiments on Brickwork conducted by the Science Standing Committee," by William C. Street and Max. Clarke; "Reports on Lime, Cement, and Bricks used in the Experiments," by Professor W. C. Unwin, F.R.S.; and "The Relationship between Form and Strength," by Professor W. C. Unwin, F.R.S. 8 p.m.

Leeds and Yorkshire Architectural Society. "Architectural Education, and a School of Architecture," by Professor F. M. Simpson, M.A., of Liverpool. 7.30 p.m.

TUESDAY.—Institution of Civil Engineers. Discussion on "Tipping and Screening Coal," and "The Surface Plant at Kirkby Colliery." 8 p.m.

WEDNESDAY.—St. Paul's Ecclesiastical Society. "Ecclesiastical Habit," by the Rev. T. A. Lacey. 7.30 p.m.

Carpenters' Hall, London Wall, E.C. "Setting Out Works," by James Bartlett, demonstrator at King's College, London. 8 p.m.

Society of Arts. "The Chamber Music of Purcell, Handel, and Bach," by Arnold Dolmetsch. 8 p.m.

THURSDAY.—Society of Architects. Discussion on (a) "The Arguments for and against the Registration of Architects," and (b) "The Advantages and Disadvantages to Country Architects of Belonging to a London Society." St. James's Hall, Piccadilly. 8 p.m.

Dundee Institute of Architecture. "A Gothic Renaissance," by Alex. McGibbon, A.R.I.B.A., of Glasgow. 8 p.m.

FRIDAY.—Architectural Association. "A Plea for the Application of Natural Forms as Revealed by the Microscope," by W. H. Seth-Smith, F.R.I.B.A. 7.30 p.m.

The Society of Architects.

Founded 1884. Incorporated 1893.

The SECOND ORDINARY MEETING of the Society of Architects for the Session 1896-97, will be held at the Rooms of the Society, at St. James's Hall, Piccadilly, W., on THURSDAY, DECEMBER 11th, 1896, at Eight p.m. A DISCUSSION will take place on the following Questions:—

- (1) THE ARGUMENTS FOR AND AGAINST THE REGISTRATION OF ARCHITECTS.
- (2) THE ADVANTAGES AND DISADVANTAGES TO COUNTRY ARCHITECTS OF BELONGING TO A LONDON SOCIETY.

At this meeting smoking will be permitted.
ELLIS MAIRLAND, Hon. Sec.
MONTAGU BALDWIN, M.A., Sec.

The Edinburgh Water Trust have adopted a plan and report by their engineer for providing a better supply of water for Newhaven and the Trinity district, by laying a 12in. main and a 10in. main to feed the other pipes in the district, the supply at present being inadequate for the wants of the inhabitants. The estimated cost will be about £3,600.

On Saturday the Bishop of Marlborough opened a new mission hall for Old St. Pancras. The building, approached by a new pathway from College-place, stands at the back of 26, Crowndale-road, and has been erected from designs by Mr. C. R. Baker King, of Spring-gardens. It consists of a room, 50ft. by 28ft., capable of being divided by a movable partition into two smaller rooms, with a recessed platform at one end, a committee-room being provided on one side of the platform, and a storeroom on the other.

The Fire Brigade Sub-committee of the Birmingham Corporation has recommended plans for the extension of the fire station in the Upper Priory. The additions include three offices on the ground floor, two of which would be used by the superintendent and engineers, and the third would be set apart as a general office. The first, second, third, and fourth floors would be officers' quarters in the form of flats, and each flat would be provided with a suite of rooms, so that they would be self-contained. The accommodation would comprise a living-room, scullery, three bedrooms, and bathroom. The basement would be utilised as a coal-cellar and storerooms. The building would be fireproof, and the estimated cost is £2,300.

As the result of a conference of riparian local governing authorities, the Thames (Western) Improvement Committee, the organisation which has been formed to promote the agitation for the construction of a new lock upon the River Thames below Richmond, has decided to obtain from an expert a comprehensive report upon the present condition of the river, and the steps which should be taken to effect an improvement. A survey of the lower reaches of the river will be necessary to the formulation of the report, and the cost will be about £500.

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MISTAKEN IDEALS AND QUALIFICATIONS.

SOMEWHERE, in one of his mines of inexhaustible wealth of thought and parable, Mr. Ruskin describes certain people who impede and encumber the ground. He describes some as of the nature of stones, who fall on other people and crush them; some of the nature of weeds, which twist about other people's feet and entangle them. More, he says, are like logs lying in the way, so that others fall over them, or thorns choking the good seed by the wayside. The parable may very well be taken to illustrate the effect of certain modern ideals which just now obtain a hold in regard to the architect's qualifications. We have a certain class of teachers who would detach from their true meaning and intention such subjects as construction, technical knowledge, and art, and who are thereby actually crushing, entangling, or stifling the true follower or disciple of architecture. None of those whom Ruskin describes are "doers": they are generally talkers, theorists, and faddists; it is rather their nature to crush, impede, or stifle the good or honest intentions of other people. One sets up a standard of constructive science for the student which is far too subtle and fine-strung to be of any practical use to the architect or engineer; another dogmatizes on art as if it were something quite distinct from building or workmanship—a something too refined to be grasped by anybody but the idealist; a third digs out some archaeological idea or some cult for emulation. These are the sort of teachers who act like "stones"—fall on and crush out any honest intention of the real student, or their opinions, like "logs," lie in his way. We have plenty of these exponents of architecture and art who only propound partial views—well-intentioned, no doubt, but whose influence has been rather obstructive, and has hampered the student in his professional studies.

Construction, of course, is one of the important qualifications of the architect—if, indeed, we can speak of the art of architecture as something that is different from outside construction. Is it not rather the art of expressing construction? In one building bare construction is paramount; in another it is subject to motive; but to talk of a skilful piece of construction as if it had nothing to do with architecture, is as absurd as to deny that the structure of sentences has nothing to do with good prose composition. While it is true that every piece of construction is not architecture, we can confidently affirm that there is no architecture without constructive skill. And yet there are many misconceptions on the subject. There are those who represent constructive genius as the power of accomplishing some *tour de force*—a sort of talent for acrobatic feats of all kinds, like erecting Eiffel towers, vaulting vast spans, poisoning lanterns in mid-air. The great constructor, say they, is one who can do very wonderful engineering feats: erecting leviathan buildings of great height on a platform of iron and concrete; lifting great masses of granite or stone to prodigious heights in building. But this conception of the constructive genius is far from being the highest. It may display mechanical dexterity, but is not the sort of constructive excellence which has given us our finest buildings or our most successful engineering structures. The constructive equilibrist or gymnast is interesting to the

reader of popular exploits; but he is by no means the safest to follow. The sort of mind which revels in such works as the aerial lantern at Newcastle, the octagon lantern at Ely, or the fan vaulting and pendentives of Henry VII's Chapel, is not always the readiest to understand architectural construction. Admirably clever and beautiful some of these works are, especially when they exhibit an honest intention to accomplish any structural requirement, as that of covering with one octagon vault the crossing of nave and aisles, as at Ely, or to carry out a problem in stone vaulting like that which the builders of the "Chapel of Nine Altars" did at Durham. But when the ingenuity is expended for no such purpose, but simply for the display of *tour de force*, the effort defeats itself.

There is another class of mind which looks upon constructive skill as a kind of athletics. Their idea of construction as a qualification consists in being able to calculate with precision the stresses on the members of a roof-truss, or to make the "stress diagrams" of iron roofs; to show the mathematical process of estimating the thrust of an arch or the stability of a retaining wall; to answer expertly examination papers on such subjects. Expertness in these things is very creditable, but no more indicates constructive genius than skill in arithmetic or algebra will make an engineer, or expertness in mixing pigments will make a painter. They are merely the processes to obtain certain results, but do not in the least help to solve the problem. Algebraic equations enable us, when we have found a weight or a force, to proportion the materials of our structure—to meet it; it enables us to discover the equilibrated structure; but it gives us no idea as to what is the best design, or how the material can be best arranged as a whole. These must first be conceived by the designer's mind. Again, the architect or engineer makes his stress diagram for his roof after he has sketched out the truss he intends to adopt. The diagram only affects the details of the members. Skilful construction depends, in fact, on many things: on a knowledge of the materials, how they are to be used, the proportions of the parts to each other; and all these things depend in turn on the larger conception of form and plan for the object desired. The mind intuitively must grasp the subject in all these steps in inverse order, beginning with the conditions of the problem. The constructive genius must in turn grasp chemistry, physics, geometry, conceive the whole in the crucible of his mind, before he begins to avail himself of any analysis or process, which are only instruments in his hands.

Then there is the narrow practical man's view of construction, which means the choice of good from bad materials—Swedish from Baltic timber; the selection of the best beds of stone, how to select limes and cements, knowledge of the building trades, and so on—a view of constructive skill which, however excellent, narrows construction to technical qualities and methods. This is the builder's and workman's ideal. Much as it involves of construction, it fails to realise the fundamental conception of arrangement and design. It would hardly be fair to say that an architect who could not distinguish one kind of limestone from another, or even Swedish from Baltic timber, failed in constructive skill; or that because he did not understand a certain trade properly, he was deficient in construction. No doubt it would be better for him to understand these details; but it would no more militate against his genius as a constructor than ignorance of a particular Act of Parliament would prove incompetence in law. We are not of those who think that it is desirable that every young architect should have himself worked at the bench, be able to make a door or a sash window, or even

be an expert at handling tools. Such skill in craftsmanship may be useful; but it is not necessary to make a man competent to judge between good and bad work. That is a faculty which demands a wider view of things than being able to detect an error in details of execution. And an architect should be also an engineer in a certain sense; he ought to be able to judge of questions which more specially come under the engineer's care—problems of iron construction, foundations in treacherous soil, modes of shoring and mechanical appliances of one sort or another. At least, he should be able to control and direct such work; but it is not necessary that he should go through all the branches of mechanical engineering. There must be uppermost in his mind a sense of proportion, so that the essential principles of his own art should not be ignored and lost sight of. Each particular way of looking at construction which we have mentioned is to be deprecated, if one would obtain a true view of what construction means to the architect. In these days there is a tendency to take up one or the other of these isolated views, to become meddlers in this or that science—bits of engineers, bits of experts in the strength of materials, chemists, sanitary science; and many of the examinations of the Science and Art Department, and of other technical schools, are framed upon this principle of learning all that can be taught by specialists in these different matters, but who do not care to find out what the architect mainly requires. This unharmonised, unrelated knowledge, may be beneficial; it is disciplinary to the mind, but it is not the material from which great constructors or architects spring. We have all seen over and over again how many men who have won the highest places in the University, or are expert scholars and mathematicians, are unable to accomplish any great artistic, literary, or scientific work. They remain experts or scholars, but they lack the constructive power of creating or organising. So with theorists of construction, experts in materials and mathematical analysis: they can write excellent textbooks on the mechanics of building construction and the elements of science, but are still incapable of making a design for even an ordinary building. They are people of the nature of Ruskin's "stones" or "weeds": they crush or entangle. The formidable nature of their treatises really deters the student from a profitable study, or they throw doubts and difficulties in the way.

A great deal of trash has been talked about art—the artistic side of the profession—as if it was possible to make an architect artistic by teaching him certain things. These teachers appear to have the impression that art can be supplied by so many courses of lectures and books—useful, no doubt, in classifying facts and methodising, but no good at all if there is no instinctive desire on the part of the student to do what is natural and honest. We can never believe that mere looking at fine buildings or pictures inspires anyone with the artistic faculty; that contemplating great buildings like the Parthenon or Salisbury Cathedral can inspire anyone to do great things, any more than to learn a catechism, or a formulary can make a man religious. In both cases the desire, or the want, or the experience, has always been precedent; the want or the structural necessity was first felt and afterwards defined, formulated, or expressed, either in the shape of style or dogma. People nowadays run away with the idea that everything can be learned at once from treatises, grammars, and catechisms. They do not see that these formal statements or elements have been the result and outcome of a vast experience, that to learn how to understand a principle or a rule it becomes necessary to go back to the motives of the original designers and constructors. So it is with what is called art

instruction. Most of the art schools and the books which are placed in the hands of the young architect teach an art that has nothing to do with practical experience, as if it was something that had fallen from the clouds—to be learned like arithmetic or grammar. Styles and ornament have been taught in this way, so has stained glass, ornamental iron-work decoration, sculpture, carving, &c. No doubt there is a considerable educative value in examples of good work; but they have the tendency of weakening restraint and reserve, of encouraging a reliance on precedents. Even of the value of plans of well-considered buildings there is a doubt. The plan of an executed building is really the outcome of special circumstances, and its educative value is limited. Its principal use to the architect, if it is good, is to show how the author has thought out a particular problem; but it can never supply the real motive. And it is the same in all details of building: they may only be results of accident. The young architect ought to trace back the result to the cause before he can find out whether he can safely accept the conclusions of the author. The very first essential of architecture is to realise the motive in each special case; not to borrow others' plumes, or to take for granted another's interpretation.

STUDENTS' WORK AT THE ROYAL ACADEMY.

THE architectural work at the Royal Academy Schools, judging by the exceedingly indifferent display of drawings exhibited last Friday at Burlington House, is at its lowest ebb, and no matter what the theories and much-talked-of schemes for efficient architectural teaching, propounded for years past by the master under whose supervision those classes are conducted, may be as an ideal academical method, it is perfectly clear that the results are about as poor as they can very well become—so poor indeed that the Royal Academy Travelling Studentship for Architecture found no worthy competitor, and therefore is not awarded. Only two excessively inconsequential designs were submitted, the subject being "A Club of Arts and Letters." The measured drawings in competition for the Silver Medal, illustrative of Waterloo Bridge, are also most indifferent, and the competitive perspective drawings "an Interior of St. Stephen's, Walbrook," are only a trifle more worthy of the occasion. As to the designs exhibited from the students' class work in the Upper and Lower Architectural Schools, we are bound to say that, with few exceptions, they cannot be compared for merit with the work of our "Designing Club," sent from all parts of the country by students who have no Royal Academy advantages, and no personal direction such as Burlington House students are supposed to enjoy. Mr. John Anderson's pencil elevation for a campanile, for which he obtains the Upper School prize of £25, is certainly a creditable performance, though the execution of the drawing is slight and unfinished. The country house by Mr. Archibald Haswell Christie, winning a £10 prize in the Lower School, is quiet and unpretentious—qualities always worthy of recognition, even though, as in this case, the designer fails in matters of detail. The President, in his address, spoke of the "unmistakable evidence that, successful or not, the students had been putting their best strength into their studies." We recognise the reasonableness of the major part of his first Presidential address being appropriately occupied as it was with a suitable reference to his predecessors in office; but Sir Edward Poynter has had so intimate and life-long a personal connection with the teaching of his art, that it is the more unaccountable he should thus gloss over the inadequate character and

indifferent merit of much of the students' work on which he so lightly lavished such undeserved praise, unmerited not by reason of lack in endeavour on the part of the students themselves so much, as because of their failure for want of proper teaching, and the consequent paucity of capable students. The evidence of this being the case, moreover, is not confined to the Architectural department, and the "no competition" recorded for both the silver medals in the Sculptor's group, and the withholding of the silver medal for Composition in Ornament, shows unmistakably the justice of these remarks. Sir Edward Poynter said, with a covering grace: "Criticism, I may remind you, is easy. To do, to produce, and to create—those are the difficult things in life. We can all criticise, and we all do criticise, each other." While fully recognising the value of these remarks, so far as they apply, we have no desire to emulate the carping pretence of that facile cant which the President so much abhors and descanted upon as the envious criticisms inspired by the baser sort of journalism. But, notwithstanding all this, exclusive privileges carry with them peculiar responsibilities, and when a great institution like the Royal Academy of Arts so entirely fails in its manifest obligations to architectural art as the present state of its schools and the lack of merit in its students' work displays, it is high time that something should be done to rectify such a condition of things. Here is the chance then for Mr. Norman Shaw and Mr. T. G. Jackson to step in with a combined energy and liberal minded recognition of the need of improvement. While the failure of the R.I.B.A. and the deficiencies of the A.A. methods have afforded a reason for these two joint authors of "Architecture: a Profession or an Art?" to write a book, now is the time, and the Royal Academy furnishes the opportunity, for putting into practice the more comprehensive and artistic scheme of teaching which they have united in advocating. They have "criticised," as the President says; but to continue his parable, the thing for them now to speedily undertake is "to create and produce" a more worthy school of architecture in their own Alma Mater, the Royal Academy. They can have the full advantage of their own Professor of Architecture, Mr. George Aitchison, A.R.A., who is the President of the R.I.B.A. Thus can forces be combined. Mr. Jackson, in the above-mentioned volume, admits "the Academy School of Architecture is at present wholly inadequate; but if it were put on the same footing as those of Painting and Sculpture, as we hope it may be before long, with a staff of teachers and a system of visitors; and if the architectural students were brought into contact with those of the other arts, an excellent result might be looked for." The same writer taunts the Institute, saying that there "reform is hopeless: too many interests are involved in keeping things as they are, and its self-reform would amount to self-destruction." *Et tu, Brute!* Let the writer of this statement demonstrate that this shall no longer equally apply to the Royal Academy of Arts. At present the Institute shows far better students' work than that seen at Burlington House. The following is the list of awards and non-awards for the year at the Royal Academy:

Landscape painting, a farm, Creswick prize (£30), Edward Francis Welch. Painting of a figure from the life (open to male students only), silver medal—1st, John Young Hunter; 2nd, Francis Owen Salisbury. Painting of a head from the life, silver medal—1st, John Shenton Eland; 2nd, Owen Baxter Morgan. Painting of a draped figure (open to female students only), silver medal—1st, Mary Towgood; 2nd, not awarded. Cartoon of a draped figure, a Roman Empress, silver medal and prize (£25), Francis Owen Salisbury. Design in monochrome for a figure picture, Adam and Eve driven out of the Garden of Eden, Armitage prizes—1st, £30 and bronze medal, Allan Douglas Davidson; 2nd (£10), Maud Marian Wear. Design for the decoration of a portion of a public building, winter, prize (£40), Rose Livesay. Set of six drawings of a figure from the life (open to male students only)

—1st prize, £50 and silver medal, not awarded; 2nd prize (£25), Percy William Gibbs; 3rd (£15), Morris Bernstein; 4th (£10), Francis Owen Salisbury. Drawing of a head from the life, silver medal—1st, Thomas Butler Stoney; 2nd, Edmund Lawrence Van Someren. Drawing of a statue or group, silver medal—1st, Aaron Wolmark; 2nd, not awarded. Perspective drawing in outline (open to painters and sculptors only), an interior view of the entrance portico of the Royal Academy, looking east, silver medal—no competition. Model of a design, charity, 1st prize (£30), Alfred Turner; 2nd prize (£10), Alfred Bertie Pegram (disqualified owing to having received the same prize before). Set of three models of a figure from the life (open to male students only), 1st prize (£50) and silver medal, Charles Beacon; 2nd prize (£20), Alfred Turner. Model of a bust from the life (open to female students only), silver medal—1st, not awarded; 2nd, not awarded. Model of a design containing figure and ornament, Neptune and Tritons, silver medal Alfred Bertie Pegram. Model of a statue or group, silver medals (1st and 2nd), no competition. Design in architecture, a club of arts and letters, travelling studentship (£60), not awarded. Set of architectural drawings, Waterloo Bridge, silver medal—1st, Horace Charles Hide, 2nd, Francis Hatch. Set of architectural designs (upper school), prize (£25), John Anderson. Set of drawings of an architectural design (lower school), prize (£10), Archibald Haswell Christie. Plan of a building, a concert-room to hold 2,000 people, prize £10, George Weald. Original composition in ornament, silver medal—no competition. Perspective drawing in outline (open to architects only), an interior view of St. Stephen's, Walbrook, silver medal, Lionel Newman Barrett. A Landseer scholarship in painting, of £10 a year, tenable for two years, has been awarded to Morris Bernstein. The second Landseer scholarship in painting, and both Landseer scholarships in sculpture, were not awarded.

ADAPTABLE SPECIFICATIONS.—XXII.*

PAINTERS' WORK: FACTS AND MEMORANDA.

PAINTING ON OLD WALL-PLASTER.—Before doing this the plaster should be repaired and cleaned down with a weak solution of ordinary washing soda in water. This is far better and healthier than preserving the dirt of years (as is frequently done) by clearcoating it as a ground for the paint. The first coat, after the wall has been cleaned, may be made up with two parts of turpentine to one of linseed oil. If the work is going to be flatted the next colour may be of oil colour alone, and the third one will then be the flattening coat, made up with nothing but turpentine. Old walls, when repainted, can seldom be properly finished with fewer than three coats, while new ones require five or even six. It is an axiom with painters that one flattening coat over another never makes a good job. A flattening coat should always be put on over a "gloss" or oil coat, and conversely, a "gloss" coat should be put on over one which has been made up with a good deal of turpentine.

Painting on Keene's and Similar Cements.—Where these cements have been trowelled smooth, paint made up chiefly or wholly with linseed oil will not sink into them. It remains on the surface, and forms a skin which can easily be rubbed off. The first coat, therefore, on these hard even surfaces, should consist of equal parts of turpentine and linseed oil, with about 5lb. of white-lead to a pint of the liquid. The second coat should have two parts of oil to one of turpentine, and the next one two parts of turpentine to one of oil. These remarks do not apply to Portland cement, which, in painting, may be treated like ordinary wall-plaster.

Painting on Iron.—All rust should first be removed, either by brushing or scraping. Where lead paints are used, pure red-lead in oil as a first coat has the reputation of being the most effectual protection. On this other coats may be laid, finishing the work to any colour that is desired. In painting on zinc there is some difficulty in making the paint adhere properly. To assist it in doing so it has been recommended to daub over the metal previously with a mixture of one part of chloride of copper, one part of nitrate of copper, one part of sal-ammoniac, and one part of hydrochloric acid, diluted with 64 parts of soft water.

Painting on canvas should be preceded by a good coat of glue size, as oil paint without it soon destroys this material. The same preparation is desirable before painting on paper. **Blackening stoves** is commonly done with a coat of Brunswick black, but sometimes also with asphaltum mixed with turpentine and a little linseed oil.

Graining on new woodwork requires four or five coats of paint as a preparation, the last coat being thinned with equal parts of oil and turpentine, and being coloured nearly to the ground tint required. On this transparent washes of burnt sienna, Vandyke brown, and similar pigments are applied, and these are frequently water-colours,

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not oil, and are rubbed up with small beer. For oak graining, however, it is usual to mix the colour with turpentine and a little varnish, and then, before it dries, to "comb" it in imitation of wood, with flat brushes moistened with oil or turpentine. After this the graining can be carried further, by water-colour tints laid on the "combing" when it has dried. The work is finished with two coats of copal varnish.

Quantities of Material required in Oil Painting.

—Those vary much, according to the nature of the surface to be painted on. A gallon of paint is said to cover from 450 to 650 superficial feet of wood. On plaster it does not go so far. Each coat, especially on woodwork, usually covers a larger surface with the same quantity of paint than the previous one did. Thus the same quantity, which in a first coat will cover 560ft. super. will cover 900ft. as a second coat, and more than 1,000ft. as a third coat. Old and thick oil, though it dries better, does not go so far as a newer and thinner kind. It is usual to reckon that 1lb. of putty is enough to stop from 200ft. to 250ft. super. of woodwork. One pint of copal varnish will cover about 140ft. super. as a single coat. One pound of knotting is sufficient on the average for 1,300ft. super. of new woodwork. A common, practical rule is to estimate that 1lb. of paint will cover four superficial yards or 36ft. as a first coat, and six yards or 54ft. in any subsequent coat.

4. *Varnishes*.—Varnish is a solution of some kind of gum or resin in a liquid which will either evaporate and leave it behind, as, for instance, alcohol will do, or which will combine with it, and by absorbing oxygen from the air will form—as, for instance, linseed oil does—a hard skin. Copal, kauri, mastic, dammar, sandarach, and lac are the principal resins used in varnishes for the builder's and cabinetmaker's purposes. Copal differs from most of the others by being nearly insoluble in alcohol and volatile oils. When melted, however, it will mix with linseed oil, and in this way is made into a varnish. There are several kinds of copal, that from Sierra Leone having the highest reputation. It exudes naturally from the bark of a tree in soft, white drops, but is frequently not collected by the natives till it has fallen and become imbedded in the soil. It differs greatly, therefore in quality, according to the treatment it has undergone, and the amount of dirt which has become mixed with it. The best copal is expensive, and the varnish is commonly adulterated with gum kauri—a New Zealand product, which is far more plentiful. *Kauri varnish*, in fact, is frequently passed off as copal, and, though seldom heard of, is said to be used to a larger extent than all other varnishes put together.

The more expensive qualities of copal varnish are made, or are supposed to be made, from the best and purest specimens of that gum. The darker samples of it, when unadulterated, make useful dark varnishes for common purposes, and are sold under the names of "mahogany varnish," "oak varnish," &c. *Gum animi* affords a superior, though expensive, kind of varnish. *Gum mastic*, when made into varnish by dissolving it in turpentine at a moderate heat, is chiefly used for protecting maps and drawings. It is also an ingredient in the original French polish. *White lac*, which is simply shell-lac with most of its colouring matter removed, dissolves slowly in spirits of wine, and affords a hard, clear varnish. A softer varnish may be made from *gum sandarach* by dissolving it in four times its weight of alcohol, and adding a small quantity of Venice turpentine.

Copal varnish is the best for nearly all purposes connected with building. To obtain it pure, the safest plan is to obtain it from some particular maker who has a high reputation to preserve. Oil varnishes, like copal, greatly improve by being kept in stock. When good they work smoothly and evenly, and are free from particles or specks of undissolved gum. Inferior oil varnishes are full of such specks, they coat the work unevenly, and are apt to dry in patches—some parts bright and other parts dull. They soon lose their gloss, becoming whitish and semi-transparent, and often wrinkle up here and there. The very best varnish, however, needs to be properly put on. The brushes must be perfectly clean, and free from dry particles at the roots of the bristles. If any of these are left they soon work down among the varnish as the painter proceeds, and leave the whole surface rough and specky. Varnish should be put on freely, and crossed and re-crossed, till, by beginning to set,

it ceases to run. Varnishing should, as far as possible, be done on fine, warm days, and not when the air is saturated with moisture. Currents of cold air also interfere with the proper drying of a varnished surface. Quick-drying oil varnishes, being made up with mineral "dryers," are liable to crack. Really good oil varnish takes from 20 to 48 hours to dry, and is at last quite as hard as, and much more durable than, the "quick-drying" kinds. The "blooming" of varnish is the appearance on a varnished surface of a film or bloom which disfigures it. Damp and careless workmanship may produce it, but it is sometimes troublesome when neither of these causes can have affected it. It is not peculiar to cheap and inferior varnish, but affects even the best qualities. The most effectual remedy when varnish has "bloomed" is to cut it down and polish it. The following, however, has been recommended as a cheaper way of dealing with it: "First wash with a weak solution of white soap in water, and clean off well with pure water; then make up a 'cotton boss,' that is, a piece of silk inclosing a ball of cotton wool about 3in. in diameter, and with this 'boss' rub pure linseed oil well over the work, not sparing labour in rubbing. Clean the oil well off with soft cotton cloths, and rub up to a polish with an old silk handkerchief, taking care not to scratch. The motion of the hand should be in a circular direction, and not up and down or across."

Cure of Paint and Varnish Brushes.—If the brushes are carelessly put away when work is over, and not thoroughly cleaned before it begins again, no caution in selecting materials will be of much avail. "A good workman will have his brushes clean in the handle, and free from paint on the stock and the bridding, and will take care that the paint is well scraped away from the roots of the hair before the brush is put away for the time." If placed in water after the day's work, they should dip into it far enough to cover the bristles, that particles of dry paint may not form amongst them, and then mix up with the paint when the brush is used again, so as to produce a rough and "nitty" surface. This applies only to paint-brushes. Varnish brushes should never be put into water. They will keep safely for a week or two in linseed oil, if first cleaned as much as possible from the varnish by rubbing out or scraping on a palette knife. But the safest plan is thoroughly to clean the brush, first rinsing it in turpentine, and then well washing it with soap and warm water.

5. *Recipes for Varnishes*.—*Copal varnish* may be made by dissolving the copal, broken in pieces, in linseed oil, by digestion, the heat being almost sufficient to "boil" the oil. The oil should be made "drying" by the addition of quicklime. It should be diluted with oil of turpentine. A very small quantity of copal, in proportion to the oil, will be found sufficient. Another recipe for *white copal varnish* is as follows:—Mix 4oz. of powdered copal with ½oz. of camphor and 3oz. of the best raw linseed oil. Heat them over a slow fire; then add 2oz. of oil of turpentine, and strain.

Shell-lac varnish is made by breaking up 2½oz. of shell-lac into a coarse powder, putting it into one pint of spirits of wine, and keeping it in a warm place for a few days, with frequent shakings, till the lac is dissolved. Strain before using.

Black varnish, for ironwork, may be made of 12oz. of amber, 2oz. of resin, and 2oz. of asphaltum, melted separately and afterwards mixed. Six ounces of oil are then added, and finally 12oz. of turpentine.

Lacquer for brass consists of two parts lac, one part of sandarach, and a small quantity of Venice turpentine, dissolved in 20 parts of water.

French polish of the original kind appears to have been composed of gum sandarach 14oz. and 2dr.; gum mastic, 7oz. 1dr.; shell-lac (the yellower the better), 14oz. 2dr.; alcohol of 0.8295 specific gravity, 3 quarts and one pint. Pound the gums, and dissolve them by agitation without the aid of heat. If they are well mixed, before the alcohol is added with an equal weight of powdered glass, they will dissolve more easily. Before this varnish is applied, the wood should be moistened with linseed oil, and the excess rubbed off with flannel. The varnish should be applied by saturating with it a piece of soft coarse linen, folded into a kind of pad. With this the wood is rubbed softly at first, until the linen becomes nearly dry. This should then be saturated afresh, and the rubbing continued till the pores of the wood are completely filled. Two or three

coats will generally accomplish this. If the varnish becomes "tacky," apply a very little drop of olive oil uniformly over the surface of the pad. The finishing process consists in pouring a little pure alcohol upon a piece of clean linen. This is lightly rubbed over the varnished wood, and as the linen and the varnish dry, it is rubbed more briskly, till a perfect uniform polish is produced over the whole face of the work.

The following are *Stains for Wood*:—*Yellow* may be produced by a hot concentrated solution of picric acid, after which the wood is to be dried and varnished or polished. Picric acid is poisonous, and must be used with caution. A *grey* stain may be given by applying a solution of one part of nitrate of silver in 50 parts of distilled water, and afterwards brushing this over with a solution of acetate of iron. The nitrate of silver will stain the hands if allowed to touch them. Asphaltum dissolved in turpentine makes a good *brown* stain for wood which is about to be varnished. Bichromate of potash dissolved in water will give a different brown. Stephens' stains for wood were largely in request when staining and varnishing were more in favour than at present. A dead *black* surface on cabinetmakers' work is produced by staining and charcoal-polishing. Carefully selected wood is used, of close and compact grain. It is first treated with a solution of camphor, then dyed black with sulphate of iron and nutgalls. When quite dry it is rubbed over with a very hard brush of couch-grass, and then with soft, friable charcoal. Alternately with the charcoal, it is rubbed with linseed-oil and turpentine, till a smooth, dead surface is obtained, far more beautiful and durable than those which are given by varnish and French polish. Ammonia, either as gas or in solution, is used for *darkening oak*.

6. *Patent or Special Paints*.—Many of these are largely used in place of ordinary oil-paint, and have advantages of their own. An objection to some of them is that it is necessary to adopt such tints as the makers supply; and that these, from an artistic point of view, are not very satisfactory. "*Isodorous paint*" avoids the smell of turpentine by substituting for it a solution of shellac in methylated spirit. It dries very rapidly. "*Indestructible paint*" is stated to consist of some metallic oxide, ground with a small quantity of oil, and mixed up with petroleum spirit holding resinous matter in solution, or with the same spirit mixed with bitumen. "*Anti-corrosive paint*" appears to be a mixture of white-lead and powdered glass. To be fit for use, it needs only to be stirred up with oil. It is cheaper than white-lead alone, and lasts longer. "*Silicate paints*" are much recommended for internal work of an ordinary class; they are durable, and can easily be cleaned with soap-and-water. "*Oxide-of-iron paints*" are red, purple, brown, and black. Some of them consist of pure oxide of iron, and others of that substance mixed with silica. They are cheaper than lead-paints, and it is claimed that they are much more effectual in protecting iron. Other shades than those named can be formed by mixing the usual pigments with them.

7. *Distemping, and Water-colours*.—Ordinary distemping has whitening mixed up with size for its basis. This mixture takes the place of the white-lead and "thinners" in oil-paint, and colours are added to it as required. The simpler sort of wall decoration of the Middle Ages seems to have had what we should now call lime-whitening for its basis, and the lime-white was sometimes made more adhesive by adding the yolk and white of eggs to it, along with the colours. These were very few and very durable; red ochre, yellow ochre, and a kind of blue-black were the usual ones. They were mixed with lime, and the wall plaster to which they were generally applied was much more porous than our own. It contained more sand, and the sand was coarser than that which is now approved for the purpose. The wall-plaster was wetted before the colouring on it began. A different method was adopted in the highest class of buildings. The 13th-century custom, according to the late Professor Middleton, was to prepare the great halls of the period for decoration by covering their ashlar lining with a thin coat of very carefully-prepared plaster. This was formed with gypsum and size, to which white-lead was sometimes added, and it set with a hard, smooth surface. When this ground of plaster was dry, the picture or decoration was outlined on it with a fine brush or with red chalk. Then the artist set about forming on it various ornaments in relief, such as diapers, patterns, crowns and sceptres, and especially the main lines of the houses and other

architectural compositions which formed the background of his picture. These ornaments in relief were composed of the same materials as the plaster groundwork. Patches of this were laid on afresh where projections were desired, and they were stamped while soft into the proper shapes by delicately-cut wooden dies. When these details in relief had set hard they were covered with thick gold or silver leaf, and sometimes further enriched by painting in transparent colours over the silvering or gilding. On portions of the pictures oil-colours were used, the rest being finished in "tempera." At a later period elaborate painted decorations came into use on woodwork, and especially on wooden roofs and screens. Numerous examples remain in Norfolk and Suffolk, and brighter colours were employed than those found in Early Gothic work.

Numerous Paints without Oil, and Colour Washes for Plaster are now manufactured. Some of them, like cyanide paint and asbestos paint, are fire-resisting. Others, like "calcarium," combine very firmly with ordinary plaster, and are difficult to alter or remove. Many of them are freely washable, like the silicate paints. Particulars may be found in the manufacturers' advertisements. Silicate of soda solution much diluted with water may also be used for protecting wood against fire. After one coat has been applied, and has sunk in and dried, a coat of lime-white must follow, and on this a second coat of silicate, rather stronger than the first.

SPECIFICATION, PART XII.: PAINTERS' WORK.

XII. 1. GENERAL DIRECTIONS.—The oil-painting is to be executed with the best linseed oil and with pure oil of turpentine, free from adulteration. The white used as a basis for the paint is to be [the best white lead] [the best zinc white] [Griffith's white of the best quality], and all the pigments before using are to be submitted to and approved by the architect. All new woodwork to be painted is to be thoroughly freed from dust, knotted, and stopped, all knots that are very large or very full of turpentine being cut out, and their places neatly filled with fresh pieces carefully fitted in. Each coat of paint, except that on which a flattening coat is to be immediately placed, is to be carefully rubbed down when dry, before the next coat is applied.

XII. 2. PAINTING ON WALL-PLASTER.—All new walls and plaster ceilings which are to be painted on are to be well rubbed down first, and all small inequalities, whether cavities or projections, made level. Cracks are to be carefully deepened, and stopped with a mixture of plaster of Paris and lime putty: and this mixture, when dry, is to be properly rubbed down smooth and level. Old plaster, before being painted on, is to be freed from paper and other foreign substances adhering to it, and is to be rubbed down, first with a solution of washing soda in water, and afterwards with clean water. Cracks and inequalities are to be dealt with as directed for new plaster. The surfaces are not to be clearcoated, and clearcoating is not, in any part of the painters' work, to be substituted for paint.

XII. 3. PAINTING ON OLD WOODWORK.—Where not otherwise stated, the old woodwork is to be prepared for painting by being well rubbed down with pumice-stone and water, and afterwards thoroughly washed. Fill up all holes, cracks, and crevices in it with hard stopping, and bring it to a uniform face before the painting is begun. The following old woodwork, namely,, is to be covered with distemper filling on an extremely thin coat of oil-paint, and this filling, when dry, is to be rubbed down, before the actual painting is begun, to a perfectly regular and even surface. The following old woodwork, namely,, is to have the paint entirely removed down to the wood by a mixture of quicklime and soda, the wood brushed down with vinegar, and then thoroughly washed with clean water. It is then to be repaired where necessary, and knotted and stopped as a preparation for painting.

XII. 4. MEANING OF THE PHRASE "COATS" OR "COATS OF PAINT."—In this specification, wherever a direction is given to paint work, whether old or new, a specified number of coats, that number signifies the number which are to be put on in addition to all preparatory processes, such as knotting and stopping, thinly painting over to receive distemper filling, and the like.

XII. 5. PAINTING ON KEENE'S, PARIAN, AND OTHER HARD CEMENTS WITH SMOOTH FACES.—The first coat in these cases is to be made up with equal parts of turpentine and linseed-oil.

XII. 6. PAINTING ON IRON.—The iron is to be completely freed from rust before the painting is begun, and the first coat on it is to be of pure red-lead and oil, where the subsequent coats are to be in oil. If it is to be painted with any patent or special composition, the work must be done according to the directions issued by the makers of such composition.

XII. 7. VARNISH.—All varnishes are to be those manufactured by Messrs. and, unless otherwise directed, are to be of the qualities specified. A sample of the varnish for each part of the work, on a strip of wood, is to be submitted to the architect for approval a reasonable time before that varnishing has to be done, and if he disapproves of the samples, or any of them, other varnishes are to be substituted in conformity with his directions. Any difference in cost which may thus arise will be measured and valued, and added to or deducted from the amount of contract, as the case may be.

XII. 8. FOUR AND FIVE OILS, COMMON COLOURS.—Prepare for as above described, and paint four oils, finishing common colours, all the new external and internal woodwork usually painted, with the exception of Paint four oils in the same way all the ironwork usually painted, including outsides and insides of eaves gutters, and all straps, bolts, and ironwork of roofs, also all iron columns, and iron joists or girders; but not the following ironwork, namely, Paint the wall-plaster five oils, common colours, of the following walls, namely, Paint five oils and flat, to an approved common colour, the plaster of the following walls, namely,

XII. 9. SELECTION OF COLOURS.—The whole of the colours in the painter's work are to match exactly those which the architect may decide on or provide as samples, and any colours not exactly matching those which he may decide on are to be removed and made good at the contractor's expense.

XII. 10. PROVIDE THE SUM OF £. for superior colours and more elaborate work in such parts of the building as the architect may direct.

XII. 11. PROVIDE FOR DECORATION the p.c. sum of £. to be paid without deduction to any one who may be appointed by the architect to decorate the and provide the decorator with all necessary ladders and scaffolds, and with all necessary assistance, if he desires it, in moving and refixing them.

XII. 12. THREE OILS, COMMON COLOURS.—Prepare as above directed, and paint three oils, finishing common colours, the following old woodwork—namely

XII. 13. VARNISHING.—Size and twice varnish without stain with best copal varnish the following woodwork—namely Stain to a light tint approved by the architect, and size and twice varnish with best copal varnish the following woodwork—namely Twice varnish with best copal varnish the following work specified to be painted—namely

XII. 14. VARNISH AND RUB DOWN so as to be similar and equal to the sample marked which may be seen in the architect's office, the following work—namely

XII. 15. FRENCH POLISH in the best and most durable manner the following work—namely

XII. 16. PAINT KEENE'S, PARIAN AND MARTIN'S CEMENT.—Four oils, common colours, in the case of the following surfaces, skirtings, mouldings, &c., namely

XII. 17. CLEAN AND TOUCH-UP old paint in the following places, namely

XII. 18. GRAINING.—Paint four oils, comb and twice varnish with best copal varnish the following woodwork, namely Paint five oils and grain [oak] in the very best manner the following, namely, and well varnish with best copal varnish.

XII. 19. GILDING.—Prepare and gild in oil gold in the best manner, and with best metal

XII. 20. WRITING.—Write in plain letters (1) inch high or under, No. letters on ground previously prepared. Write on prepared ground No. [gold-shaded] letters [12] inches high.

XII. 21. PROTECT FROM INJURY OR DISFIGUREMENT by paint all the floors, cornices, and every part of the building. Protect the paint-work and varnish from injury, and leave all the work clean, sound, and perfect when the building is given up for occupation. Clean all paint and oil off the glass.

THE TOWN HALLS OF EUROPE.

IN opening the session of the Architectural Association of Edinburgh, on Thursday night in last week, the President, Mr. R. Rowand Anderson, LL.D., devoted the greater part of his inaugural address to a consideration of the principal town halls of the Continent, from the 12th to the 16th centuries, with some application to a project in which the citizens of Edinburgh are now much interested—the proposed Usher Hall. Dr. Anderson remarked: I shall endeavour to show you what the great and small municipalities of past ages did in rearing in their midst buildings whose beauty and magnificence show that their citizens took a greater pride in, and lavished more money on, such buildings, and gave more employment to artists of all kinds, than we do, who boast of greater wealth, power, freedom, and education.

THE GREAT MUNICIPAL PALACES

of Europe, which form such a valuable exposition of the art of their time, were built, some in the 12th and 13th, but mainly in the 14th, 15th, and 16th centuries, and were the visible embodiment of the independence and self-government which the citizens of the industrial and trading communities of that period struggled for and obtained. Municipal freedom and institutions are, of course, of a much earlier date than the times to deal with. Rome granted self-government and municipal institutions to numerous provincial cities of the Empire, subject, however, to the Imperial Governor of the province. While the rule of the Empire became more autocratic at its centre, these municipalities grew and prospered, and this led to many quitting Rome in order to enjoy the privileges of citizenship in them. But the decline and fall of Rome involved the destruction of these cities, and for many succeeding centuries municipal freedom and institutions practically disappeared. During these centuries Europe was in a state of constant ferment; the weak could only find protection by ranging themselves under the banner of the strong, and hence arose the feudal system, the natural outcome of the lawlessness of the times which tended to suppress the freedom and even the personality of the individual. Against the domination of this system arose the spirit of industry and commercial enterprise. There is a spot in the north of Italy where, during these dark centuries, a rich and prosperous town arose and revived municipal institutions as early as the 7th century.

VENICE

was founded by the peaceful inhabitants of the towns of the mainland, who, flying before the hordes of barbarians then overrunning Italy, took refuge on the islands of the lagoons. As Europe gradually settled down again, many towns, especially in the north and centre of Italy, began to imitate the independent constitution of Venice. They threw off the ties of feudalism and renounced allegiance to any intermediate power between themselves and the German Emperor, who was also the representative of the Western Roman Empire. These communities assumed the privilege of regulating their own affairs, as if they were independent republics. With the beginning of the Crusades, and the consequent flow of great bands of soldiers and adventurers travelling to Palestine through the South of Europe, a wider field was opened for trading and enterprise, and these Italian Republics did not allow Venice alone to reap the benefit of it. All did what they could to obtain their share of traffic, and, for a time, Pisa and Genoa not only rivalled, but even bade fair to eclipse Venice in the trade to the East. It was in those many independent centres that the Palazzo Pubblico, or town hall, was erected. In it the town council, from which anyone having the remotest claim to nobility was rigorously excluded, met to decide all matters of town administration, and its relations to its neighbours. The town hall became the centre of the life of the town, and the citizens made it their care that it should in all respects be a worthy indication and emblem of their freedom and prosperity. Looking at the map of Europe, we recognise the favourable situation of Italy for the purposes of trade with all countries bordering on the Mediterranean. Seaman-ship was, however, not very far advanced in these days, so that their vessels rarely passed out of the Mediterranean. The distribution of merchandise from the East throughout the centre and north of Italy was easily accomplished by the Venetians and Pisans, using for transport the rivers at the mouths of which stand their towns.

A further distribution of goods was effected in France by way of Marseilles, Narbonne, Nîmes, &c., and in Spain by way of Barcelona and Valencia. In those days of few roads, the traders took advantage, whenever possible of the great natural water-highways, and, therefore, we find that the great trading towns of these times grew up either round the coast or one of the great navigable rivers of the interior. It was then more difficult to arrange for transport to the centre and north of Europe, and to reach such important South German towns as Ratisbon, Augsburg, Nuremberg, and Ulm a long overland journey had to be taken across the Alps. The merchants of these towns went themselves to Venice, returning with their goods by the Pass of Brenner. These towns, the most important in South Germany, are all situated on the Danube or its tributaries, and these provided facilities for dispersing the commodities which the enterprise of the merchants had obtained. The improvement in the science of navigation in the beginning of the 14th century, coinciding as it did with the withdrawal of the privileges which the Italian merchants had enjoyed in some of the great fairs of the interior, encouraged them to venture beyond the Straits of Gibraltar, and from this time by far the greater part of the Eastern trade found its way into Europe by the ports of the North Sea and the Baltic.

FLANDERS.

Already the countries of the North carried on a brisk interchange of products. England was famous for its wool, and Flanders was unrivalled in the art of weaving it into cloth. The cities of Flanders, originally small communities of weavers, combined into guilds to insure freedom to prosecute their industry undisturbed, and grew into rich and prosperous towns, and the extension of trade to the South of Europe greatly increased their wealth and prosperity. Flanders commended itself to the Italian merchants as a suitable place of disembarkation for their goods, being situated just at the entrance to the boisterous northern seas, into which they did not venture, and being already a country of great commercial prosperity. Merchants of all nations awaited the arrival of Eastern cargoes in Bruges, Ghent, and Antwerp, where they were transhipped and then carried to all the ports of the north. From these ports, such as Lübeck, Hamburg, Stralsund, Stettin, Dantzic, &c., access was got to the interior by means of the rivers Elbe, Weser, Rhine, Oder, &c., where are the important towns of Bremen, Breslau, Cologne, &c. All these towns lived by their trade, and banded together for mutual protection into the great Hanseatic League, which founded communities and enjoyed privileges in almost all the trading centres of Europe. The remnants of this league continued to the present day, and were only extinguished after the unification of Germany. To this later period belong most of the town halls I am about to show you, and they will, I think, convey some idea of the wealth and importance of the towns which could afford to raise such buildings. The northern Netherland provinces, which are now known as Holland, were longer in coming to maturity than those of the south. Flanders became early distinguished for its manufactures, while Holland was chiefly occupied with fisheries. At a later period Holland distinguished itself as one of the great maritime powers, and it was able to fight for and obtain its independence from the Spanish rulers who subdued the rest of the Netherland provinces. The persecutions of the Spanish Inquisition drove many of the Flemish weavers and others into Holland, and as the importance and wealth of the cities of the South decreased, that of Amsterdam and other cities of Holland increased in proportion. The later development of these cities is manifested by the architecture of their town halls, which are distinctly of a later style than those of the South.

FRANCE.

There is a very definite distinction between the municipalities of Flanders and those of France during the Middle Ages. The latter were, for the most part, revivals of municipalities which had actually existed in the time of the Roman Empire. The privileges enjoyed by these municipalities had been in abeyance during the domination of feudalism; but the traditions had remained, and the time came when the cities would no longer remain passive under the oppression of their hereditary rulers or of the bishops, who, in many instances, purchased

temporal power over them. The citizens, therefore, united in a body and demanded back their ancient privilege of self-government; and as the king was only too ready to avail himself of any means of curbing the power of the barons, they usually obtained a Royal charter recognising their demands; but, although the privileges of the French cities were of much older origin than those of Flanders for instance, France was not so full of foreign commercial life, and, consequently, their municipalities take but a secondary place when compared with those of Flanders and Italy. Town halls of outstanding merit are not so common in France as in the other countries I have mentioned; because the citizens of the French towns helped largely in the erection of the magnificent cathedrals for which their country is famous, and in return were allowed to use the cathedrals for great secular meetings of general popular interest. In describing and submitting the lantern views of these town halls for your inspection, you must not assume that I suggest any one of them as a model to be followed for a town hall of the present day. Our wants, both in nature and extent, are very different from the wants of these early municipalities, and so must our buildings differ from theirs. All I want you to notice is that these ancient municipalities took a pride in making their town halls an ornament to the town, and representative of the art of the time.

THE NEW TOWN HALL.

In the few concluding remarks I have now to make, I am not going to try to solve the problem of finding a site for Mr. Usher's munificent gift. I have no doubt that every possible site has already been thought of, and I feel sure that the committee of the town council are giving their earnest consideration to the whole question and endeavour to come to a sound decision. In doing so, I hope they will not forget that the Castle of Edinburgh, the one great and outstanding feature of our town, known to all the world, must not be interfered with, but must be kept isolated, now and for all time. I would also say that the site chosen should be the centre of as large a populated area as possible; that no open spaces should be filled up; and, finally, that the hall, when built, should not be less an ornament to the city than many of the buildings I have shown you are to the towns where they exist. The hall, when erected, should be not merely a structure to hold so many thousands, but also a place where the best artists of the day could find a field and encouragement for the exercise of their skill. Sculpture and the decorative arts have been too long practically strangled by false ideas of the scope and meaning of Art. But now that architects, aided by a better public sentiment, are striving to re-establish the co-operation of all the separate arts, which is the only condition under which they can individually thrive, there is within sight a better future for all earnest workers, and this new hall ought to mark a stage in the progress of true art. I think Edinburgh is to be congratulated on numbering among its citizens such men as Mr. Findlay, Mr. McEwan, and Mr. Usher, who have so nobly given of their substance to beautify the city and add to the education, enjoyment, and convenience of its citizens. Let us trust that their good example will be followed by others, as wants are growing, and social problems are waiting for solution. I would venture to refer to two of those. The first is the necessity for a properly equipped and endowed school for the industrial arts. Many are apt to confound this with technical education; but it is entirely distinct from it, and in every country of Europe the two things are kept separate. The school that has been established here is doing much good work; but it is small, and its power is cramped for the want of means and accommodation. In a great educational centre like Edinburgh this ought not to be. Think of the enormous sums that have been and are being frequently given for the advancement of what one may call book-learning. Is high-class artistic labour not as worthy of encouragement, and, to a large extent, more necessary? Labour is as worthy of honour and respect as learning, and the withholding of these from it is the cause of much of the inferior work and trashy and meaningless design we see everywhere. The other want to which I would refer is one intimately associated with one of the serious social problems of the day, and is the provision of a place to which the people can resort in thousands, especially in winter. The great want of this, and every other city in the kingdom, is a huge

WINTER GARDEN

easily accessible and free to all, into which the people can flock in thousands, and find light, heat, beautiful and attractive surroundings, good music, and every legitimate entertainment. There is at present a site vacant in Edinburgh, admirably suited for such a purpose. I refer to the Cattle Market in Lauriston, and there I suggest that a winter garden should be erected. A cattle market there has long since become a nuisance to the whole locality, and a better one can be provided elsewhere. Such a building as I suggest could not be better situated, or readier of access to the classes I am pleading for. The Cattle Market shows an area of upwards of 145,000 sq. ft., greater than the combined areas of the Waverley Market, the Music Hall, the Synod Hall in Castle-terrace, and the McEwan Hall. This will show you that I am not exaggerating when I say that you could have here, all under one roof, a large auditorium capable of holding many thousands for orchestral and popular concerts, and public meetings, ample space for military tournaments, fruit and flower shows, and extra large bazaars. A good organ should be set up and played daily at fixed hours, and the town could not do better than maintain for the enjoyment of all who flock here a good orchestra. Ample means for refreshment should also be included, and open spaces where recreations of all kinds could be indulged in. If any permanent good is to be effected, you must change the habits and desires of the people, and you can only do this by giving them something better. Not so very long ago the manners and customs of the male portion of the upper classes were not of a very high standard. The improvement was brought about largely, I believe, by increased social intercourse, and the refining influence of the presence of women in most of men's social gatherings and amusements. Like causes will produce like effects. Make such a place as I speak of not a charity, but a recognised social institution, and the common resort to it a part of the every-day life of the people. Let each one here find the attraction and amusement he seeks for; the unconscious restraint exercised by the best would prevent excess on the part of the weak, and all would be elevated and refined by their beautiful surroundings. The day is not far distant when the provision of such buildings will be looked upon, in a climate such as ours, as essential to the healthy life of a community, and of more importance than police cells, night refuges, and poor-houses, and he who out of the abundance of his wealth erects such a building will have not only an enduring and material monument to his generosity, but, what is better than all, the satisfaction of knowing that he has helped to brighten the lives of thousands of his less fortunate fellow citizens in his own and succeeding generations.

The address was illustrated by upwards of forty limelight views of the Town Halls of Italy, Germany, Belgium, Holland, and France.

IRON CASEMENTS AND SASHES.

THE CRITTALL MANUFACTURING COMPANY, Limited, of Manor Works, Braintree, Essex, have issued a third catalogue of their specialities, including casements and sashes of iron, steel, and bronze; doors, wrought-iron gates, grilles, roofs, and skylights. The company have usefully divided the catalogue for easy reference, the sections, prices, and qualities being so arranged that comparison can readily be made. Thus all side-hung casements and frames are found on one page, top-hung casements on another, and fixed frames and lights on a third sheet, and so on, so that the architect or builder has only to refer to the particular department he is in need of. Opposite each sheet of illustrations will be found the prices. Thus for side-hung casements there are three qualities—best gunmetal, plain gunmetal, and malleable iron—and every size is priced. The casements shown possess all the important features for cottages, mansions, or public buildings. Full-size sections of copper or gunmetal weather bar, are shown to each casement; they provide for condensed moisture and are rustless. The "patent condensation channels" appear to be perfect for carrying off the condensed water; they are made in brass and in bronze. Another division gives us a large selection of very superior "machine mitre joint sashes" of sections rolled to special models, suitable for warehouses, factories, schools, &c. Some of these have ventilators fixed in different

ways. The sheet of louvre, folding, and French casements, the single sliding doors hung on wrought-iron hangers with cast-iron wheels and channel guide; the single hanging doors, and double-hung doors, and the party-wall doors made to pass the L.C.C. and fire-office regulations, are useful additions. We must also call attention to the Crittall Company's gearing, suitable for both wood and iron casements, very simple and direct in action; and the ornamental handle brackets, &c. Full particulars and prices are given of each branch. The architect will find every particular as to requirements of mullions, transoms, heads and sills for outward and inward-opening casements—even the preparation necessary to be made. The Crittall Company's catalogue will, in short, save much trouble in ordering and specifying goods of these descriptions.

GRAPHIC STATICS.—VI.

ONE form of the truss which comes next in order of simplicity is shown in Fig. 19 (a). Suppose a given load to be borne by the truss, this load being distributed uniformly along the rafters FB, GC. Then, since we are now dealing only with the direct stresses produced in the members of the truss, half the load on each rafter must be taken as being concentrated at each end of the rafter—that is, we take one-fourth of the total load as being concentrated at the foot of each rafter, and two-fourths, or half the total load, at the apex. We assume that the supporting resistances DE and EA are vertical, and, therefore, each equal and opposite to half the total load. Thus we get the loads AB, BC, CD, and the resistances DE, EA.

To Draw the Force Diagram.—In Fig. 19 (b), *ab, bc, cd* are set off, in order, along the vertical line* *abcd*, to represent the loads AB, BC, CD respectively; *e*, the middle point of *da*, is taken so that *de* represents the resistance DE, and *ea* represents EA. We thus obtain *abedca*, the complete polygon of the external forces, and can now proceed to find the internal forces.

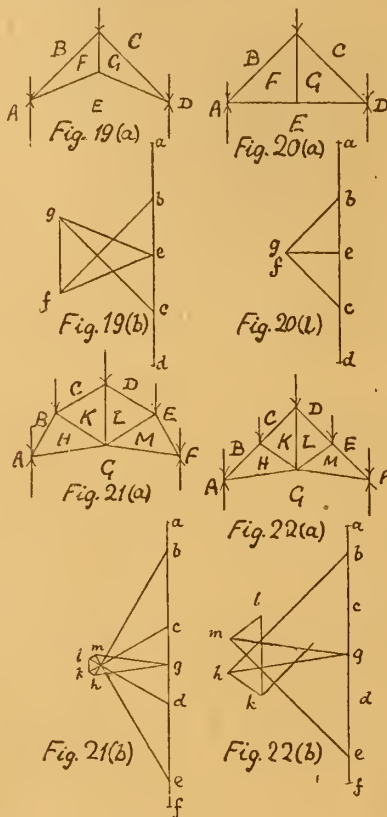
Beginning with the joint ABFEA, we have the known forces EA, AB; draw, then, in Fig. 19 (b), *bf* parallel to BF, and *fe* parallel to FE, thus completing the polygon *abfeca* of the forces which act at that joint, and so obtaining *bf* and *fe* as the representatives of the forces which act in the rafter BF and in the tie FE respectively. We now know the forces FB, BC at the joint FBCGF, hence the force polygon *fbcg* may be completed by drawing *cg* parallel to CG and *gf* parallel to GF, thus finding *cg* as the thrust of the rafter CG, and *gf* as the pull of the rod GF. If our work has so far been accurate, the force polygons for the joints GCDGE, EFGDE may now be completed by drawing the line *eg*, which must be parallel to EG, and thus getting the polygons *gedeg*, *efge* for these joints respectively.

In Fig. 20 (a) another form of the same truss is shown, the two members EF and GE being supposed to be in one horizontal straight line. In Fig. 20 (b) the force diagram is shown, and, bearing in mind the extended use of the word *polygon*, it will be found that the explanation of Figs. 19 (a) and 19 (b) will in all respects apply to Figs. 20 (a) and 20 (b) respectively. In Fig. 20 (b) the two points *f* and *g* are found to coincide, and so to indicate that there is no force acting along the member FG. This may present a difficulty to the beginner, as it is evident that the weight of the members EF and GE would produce a pull on the member FG; but he must remember that we are taking no account of the *weight* of the various members, our present object being simply to find the forces which the members of the truss must respectively exert in order to resist the action of the *given* external forces.

In addition to the remarks at the beginning of Chapter V., the following should be carefully noted:—In the frame diagram the lines representing the forces should be drawn *outside* the frame. In lettering the spaces outside the frame it is convenient that a certain cyclic order should be observed in going round the frame. In the force diagram, in drawing the polygon of the external forces, the same cyclic order which was adopted in the frame diagram should be observed in going round the frame. In the examples just given we have gone round the frame in the same direction in which the hands of a watch revolve. The reverse direction might equally well have been chosen. Whatever cyclic order has been

observed in taking the forces round the frame to draw the polygon of the external forces, the same order must be observed in *going round any joint* to draw the polygon of forces for that joint.

In a force diagram drawn according to these rules, the force polygons for the various joints are so connected that the force exerted by any member is represented once, and only once. Such a force diagram is very frequently called a *reciprocal diagram*, and the problem of drawing the force diagram for any frame under the action of given external forces



is commonly spoken of as that of drawing the reciprocal diagram of the said frame. Reciprocal diagrams, as such, will be treated of in a future chapter.

The order in which the various joints of the truss are dealt with in drawing the force diagrams may often be varied. At any stage of the working we may draw the polygon for any joint with respect to which there are only *two* things unknown.

The forces which act in all the bars which meet at any point of the frame are easily read off from a properly constructed force diagram, if we first know the *direction* of *any one* of the forces acting at any joint of the frame. Consider, for example, the forces at the lower end of the vertical bar of the frame shown in Fig. 19 (a), and suppose that all we know is that the external force at the apex of the frame acts downwards. Referring, then, to Fig. 19 (b), we find this force denoted by *bc*, thus showing us that the cyclic direction round the apex is given by taking the spaces in the order B, C, G, F, B, and is, therefore, that in which the hands of a watch revolve. The same order must be followed for the joint EFGDE, the polygon for which is, therefore, *efge*. The forces, then, are represented by *ef, fg, ge* respectively, thus showing us that each member exerts a force in the direction *away* from the joint, and is, therefore, subjected to tension.

A little experience in the drawing of force diagrams will enable us often to tell, by mere inspection of the frame diagram, which members of a frame are subjected to tension and which to compression; but we must not expect to be able always to do this.

Now let us go on to the frame shown in Fig. 21 (a). Suppose the given loading to be symmetrical, the supporting resistances to be vertical, and, as in the former examples, that the selected cyclic direction is *clockwise*. In Fig. 21 (b) set off *a, b, bc, cd, de, ef* to represent the given loads AB, BC, CD, DE, EF; take *fg, ga*, each equal to half *fa*, and, therefore, representing

respectively the resistances FG, GA. The force polygon for either point of support may now be drawn. Taking the right-hand point, we have the known forces EF, FG; draw, then, *gm* parallel to GM, and *me* parallel to ME, thus getting the complete polygon *efgme*, and so finding *gm*, acting away from the joint, and *me*, acting towards the joint as the forces in the bars. The bar GM, then, is in a state of *tension*, and the bar ME in a state of *compression*.

Take next the joint DEMLD. Here we now have the known forces DE, EM (equal and opposite to ME, which has just been found); hence the polygon *demld* for this joint may be completed by drawing *ml* parallel to ML and *ld* parallel to LD. The bar ML, then, exerts a force equal to *ml*, and is, therefore, subjected to tension, and the bar LD exerts a force equal to *ld*, and is, therefore, subjected to compression. The polygons, *cdlkc*, *bckhb*, *gabhg*, *ghklmg*, may now be drawn without further explanation.

In Fig. 22 (a) another and more common form of the same truss is shown. The force diagram, Fig. 22 (b) may be found in the same way; but it will be seen that the *nature* of the stresses in corresponding members of the two frames is not always the same. For instance, if the polygons *ghklmg* in the two figures 21 (b), 22 (b) be compared, it will appear that in the frame in Fig. 21 (a) all the members GH, HK, KL, LM, MG are in tension; but that in the frame in Fig. 22 (a) the members HK, LM are in compression.

J. C. PALMER.

TESTS OF BRICKWORK PIERS.

AT the meeting of the Royal Institute of British Architects held on Monday evening, the president, Professor George Aitchison, A.R.A., in the chair, papers were read by Mr. William C. Street, Mr. Max Clarke, and Professor W. Cawthorne Unwin, F.R.S., on the second series of experiments on the strength of piers built in brickwork, conducted by a sub-committee of the Science Standing Committee. The previous set of tests were described by the same lecturers in papers read before the R.I.B.A. on March 30 last, and fully reported in our issue of April 3 (p. 485-6, Vol. LXX.), and, as on that occasion, a series of instantaneous photographs were again shown as slides by the aid of the oxy-hydrogen light, clearly demonstrating the exact manner in which crushed brickwork behaves just before collapse and at the instant of failure.

In his introductory paper, read on Monday night, Mr. STREET explained that the present series of tests have been carried out by Messrs. H. W. Burrows, Max Clarke, Bernard Dicksee, Matt. Garbutt, and himself, the site, as before, being ground in front of the chief engineer's offices at the West India Docks, kindly lent by the committee of those docks, and close to the hydraulic engine-house. The work now experimented on included two specimens, each of four qualities of bricks—London stocks, gaults, Leicester reds, and Staffordshire blues—built in lime mortar, and a like number of each class of brick built in cement, and one pier of bricks constructed, at Professor Unwin's suggestion, in dry work, with a layer of sand between each brick, and no cohesive material. All the seventeen piers were 18in. square and 6ft. in height, and were erected on little wrought-iron platforms resting on a temporary line of rails 140ft. in length, and laid to a 16in. gauge, so that the specimens could be successively drawn along the rails and placed under the testing machine. The hydraulic ram and machine were kindly lent by Sir William Arrol, and the pressure was steadily applied from below. Most of the pieces had, when the second set of tests were begun, been built ten months; but six had been condemned by the sub-committee, the workmen, in their absence, having committed the sin of inserting soft bricks as closers, and since this would have vitiated the experiments, fresh piers were, therefore, built two months before the tests were made. The stocks in mortar commenced to fail at about 5 tons per square foot, and fell at 10·41 tons. Those in cement cracked at between 7 and 8 tons, and collapsed at 14·34 tons. The gault bricks in mortar first began to crack at 10·47 tons, the surfaces shelled off at 31·50 tons, crushed at 33·71 tons, and suddenly burst to pieces at 48·10 tons. The gault bricks in cement began to crack at 21·39 tons, were crushed at 41·16, and collapsed at 51·05 tons. In Leicester reds, the piers in mortar cracked at 29·28 tons, and failed at 86·39 tons, whereas the Staffordshire blue bricks

* Sometimes called the *load-line*.

in mortar failed at 74·30 tons; those in cement gave the results of maximum strength, for at 53·23 tons they were cracked and spalled, at 70·88 loud snaps were heard, but the pier did not fail till an equivalent to 108·25 tons per square foot was reached.

An instructive series of twenty lantern-slides was shown on the screen, and was explained by Mr. MAX CLARKE. He pointed out that all the piers failed at the line of closers, and that they yielded to a shearing rather than a crushing pressure. In most cases an unbroken cone of brickwork was left at the upper and lower portions, the surfaces of the central part being forced off. Before any fissures were apparent on the surfaces, cracks, increasing in loudness, could be heard. The photograph of the Staffordshire blue bricks in cement, at the moment of collapse under 108½ tons pressure per square foot, showed an absolute crushing, streams of dust and broken pieces flying off as a symmetrical shower on every side. The sample of Leicester reds, built up in dry sand, yielded unexpectedly good results, not yielding till 15 tons per square inch was registered. It was stated that other piers and pieces of walling are being built of the same materials, with the addition of samples of Fletton bricks, for testing in February next, and in these no closers will be used, so as to ascertain the loss of strength involved by introducing closers. On the wall were hung diagrams of tests of bricks recently made for the Sheffield Society of Architects and Surveyors by Professor Ripley of that city. These gave much higher results than those found in the West India Docks experiments, e.g., the mean crushing strength in tons per square foot: London stocks, 101·8; gaults, 153·1; Leicester reds, 307·7; Worcestershire blue, 398·6; Flettons, 103·6; and Sheffield stocks from 155·6 to 257·5 tons. The height of the piers tested was not stated.

Professor UNWIN dealt with the resistance to crushing evidenced by the results of these tests. He remarked that, in dealing with tension tests of bricks, it was assumed by the sub-committee that the form of the piers did not affect the issues; but that was not exactly correct, and in crushing tests the results were still more affected by the form given to the piers, and another difficulty in considering the results was to find homogeneous materials, for it was evident that most of the discrepancies in the returns were due to diversities of quality in the bricks. He, therefore, made some independent trials with red rubber bricks 2in. square, and respectively 1in., 2in., and 3in. high. He found that the maximum strength was given by the 2in. cube, the block 3in. high coming second. He was surprised to find that a half-brick under crushing was 18½ per cent. weaker than a whole brick, a fact which proved that form as well as materials must be regarded in tests of crushing. If they examined the two series of tests on which reports had been given, they would see that they were confronted by two great anomalies. The first was this: that piers built of a later date often carried more, and always as much, as the piers built at an earlier date. For example, the piers of gault bricks built last sustained a pressure of 45 tons per square foot, while the earlier erections collapsed under a weight of 18 tons. The same thing applied to the Leicester reds and the Staffordshire blues. The anomaly required some explanation for its elucidation. He had little doubt that the later piers built under the direct superintendence of the sub-committee were more carefully constructed than the earlier ones. But there was another cause for the discrepancy in results, and that was the materials used in the making of the mortar. He was disposed to believe that nearly the whole of the difference was due to the varying kinds of sand used in the mortar. A second anomaly was this; if they took the tests in order they would find that in by far the greater number of cases, the piers of later date carried more than the piers which had stood for ten months. The older erections ought certainly to have shown the greatest strength, whereas they were actually weaker, and as no frost had occurred, the failure was not due to that cause. The result of the experiment he suggested, in building a pier without lateral cohesion, that was, dry and without mortar, was instructive. It behaved commendably, for it carried 15 tons, although it was all closers, so that the question of closers could not have the importance which architects attached to it.

In opening a discussion on the papers, Mr. WILLIAM WOODWARD asked if the brickwork in the

piers was grouted. The statement that a pier which had stood for ten months was weaker than one only built four months was to him astounding. He believed there was something radically wrong in the conduct of the experiments. The London stock brick was nowadays a misnomer—no such brick was made, and those bearing the name came from Kent. These Sittingbourne bricks would not bear more than 5 tons before cracking seriously, and were crushed at 22 tons; but true London stocks, as formerly made, would bear a much greater load. The discrepancies revealed by the tests upset all experience. He should like to know whether Thames or pit sand was used, the thickness of joints, and the amount of grouting, before accepting the results.

Mr. HENRY DAWSON asked for further information as to the sand used.

Mr. WILLIAM WHITE, F.S.A., urged that good sand was of the first importance in building in brickwork.

Mr. P. GORDON SMITH, of the Local Government Board, and chairman of the Science Standing Committee, proposed a vote of thanks to the three lecturers and to the other members of the sub-committee who had carried out the experiments, coupling with it the names of Sir William Arrol, who lent the testing machine; Dr. Longstaffe, who subscribed to the fund; and Mr. Donaldson, the engineer to the West India Docks Company, who granted the site on which the experiments were carried out.

Mr. JOHN SLATER seconded the motion, remarking that for the first time experiments had been made on this scale, and it was not wonderful that the old rule-of-thumb modes of estimating had proved incorrect. There were enormous discrepancies in the results, however, and until further tests had been carried out it would not be wise to rely too closely on the results shown.

Mr. HUGH LEONARD said the amount of labour and attention given by the sub-committee could only be appreciated by those who witnessed some of the experiments.

Mr. BERESFORD PITE, P.A.A., expressed the hope that architects would now be debarred from rule-of-thumb modes of calculating safe loads.

Mr. W. EMERSON asked what difference was made to the result by having or omitting frogs in brickwork. He thought some of the differences of results from those previously assumed were due to the sudden application of the crushing force.

In closing the discussion, the PRESIDENT referred to experiments he made many years since as to the resisting qualities of bricks, and remarked there were many points about the present tests which required further elucidation. Of course it was very unpleasant for them to realise that the theories which they had worked on for years were no longer tenable, but still they must be willing to move apace with scientific investigation. There were several factors, such as the hardening of mortar, the varying sizes of bricks, and the effect of time they occupied by the crushing, which would cause every experiment to vary of necessity.

In replying to the vote of thanks, which was carried by acclamation, Professor UNWIN remarked that frogs in bricks diminished their resistance to crushing. The longer the pressure was in gaining its full force the greater would be the effect on the material.

THE ECCLESIASTICAL ARCHITECTURE OF SCOTLAND.*

THE second volume of Messrs. David MacGibbon and Thomas Ross's work lately published deals with the subject from the earliest Christian times to the seventeenth century. In the first volume, already noticed, those styles which were derived from the earlier types of Celtic and Romanesque are described; the authors here trace the development of the style, or rather the new departure, which sprang from the great vaulting problem which was to enable the builder to vault spaces so that the ridges should be kept level. This requirement was met by the pointed arch which soon appeared in other features, as well as the vaulting of the buildings. As we turn over the pages of well-drawn sketches and illustrations of this volume, we can follow the steps of this great Transition movement. The introduction of a simple and dignified architecture, but gradually losing sight of initial elements and motives, is noticeable, for instance, in the design of that great Transitional example, St. Andrew's Cathedral,

Fifehire, where we see the old Romanesque or Norman structure and arches, as at the east and west ends. As the authors point out, the upper tier of round-arched windows at the east end was taken away, and a traceried window took their place. The remains of this window show a simple kind of Early tracery, with a slightly pointed arch, the inner arch being semicircular. The Transitional work is seen best in the remains of the beautiful west front. Many interesting features and details are pointed out, and the sharp illustrations given of this example enable the student to see the changes made at the end of the 12th and beginning of the 13th century. One of the points to notice is the retention of the round arch in many of the doorways. At Jedburgh Abbey the pointed arch is also seen with the round arches of the early style, and this was the rule as in English and French examples. One of the finest examples of the Early Pointed is Elgin Cathedral, which is illustrated by a plan, views of the west end and interior of choir, east end, south transept, western doorway, chapter house, and Lady chapel. Its plan is perfect: double aisles to nave and choir, transepts, presbytery, a Lady chapel, and octagonal chapter house. Its most beautiful parts are of 13th-century design, as the magnificent east end, with its two tiers of lancets and circular traceried window in gable flanked by octagonal turrets. After the damage of the cathedral by fire in 1270, it was reconstructed in a Later style. Cromwell's troops seem to have done great damage to the edifice, and to have left it a ruin in 1650. In this example the pointed arch is general, and we have a very perfect instance of the style in all its beauty. As to vaulting, the author observes, "Few of our early churches were vaulted throughout at the beginning of the 13th century, and the forms of such vaults as existed were doubtless borrowed from England. The vaults of the choir of St. Andrew's Cathedral and the lower church of Glasgow Cathedral are probably the only exceptions, most of our other large churches having been vaulted, if vaulted at all, at a later period. The large churches were generally designed to have the side aisles only vaulted, the central aisle (nave?) being covered with a wooden roof, as, for example, Arbroath Abbey, Dunblane and Elgin Cathedrals. Holyrood Abbey is an exception; but there the vaulting of the central aisle (?) was sexpartite." We agree with the opinion that the Scottish buildings "represent the echo rather than the original voice of the genius of Gothic architecture." The leading principles were not so fully kept in view as we find they were in France and England. Whether the adherence to wooden roofs in England is so common as Mr. MacGibbon supposes is rather questionable, as he surely must have forgotten the vaults of many of our greatest English naves. We also do not share the view that the wooden roof shows a desire to fall back on the ancient trabeate system. Where the vault has been abandoned, it will be found to have been from the difficulty of obtaining a suitable stone, or from other local causes. The use of the wooden roof no doubt led to changes like the disuse of wall-shafts between the bays, and to plainness of walling over the arcade, as we see at Dunblane Cathedral and Sweetheart Abbey. In these and other instances the concentration of vaulting pressures at certain points as in vaulted naves was abandoned, of course. We are sorry we cannot enter more fully into the author's very interesting work: it must be sufficient if we say that every example of note is to be found described and illustrated, many of the abbeys and cathedrals with plans drawn to a good scale. The Middle Pointed or Decorated examples are illustrated by buildings like Sweetheart Abbey, Melrose, Fortrose Cathedral, St. Giles' Collegiate Church, Edinburgh; St. Michael's Church, Linlithgow. But the main interest of the work is in the Early Pointed work, and the examples so amply illustrated of Arbroath Abbey, Holyrood, Dunblane, and Elgin Cathedrals, St. Mungo, Culross Abbey, and other lesser edifices.

Although the City and South London Railway Company have not yet commenced work beneath the church of St. Mary Woolnoth, expert opinion has been taken upon the possibility of making the station without endangering the church, and it is stated that, from an engineering point of view, the project is quite feasible.

* Edinburgh: David Douglas.

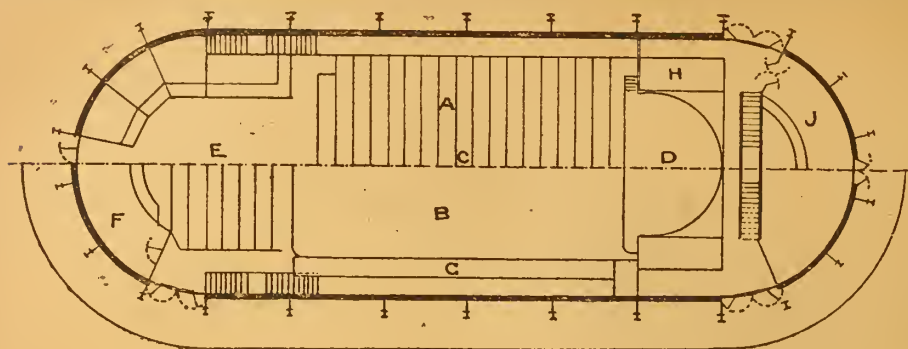


Fig. 1.

CONCERT-HALLS AND ASSEMBLY-ROOMS.—XXXI.

By ERNEST A. E. WOODROW, A.R.I.B.A.

THE pier pavilion is a very popular example of the public assembly-room, and the uses to which it is put are numerous and varied.

One of the most recent erections of this class is the pavilion on the pier of Clacton-on-Sea, erected in 1890-93, from the designs of the engineers, Messrs. Kinipple and Jaffrey. The construction of this building is of great interest, and it would not be out of place to repeat the description of it given by the engineers of the pavilion: The length is 156ft., while the width is 66ft., and the height 38ft. 6in.

The pavilion is a steel structure with galled

along both sides there is a gallery, access to which is obtained from two side stairs within the hall, or from a stair in a passage between the concert-hall and the refreshment-rooms. The hall accommodates 1,500 persons, and of its acoustic properties artists on the platform and the audience in the remotest part of the gallery speak highly.

The arrangement of the balcony floor, showing ladies' rooms, lavatories, &c., is shown in the lower portion of Fig. 1.

There are 26 main stanchions supporting the roof and gallery, which are placed 15ft. apart. Each main support is 24ft. 9in. high and 4ft. wide, and consists of two box columns joined together by a web; the section of these is composed of two flanges 7½in. wide and ¼in. thick,

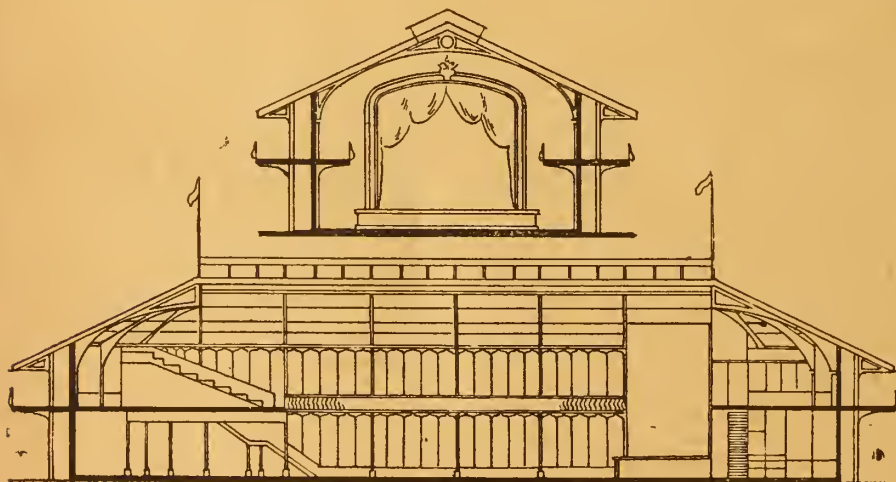


Fig. 2.

sides and roof, is two stories in height, has semi-circular ends, and an outside balcony, 6ft. wide, beyond the main principals, which forms a promenade all round the pavilion at the level of the first floor. The balcony is sheltered from rain by the overhanging roof, and the floor of the balcony serves as a cover to the promenade space on the deck level round the structure. The recesses, or alcoves, between the main principals on the balcony and deck floors are occupied by seats.

The upper half of Fig. 1 is a half-plan of the ground floor from which it will be seen that the concert-hall occupies the central or rectangular portion of the structure, the semicircular end next the pier-head being used as a spacious refreshment-room, 47ft. by 18ft., whilst the landward end is used for eight shops or stalls, each about 12ft. by 12ft., having doors and windows on the outer side of the buildings, and likewise windows and counters in the interior opening on a spacious vestibule, forming the main entrance to the concert-hall, so that visitors, either inside or outside the building, can be attended to.

The dimensions of the concert-hall on the ground floor are 75ft. by 45ft. 6in., and on the balcony 104ft. by 45ft. 6in. There are five entrances on the ground floor, two on each side, in addition to the principal entrance through the vestibule above referred to. By means of a sliding glazed screen the vestibule can either be separated from, or made to form part of, the concert-hall. A roomy stage or platform is provided at the seaward end of the hall, and at the opposite end and

two web plates 6in. by ¼in., four inside angles 2½in. by 2½in. by ¼in., and two outside angles 3½in. by 3in. by ¼in. These latter angles connect the web joining the box columns together, and thus form one main column. This web is of ¾in. plate, but is not continuous from top to bottom, a space on the lower, or ground floor portion, having diagonal bracing, the intervals between which are filled with sashes and galled.

On the upper or balcony floor portion there are also sashes, but of square form in the webs of the principals. To each box column there are two sole plates, 24in. by 21½in. by ½in., which rest on 24in. by 12in. transverse timber bearers, and are secured to them by 1½in. screw bolts.

The main columns are further secured by timber transverse bearers of the pier by strong anchor straps riveted to the inner and outer faces of the columns, and bolted to the timberwork by 1½in. bolts spaced 4ft. 6in. apart, so that a wide base is thus secured to the columns.

The roof principals are parallel lattice girders 15in. deep, having top and bottom flanges of two angles, 3in. by 3in. by ¾in., and lattice bars 1½in. by ¼in. They are stiffened, and some architectural effect is obtained at their junctions at the apex of the roof with the main columns by strong curved members, between which and the girders wrought-iron scroll-work is introduced.

The roof purlins are lattice girders 15ft. long and 9in. deep, and spaced 5ft. 2in. apart, from centre to centre. The top and bottom members are T section, 3in. by 3in. by ¾in., connected by

1½in. by ¼in. lattice bars. The balcony is carried by 5in. by 4½in. rolled joists, spaced 5ft. apart from centre to centre, laid transversely to the line of the balcony, and supported by two lines of 7½in. by 3½in. channel beams, riveted respectively to the inner and outer faces of the main columns, and also to 4in. by 3½in. by ¼in. angle-iron supporting brackets. Fig. 2 shows the sections of this building.

CHIPS.

Mr. J. Ritchie Findlay, of Aberlour, chief proprietor of the *Scotsman* newspaper, was presented on Friday with the freedom of Edinburgh, in recognition of his public services, and particularly because of his having provided in Edinburgh, at a cost of over £60,000, a building in which is housed the Scottish National Portrait Gallery.

The Mersey Docks and Harbours Board have decided to extend in a southwardly direction the new double-story shed on the west quay of the Huskisson Dock, at an estimated cost of £22,000; and to underpin the west and south-east quays of the Huskisson Dock, and also to dredge the dock at an estimated cost of £49,900.

New Board schools are being erected at Walthamstow from the designs of Mr. Longmore, architect, London. Special consideration has been given to the ventilation, which will be carried out on the Boyle system.

Sir David Salomons has offered to build and present to Southborough a theatre, as a local memorial of the Queen's reign. The plans exhibited show an interior circular gallery, in addition to the usual auditorium, while the stage is to be designed on principles similar to Sir David's own theatre at Broomhill. Underneath the stage will be dressing-rooms. There will be two entrances placed on either side of the box-office, and retiring rooms will be provided in connection with the pit and stalls, while behind the stage are the offices. The front elevation is in two stories, with gabled roof above. On the ground floor are the approaches to the large hall on either side of a central ticket-office, while outside is a covered way for carriages. Over this, on the upper story, is a large room in which not only meetings, but dinners, can be held, and adjoining this are a serving room and kitchen.

Mr. R. C. Master, lately assistant in the city engineer's office, Liverpool, has been elected the assistant surveyor to the Strand District Board of Works.

The council of the Auctioneers' Institute have written to the Commissioners of Inland Revenue on the subject of the estate duties and valuations for probate and administration.

In succession to Mr. R. Johnson, who retires at the end of the present month after fifty years' service, Mr. Alexander Ross, of the Manchester, Sheffield, and Lincolnshire Railway, has been appointed the chief engineer of the Great Northern Railway.

During the past few weeks alterations have been made to the laundry at the hospital in Coventry. The old building has been converted into a steam laundry, and has been doubled by the addition of four new rooms. The whole is ventilated by a Blackman fan. The work was carried out under the supervision of the architect, Mr. H. W. Chataway, Mr. C. G. Hill, of Coventry, being the contractor.

By the decisive majority of 35 to 14, the Hull Town Council have decided to purchase the Kingston Gasworks' undertaking for £92,500. This company supplies the town of Hull with gas within the area of the docks at 3s. per 1,000c.ft. The British Gas Company, which caters for the borough on the other side of the docks, charge 2s. only.

A stained-glass window, in memory of the late Sir James Anderson, the associate of the late Sir John Pender and others in the establishment of submarine telegraphy, is one of the features of the new chapel that has been erected at the parish of Dumfries, his native town.

Messrs. Phillips, Son, and Neale concluded, on Friday, the sale of the first portion of the collection of Oriental objects of art formed by Mr. Ernest Hart. The four days' sale of 815 lots produced a total close on £3,200.

In the new Established church now nearing completion at Juniper Green, N.B., there has just been placed in the chancel a memorial window. The window is of four lights and foliated tracery. The top sexfoil light has been filled in with a half-length figure of St. Margaret, Queen of Scotland. The lower four Perpendicular lights have each a life-sized figure occupying about one-half of the space—viz., Moses, the Saviour, St. John, and St. Paul. The cartoons for the figures were drawn by Mr. Harrington Mann, and the window is the work of Messrs. J. and W. Guthrie, Glasgow.

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ILLUSTRATIONS.

THE GALLERY AT HARDWICKE HALL.—WORKS OF ART FROM SOUTH KENSINGTON.—THE KING'S HEAD HOTEL, NEWPORT.—REREDOS AND HIGH ALTAR, ST. CUTHBERT'S, KENSINGTON.—HOUSE AT WESTGATE.—CATHEDRAL OF LE PUY, FRANCE.—HOUSE AT BRIDLINGTON QUAY.

Our Illustrations.

HARDWICKE HALL GREAT GALLERY.

THE distinguishing feature in England's historical mansions is chiefly, perhaps, to be found in the Great or Long galleries which they nearly always possessed. That at Hardwicke ranks among the finest. Lord Hartington, before he became Duke of Devonshire, occupied the house as his Derbyshire seat, and, of course, the hall and the magnificent park in which it stands are beautifully kept and well cared for. The double-page plate which we publish to-day shows the interior of the gallery with its picture treasures, tapestries, and furniture. We have before given the history of the mansion and some illustrations of the building. For example, on Jan. 6, 1888, we printed four interior views, an exterior appeared on Aug. 17, 1888, and a pencil drawing by Mr. Maurice B. Adams was published in illustration of the great fireplace of the hall on Jan. 6, 1893. Our present illustration is from an excellent photograph recently taken by Messrs. Richard Keene, Limited, Derby.

WORKS OF ART IN SOUTH KENSINGTON MUSEUM.

This double-page plate, in continuation of the Objects of Art chosen for us by the late Dr. J. Henry Middleton, the director of this great national collection, represents some very useful and suggestive examples of cast work executed in bronze. The great Italian bronze knocker, measuring 11½ in. long by 9½ in. wide, is an excellent specimen of design in application to utility, but more especially as a specimen of the modelling most worthy of adoption for cast work. The demi-figure, with extended arms, grasping a lion on either hand, is incidentally the subject of the composition; but the management of its lines, and the contrivance of its detail in a most masterly manner, unite in emphasising the purpose of the form adopted, and its appropriately artistic execution in the material chosen. The play of light and shade, the relation of solid to void, and the pose of the figure leave nothing to be desired. The work belongs to the 16th century, and the knocker was bought for the Museum in 1855 for £8. The same type of excellent work is illustrated by the contemporary Italian bronze handle figuring on the same sheet. The ring, shaped with foliated ornament, is grasped by a mask of Pan, the subject of the escutcheon, which terminates in well-designed foliations and scrolls. The height of this handle is 6½ in., and its width is 4½ in. It was acquired for £6 in 1860. The dates of purchases of this character are often useful, as taste changes, and prices accordingly vary; thus, in the forties,

and even early fifties, many objects of art and furniture were sold at Christie's for as many shillings as if sold to-day they would fetch pounds. Another handle of charming fashion is composed of a siren figure with a double tail twisted through her arms, the hands being clasped behind the head. The dimensions are 4 in. by 3½ in. It belonged to the Soulares collection, from whence it was purchased 30 years ago for £2. From the same collection came the cast bronze foot of an Italian coffer, of which a photograph is included in our plate. Here a siren figure, terminating in acanthus foliage and winged, forms the subject of the design, which is exceedingly graceful and large in treatment, though its actual height is only 4½ in.; the greatest width is 3 in. Fifteen shillings was a moderate price for so charming a specimen. The last object to be mentioned to-day is the handbell of Venetian cast bronze decorated in relief, with three shields of arms and a quatrefoil containing the winged lion of St. Mark. Festoons are ranged round the upper part of the bell and between the shields; medallions of a Roman Emperor occur below hanging bunches of fruit and flowers. The verge and crown of the bell are fittingly enriched with narrow bands of leaf ornament. The handle is neatly chiselled with elaborated and foliated patterns, a fir cone surmounting the top. This elegant bell belonged to the Castellani collection, and was bought in 1884 for £8. Its height is 7½ in., and greatest diameter 3½ in. Mr. A. B. Skinner, assistant-director, has given us the prices and some other items of information incorporated in the above references. The photographs reproduced were specially taken for our pages by Messrs. Dixon and Son.

RECONSTRUCTION OF THE KING'S HEAD HOTEL PREMISES, NEWPORT.

THE object of the proprietors, Messrs. William Blackburn and Company, is to make this hotel one of the finest in the locality, rendering it replete with all modern conveniences. Hydraulic passenger and goods lifts will be provided to work each floor. The kitchen and laundry departments will be arranged on the upper floor, which will be fireproof. About 90 sleeping rooms will be provided. A portion of the first floor will be used by the County Club, with separate entrance and billiard-room. The stabling is arranged at the back in three floors, approached by sloping ways, and affording stabling for over 70 horses. The main façade will be faced with Bath freestone, with grey granite base and polished granite pilasters to main entrance. The buildings will be lighted with electricity throughout. The corridors will be warmed by means of hot-water coils. The work is being carried out by Mr. William Blackburn, one of the proprietors, under the superintendence of the architects, Messrs. Habershon and Fawcner. The cost is expected to be about £20,000, and the portion of the present building to remain is equivalent to about £4,500.

NEW HIGH ALTAR AND REREDOS, ST. CUTHBERT'S, WEST KENSINGTON.

THIS drawing, from the Royal Academy Exhibition this year, represents the new altar-piece designed to occupy the vast space over the high altar in this church. The motif of the arrangement adopted is an attempt to combine a triptych with a canopy above, the whole resting on a base of marble, in front of which is placed the altar and retable, approached by steps. The former to be of dark oak, with panels of repoussé silver, surrounded by a border of pierced tracery, sparingly relieved with colour and gilding. The retable is intended to be of various marbles. The triptych is divided by tracery into panels, each one of which is spaced to contain a figure of an English saint in coloured gesso. The canopy, supported by brackets and a vaulted cove of open tracery, consists of a base of panelling supporting 13 niches occupied by carved figures of Our Lord and the Twelve Apostles. At the angles of the canopy are carved figures of the archangels. The whole would be relieved in parts with gold and colour, the woodwork being of dark oak. Mr. Cyril E. Power is the architect, from whose drawing the proposed organ for the same church was illustrated in our pages on Nov. 27.

HOUSE AT WESTGATE.

THIS house, erected in brick, is at Westgate, and the drawing by the architect, Mr. Arthur Keen, was exhibited at the Royal Academy this year. The plan accompanying the view illustrates the picturesque arrangements of the interior, which

are externally treated in a symmetrical elevation of homely dignity. The drawing-room is contrived on the first floor to the rear of the building, in order to command an uninterrupted sea view.

CATHEDRAL OF LE PUY, FRANCE.

AMONGST our illustrations will be found two views of this celebrated old Romanesque building. The Cathedral stands in an exalted position, high over surrounding buildings, and the main approach is up the steep street to the base of the wonderful staircase of 134 steps, which not only leads to, but is continued under, the deep-set central opening of the great portal, beneath two bays of nave, and then, instead of proceeding, as formerly, towards the main altar, it passes through an archway supported by porphyry columns, with the miraculous stone beneath the Virgin's image, and diverges to the right and left, the stairs on the left leading to the cloister, and by those on the right the floor-level of the church is gained. The exterior of the nave walls is of light and dark stones, in patterns. There are considerable remains of 12th and 13th century frescoes. The cloister, according to Viollet-le-Duc, contains the earliest type known of a cathedral cloister—viz., 8th or 9th century. Louis XVIII. made some repairs internally. The choir has been rebuilt, and the west front restored. Our reproductions are from sketches given in the *American Architect*.

CHIPS.

At last week's meeting of the London County Council, the General Purposes Committee reported that the additional year of office voted to Mr. Thomas Blashill, the superintending architect, who is now 66 years of age, had expired; but they were of opinion, as it would cause inconvenience to the public service for him to retire at present, that he ought to be allowed to hold the office for another year. The council concurred.

The condition to which corn land has fallen is shown by the fact that the Farnbridge estate, of 763 acres, near Rochford, 40 miles from London, valued in 1872 at £30,000, and on which an insurance company advanced £20,000 on mortgage, has been within the last few days sold for £6,275.

The picturesque old Judenstadt, or Jewish quarter, at Prague, is doomed, and in a few years' time will have shared the fate of the Ghettos of Rome and Florence. It has been condemned as insanitary, and, owing to the lowness of the ground, is subject to inundations when the Moldau is in flood; it is therefore proposed to rebuild the entire quarter on a higher level. Right in the heart of it, amid a labyrinth of narrow lanes, crooked alleys, and arched passages, lies the old burial-ground of the Jewish community, which is crowded with tombs, but has been disused since 1787.

Mr. W. O. E. Meade King, C.E., an inspector of the Local Government Board, held an inquiry at the town hall, Burslem, on Friday, into the subjects of applications made by the corporation for sanction to borrow £6,000 for gasworks purposes and £1,925 for works of street improvement. Mr. F. Bettany, borough surveyor, explained the proposals.

The Lord Provost's Committee of Edinburgh Town Council have approved of their sub-committee's report, recommending the purchase of the Northern Tramways at the price of £115,000.

It has been resolved to enlarge the Albert Institute, at Windsor, at a cost of about £1,600.

The properties offered at the Auction Mart last week, although not of an important character, were of a saleable class, and found ready buyers. The aggregate was £73,897, which, for the time of year, was very satisfactory. Sales have been held on the first four days this week, and were the last of the year. As far as can be judged at the present time, the supply in the early weeks of 1897 will be shorter than usual. The demand for good investments shows no diminution, and if good properties are brought into the market there will be no lack of ready buyers.

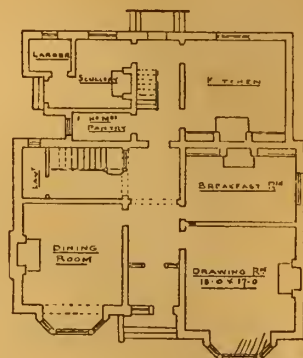
A new screen of carved and gilded oak, costing £1,000, was last week erected in Blisland Church, Cornwall. It is the gift of the rector and family. It was made in London and brought to Blisland, and five workmen have been engaged in embellishing it for the past month.

Mr. W. H. Collier, manager of the Bridgewater undertaking, has been appointed manager of the Manchester Ship Canal, in succession to Mr. Marshall Stevens.

Extensive additions are about to be made to the East Poorhouse at Dundee, from plans by Mr. William Alexander, city architect.

A mission church is about to be built at Sandford Hill, Longton, Staffs., from plans by Messrs. Lynam and Beckett, Stoke-on-Trent. The estimated cost of the first section of the scheme is £3,000.

House at
Bridlington Quay
for Wm Todd Esq.
Joseph Shepherdson
Architect



Interior View

HOUSE AT BRIDLINGTON QUAY.

THIS dwelling-house has recently been erected at the above rapidly-rising watering-place. The exterior is of red pressed bricks, with dressings of stone and tawny terracotta, with a roof-covering of Westmoreland green slates. Taking the limited site into consideration, the idea was to get a roomy and convenient dwelling-house at a reasonable cost. The total outlay was about £1,600. The architect was Mr. Joseph Shepherdson.

Sir George Newnes has intimated to the Putney Free Library Commissioners that he will make a gift of a new building to the parish, to supersede the present inadequate library.

At the last meeting of the urban district council for Weston-super-Mare, a communication from the Local Government Board was read sanctioning the borrowing of £3,567 for the new market and lock-up shops, and on the motion of the chairman it was resolved to invite tenders for the erection of the premises, according to the plans of Messrs. Price and Wooler, of Weston.

The Malton Rural District Council have considered a suggestion from Mr. R. Richardson, C.E., that six villages extending for seven miles between Malton and Slingsby should be connected to the Malton Waterworks, where new pumping plant has recently been obtained at a cost of nearly £2,000. The engineer was instructed to prepare a report of the cost of the scheme.

At the last meeting of the Foleshill Rural Sanitary Authorities, Mr. H. Bertram Nicholls, of Birmingham, was appointed engineer for the Bedworth works of water supply.

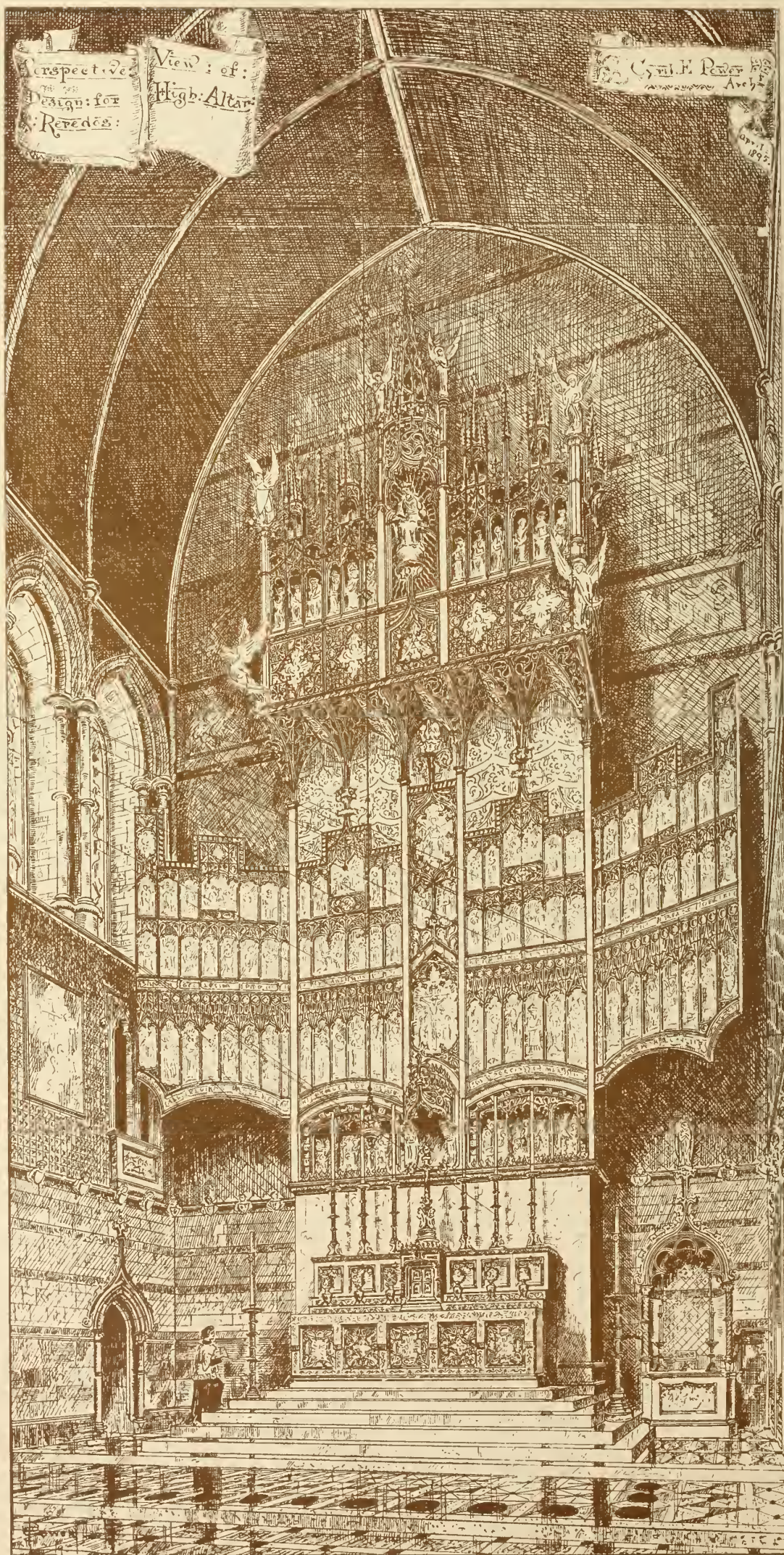


Photo-Lithographed & Printed by James Akerman, 6, Queen Square, W.C.



THE GALLERY AT HARDWICKE HALL

S. DEC^R 18, 1896.



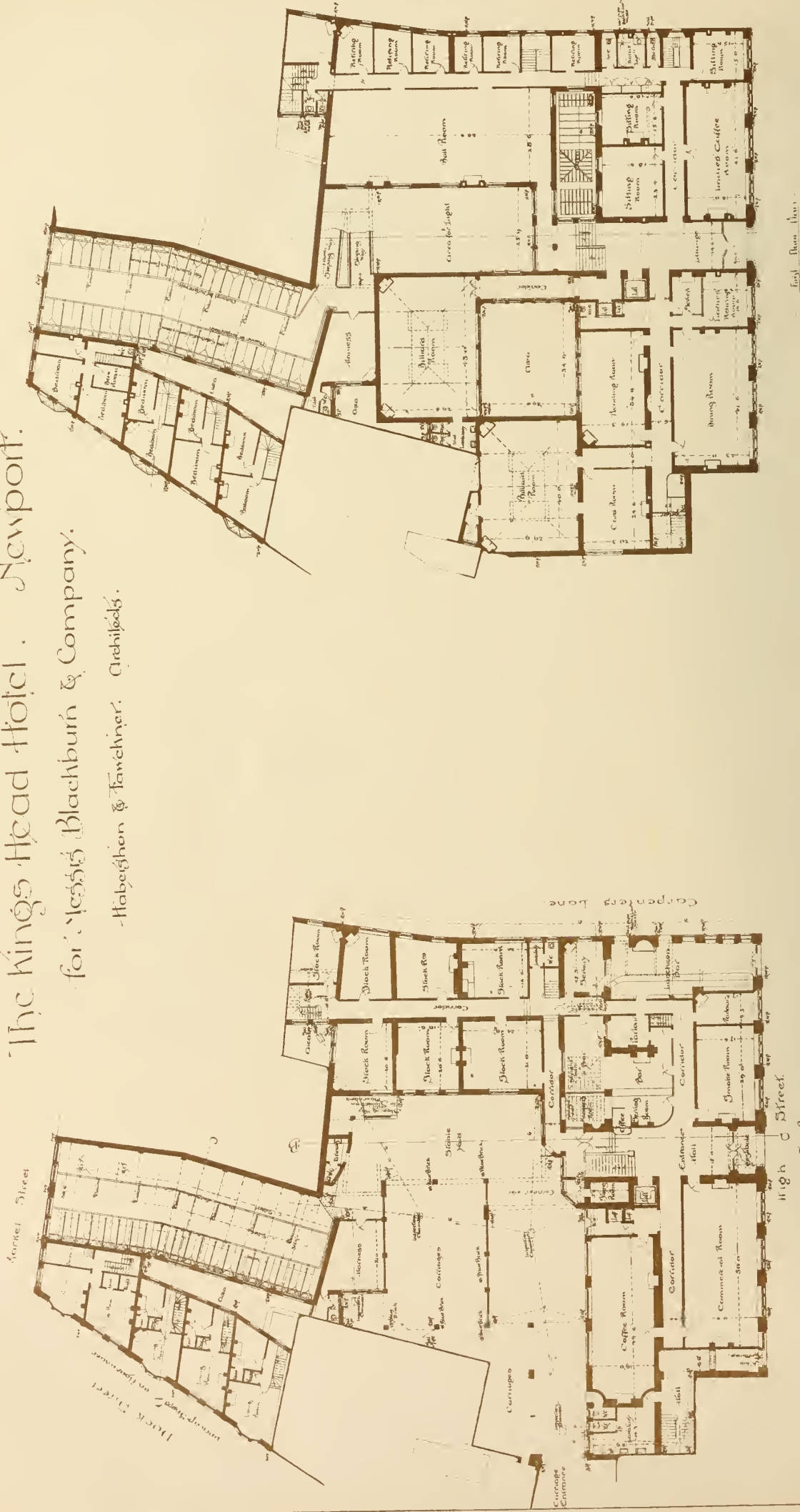
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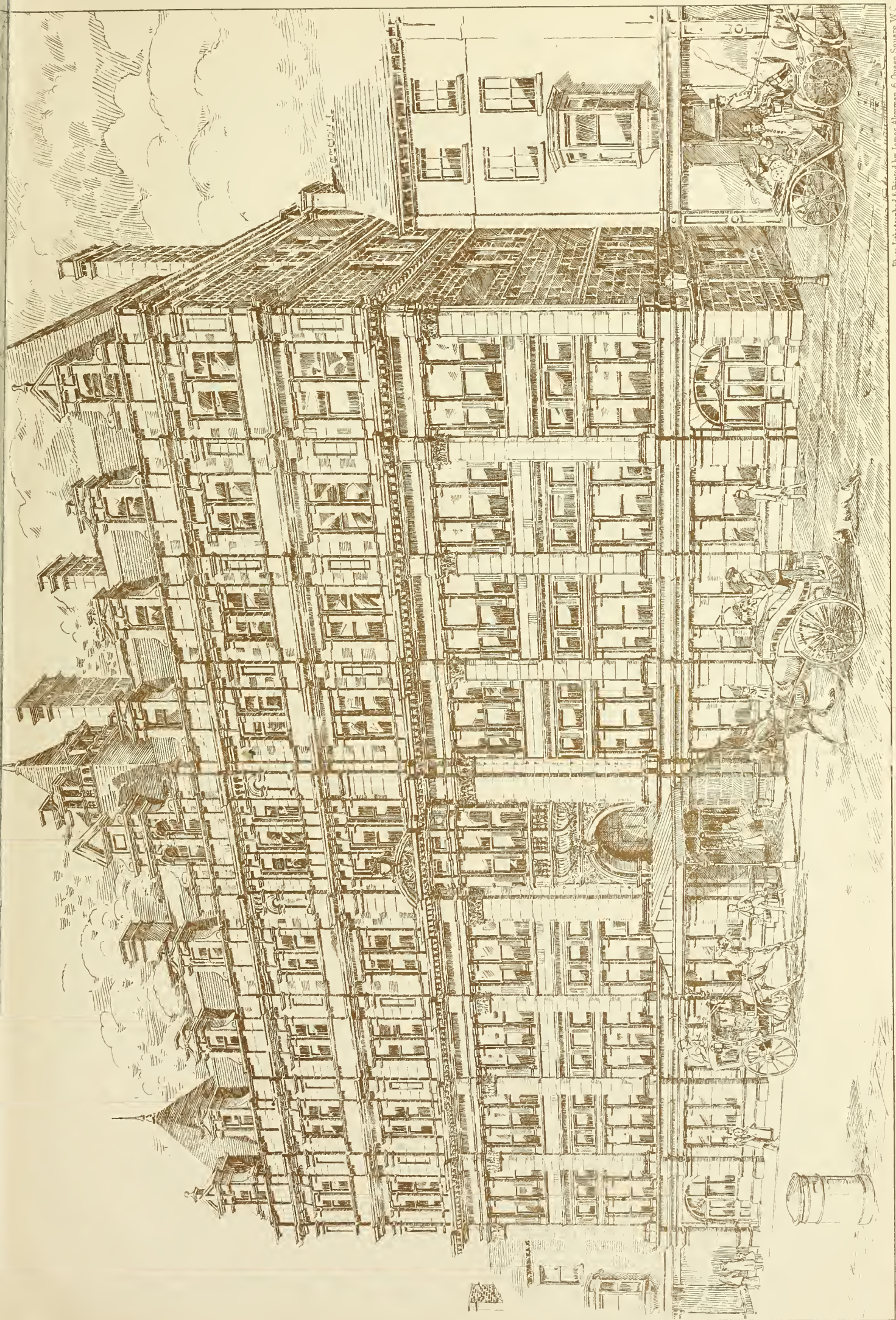
FROM A PHOTO BY RICHARD KEENE L^D DERBY.

The Kings Head Hotel. Newport.

for Messrs Blackburn & Company.

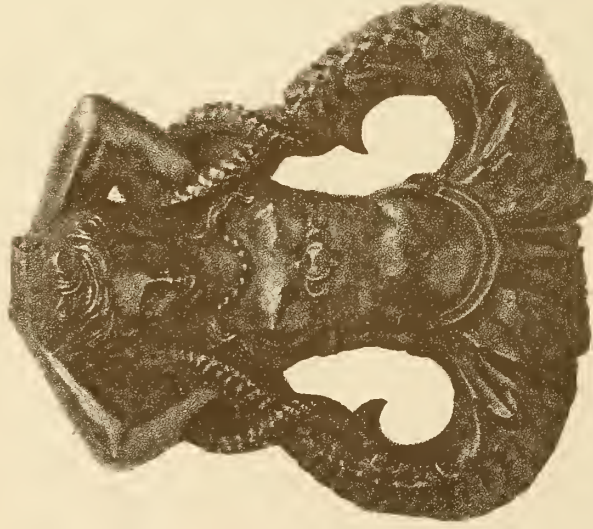
Hobbs & Trenchard Architects.



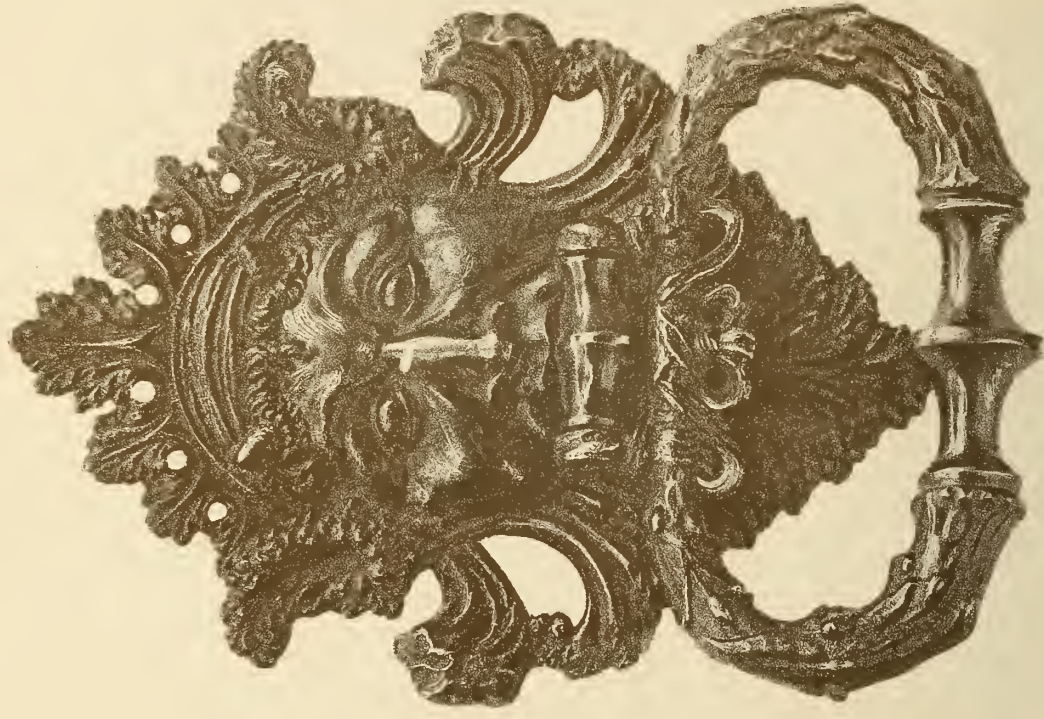




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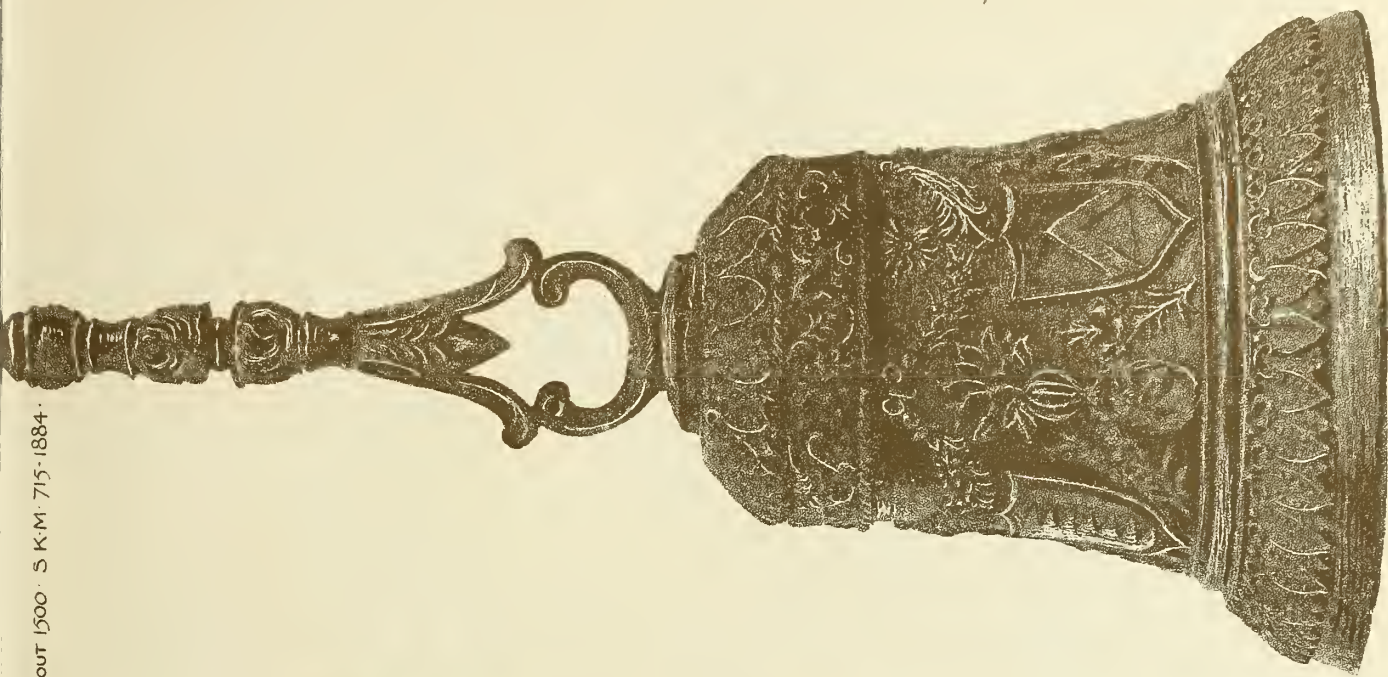
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BRONZE KNOCKER · ITALIAN · 16TH CENTURY · S.K.M. 1592 · 1855

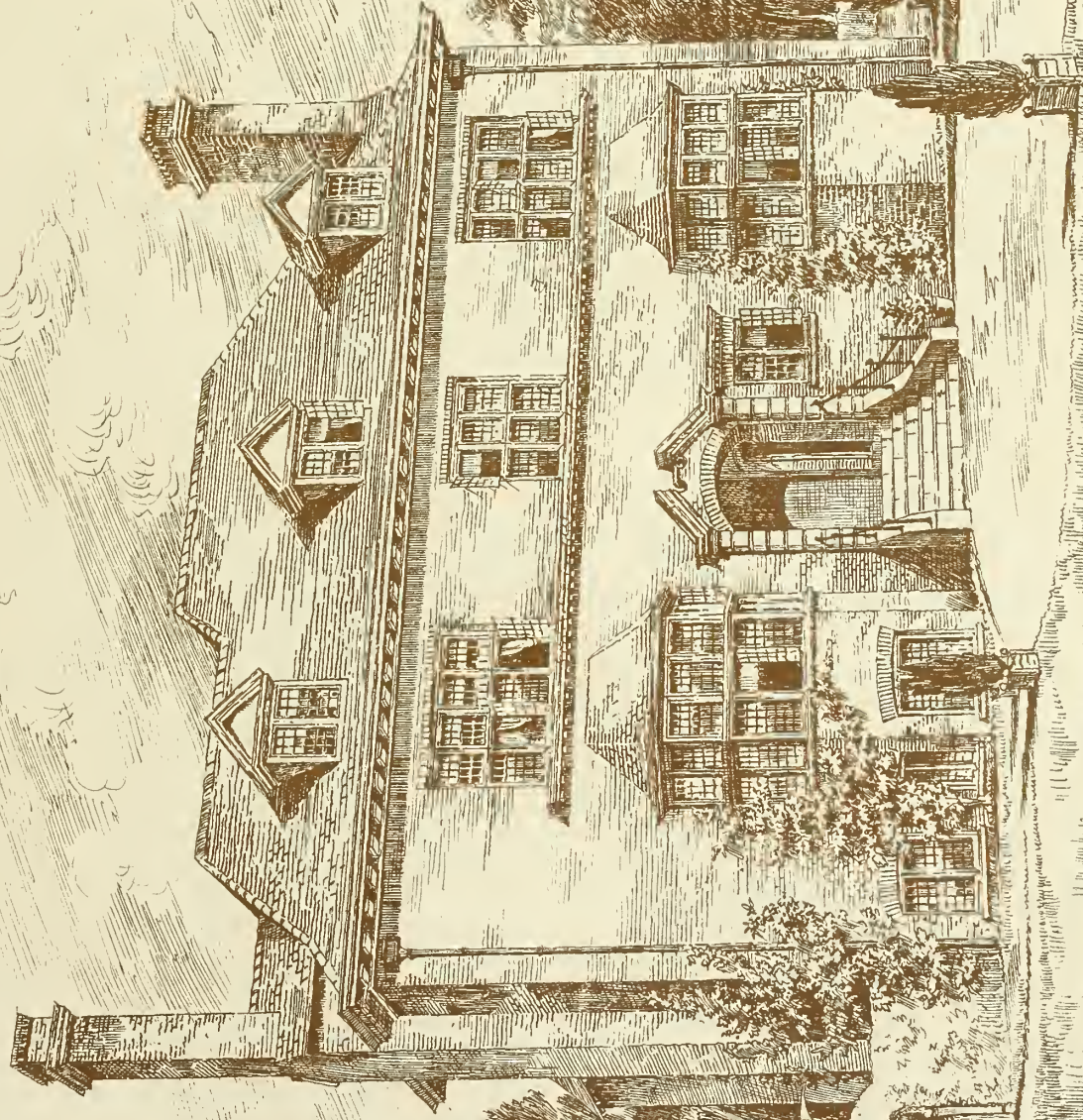
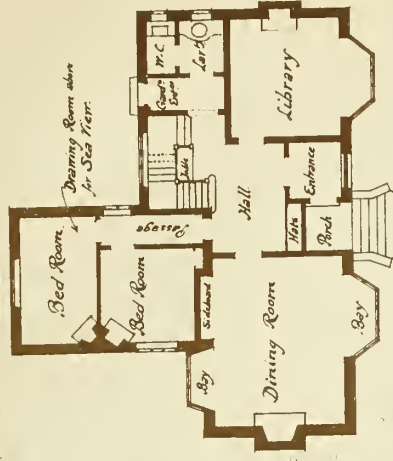
WORKS OF ART IN THE SOUTH KENSINGTON MUSEUM.

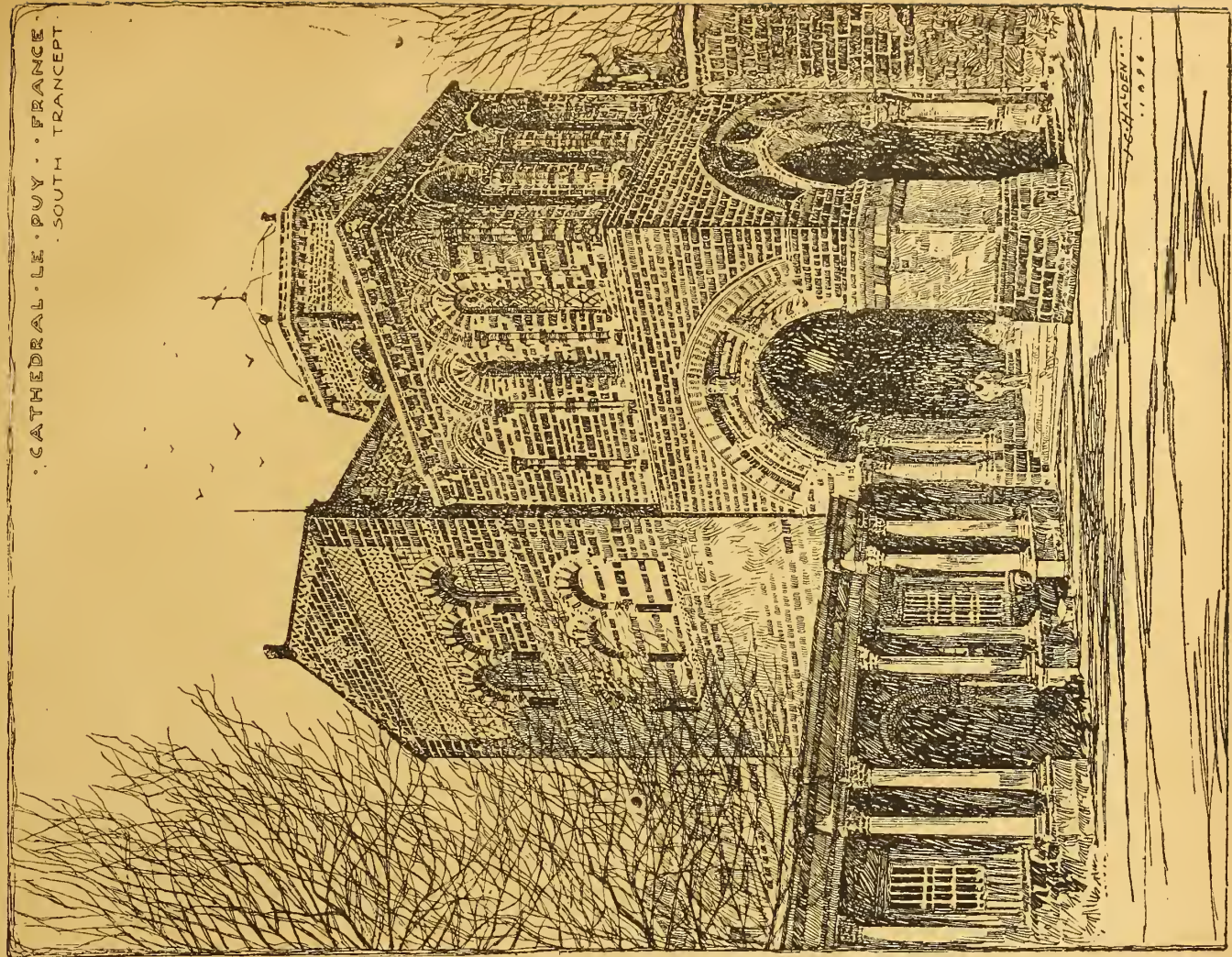
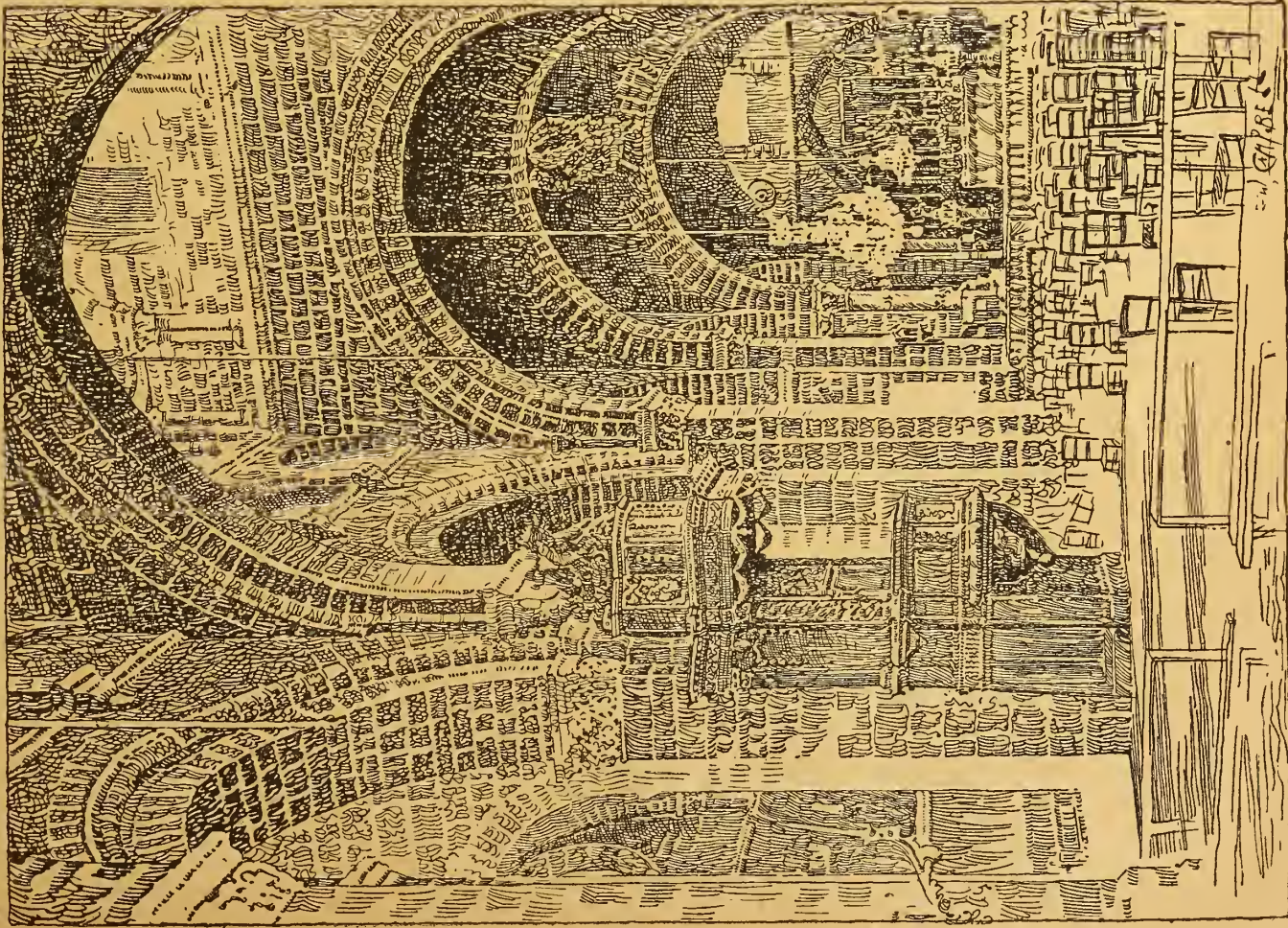


ITALIAN · ABOUT 1500 · S.K.M. 715 · 1884

HOUSE AT WESTGATE · ARTHUR KEEN · ARCHT.

ARTHUR KEEN. ARCHT.





CATHEDRAL · LE · PUY · FRANCE ·
· SOUTH · TRANCEPT ·

OBITUARY.

The death is announced, at the age of 46 years, of MESSRS. WALKER and SLATER, of the well-known firm of Messrs. Walker and Slater, builders, of Derby. The deceased, who was a bachelor, had resided for many years past at Field House, Old Uttoxeter-road, and with Mr. John Walker (his cousin) he had carried on the present business for upwards of twenty years. Mr. Slater was born in the year 1850, his father being the late Mr. John Slater, who was also a builder in the town. His father died five years later, and in the year 1875 Mr. Walker and himself took over the business which had been previously established on the Old Uttoxeter-road by their uncles, Messrs. W., H., and J. Slater. Mr. Wm. Slater died in that year, and, the two other brothers retiring, Mr. Walker and Mr. Raymond Slater entered into a partnership, which has been a successful one. The last great work of the firm is now almost complete—viz., the erection of the new Derbyshire Royal Infirmary. The deceased was warden of the Church of St. John's for sixteen years, and made many munificent gifts to the church, including the site of the new day-schools. He had also sat since November, 1893, in the town council, and was returned unopposed last month on seeking re-election; he had taken great interest in Freemasonry, having served as master of his lodge and as Provincial Grand Superintendent of Works.

CHIPS.

Dr. E. F. Fussell, medical officer of health for East Sussex, died on Sunday at his Brighton residence, 23, Clifton-terrace, aged 70.

A movement was recently started for the purpose of extending the St. Catherine's Home for Incurables in Bradford, and Mr. J. Cawthra, stuff manufacturer, Bradford, has undertaken to purchase a site and build suitable premises at his own cost. Mr. J. Ledingham, architect, of Bradford, has received instructions from Mr. Cawthra, but neither the plan nor the site has as yet been decided on.

The Glasgow Subway Railway was opened on Monday. The railway consists of two tunnels running parallel, each 11ft. in diameter. Its circuit is beneath the chief streets of Glasgow, and is 6½ miles long with 15 stations. The fare is a penny, and the cars are hauled by cable and lit by electricity. The cost of the undertaking has been about one million sterling.

Sir Edward J. Poynter, P.R.A., was elected an honorary member of the Royal Society of British Artists at a general assembly held on Monday evening.

The Senate of Cambridge University have, by a large majority, come to a decision on the long-debated question as to the site for the Sedgwick Memorial Museum. They have rescinded the decision of June 18, 1891, reserving a portion of the Old Anatomical Schools facing Downing-street for the erection of the museum, and agreed that it be erected upon a portion of the Downing College site, recently acquired by the University.

A familiar landmark has been removed from the Dorset coast during the recent gale. The smaller of two chalk perpendicular rocks at the entrance to Swanage Bay, known to many steamboat travellers and visitors to Bournemouth as Old Harry and his Wife, has been destroyed. The two rocks stood out boldly from the mainland, and the Wife had for several years past been greatly affected by the ravages of storm and tempest.

A well-chased standing cup and cover in foreign silver-gilt, the work of Jacob Fröhlich, of Nuremberg, was sold on Friday at Messrs. Christie's. It weighed 35oz. 1dwt., and the price paid for it, £760, works out at the extraordinary figure of nearly £22 per ounce.

At a special meeting of the Dundee Town Council on Friday preliminary arrangements were made with a view to the erection in a public position in the city of a statue to the Queen, to mark the 60th year of her Majesty's reign.

At Tuesday's meeting of the London County Council, a recommendation by the works committee that Mr. Holloway, the late manager of the Works Department, should be paid his salary up to Jan. 1, 1897, met with strong opposition, and was eventually defeated. The estimate for the erection of a seventh lunatic asylum at Horton Manor, amounting to £350,000, was approved. The report of the highways committee on the purchase of tramways was discussed at great length, and various amendments to the lease were submitted and rejected. It was decided that no employé of the company working the tramway should be engaged more than six days a week. The clauses of the lease were still under discussion at ten o'clock, when the Council was counted out.

Building Intelligence.

LEEDS.—The Roman Catholic church of the Sacred Heart in Burley-road, Leeds, was reopened on Sunday, after having been enlarged. The church, which was originally 50ft. long and 28ft. wide internally, has been enlarged to 87ft. long and 46ft. wide by the addition of three bays to the nave and an aisle 87ft. long by 18ft. wide. The church will now seat over 600 persons. Under the church are new infant schools, with class-rooms, having accommodation for 200 infants. The contract for the school and church amounted to £2,518 18s. The architect was Mr. John Kelly, of Leeds and London.

MANCHESTER.—The Earl of Derby presided on Monday over a meeting of trustees of Manchester Royal Infirmary, to consider a recommendation from a special committee in favour of rebuilding the structure, and enlarging its accommodation from 298 to 428 beds at a cost of £200,000. It will be recollected that, as a result of a limited competition determined in July last, Mr. Alfred Waterhouse, R.A., as assessor, recommended the adoption of the design submitted by Messrs. John W. Simpson and E. J. Milner Allen, of New Inn, Strand. Great opposition has been manifested to the proposal to rebuild to a larger scale on the existing site, which is said to be insalubrious, and the proposal is strongly supported to divide the institution, and erect the new portion at Stanley-grove, remodelling the existing infirmary. At the meeting on Monday the Lord Mayor of Manchester submitted an amendment to the effect that it was not desirable to take any steps at present. The numbers voting on either side were so nearly equal that it was decided to take a poll of the whole body of the trustees. The result will be made known in a week.

NEW BIRKBECK BANK.—On Saturday afternoon 150 masters and students of the Polytechnic Architectural and Building Trades' Classes accompanied Mr. Charles Mitchell on a visit to the new buildings of the Birkbeck Bank in Southampton-buildings, by permission of the architect, Mr. T. E. Knightley, F.R.I.B.A. The party was met by the clerk of works, Mr. Buckle, and by Mr. Moody, the foreman of the works for Messrs. Wall and Sons, the builders, and by Mr. Bone, on behalf of Messrs. Doulton and Co. Under the dome a short lecture was delivered by Mr. Charles Mitchell, in which he enumerated the notable points and features. In the centre is a large circular hall 75ft. in diameter, in which the banking business will be carried on; this will be surmounted by a dome, the external portion of which is now practically finished. Access to this hall will be by a lofty and spacious entrance at the angle of the building, while grouped about the central hall will be arranged suites of offices. After the lecture the students were divided into six sections, each under the guidance of a master, and were detailed off on a tour of inspection. The brickwork is carried up both in London stock and Fletton bricks in cement mortar; wherever tiles are to be fixed to the wall the Fletton bricks have a dovetailed key formed on their outer surface. The facings in the open areas are of white glazed bricks, the arches and sills of all openings being in buff terracotta; at other places, where bricks are employed on the face, they are of white gault. The floors throughout are fire-resisting, being formed of steel joists and concrete of broken brick and cement. There will be two staircases; the main one is situated in a chamber between the chief entrance and the circular banking hall. The stairs are supported by a steel framework throughout the whole height, the landings are to be of concrete, the steps of solid oak (which are to be fitted one to the other, after the manner of stone steps), the soffits will be covered with oak framing, the newels will be of solid oak carved, and the balustrading of wrought ironwork; the secondary staircase will be formed on similar lines. The entrance will be decorated with terracotta tile work and mosaic. The openings throughout are fitted with double-hung sashes. Fresh air will be supplied to each of the fireplaces by means of tubes placed beneath the floors, which will conduct the air from the air bricks in the outer wall to the underside of the grates. The dome, the chief feature of the building, is 75ft. in diameter at the base. The springing is 30ft. from the ground level; the drum consists of a thick brick wall, in which is imbedded a cast-iron stanchion, one beneath each of the 16

steel ribs, and forming an extension of the same to the ground level. The tops of the stanchions are connected by a steel ring in the form of a girder, which forms the springing for the steel ribs of the dome, each being 45ft. in length; the upper ends of these are bolted to a second steel ring about 15ft. in diameter, which forms the key for the ribs and the base for the lantern above. The space between each bay is filled in with wood rafters, and covered with boarding, felt, and lead; at the lower portion of each bay a large dormer light is introduced. The interior of the dome is to be carried out in Carrara ware terracotta, there being in reality two domes; the inner terracotta one, being connected by specially-formed blocks to the flanges of the steel ribs, sufficient play being allowed to prevent expansion and contraction of the steel ribs having a detrimental effect on the linings. The interior of the dome will be pictorially decorated, the subjects being various phases of financial and commercial life. There is to be a steel-framed gallery at about 20ft. from the floor level.

TRURO CATHEDRAL.—A meeting of the Cathedral committee was held on Friday, the bishop presiding, to consider the question of the continuation of the building. Dr. Gott stated that some time ago he was offered £1,000 on condition that the building of the cathedral was continued at once. He consulted Lord Robartes and the two archdeacons of the diocese, and it was decided that they could not start building with such a sum. He tried to induce the person who offered the money to invest it for use in building when the opportunity offered, but he was afraid the chance had gone. The Earl of Mount-Edgcumbe had, however, promised £1,000, and wished to give a similar sum to the diocesan clergy sustentation fund. Dr. Gott added that he himself would give £1,000, spread over five years, and Lord Robartes would give £2,000, spread over three years. A committee was appointed to arrange for a county meeting. Mrs. Arthur Tremayne, of Carclew, who was instrumental in collecting £15,000 for the internal fitting of the existing portion of the cathedral when its erection was in progress, offered to work in a similar way now, and the committee accepted her offer with thanks. Mr. J. L. Pearson, R.A., the architect of the cathedral, sent an estimate of the cost of the work remaining to be done. This reached a total of £71,000, the work including the completion of the nave and the western towers to the height of the aisles, £34,000; the completion of the western towers and spires, £14,500; the completion of the central tower and spire, £10,000; the chapter house and vestibule, £6,000; the cloisters, £5,000; and the north and south porches, £1,500. The sum already spent on the cathedral is £115,507, which includes £96,180, the cost of the building of the choir, baptistery, and part of two bays of the nave, and £16,150, the cost of internal fittings, including organ, reredos, &c. The total endowments of the cathedral are £1,196 a year, and there is £7,000 in the hands of the Ecclesiastical Commissioners towards the endowment of a third canon's stall.

In consequence of opposition strongly manifested in Birmingham, St. Mary's Church and parish will be withdrawn from the scheme of the Bishop of Worcester's Commission for the removal of city churches, so that only two churches are now threatened.

An extension of Perth Academy, involving an expenditure of £8,000, was opened on Friday. In 1891 provision was made at the academy for instruction in science and art by the erection of chemical laboratories, &c., and the present extensions, which consist of remodelling the existing departments, also include the establishment of a physical laboratory and improved workshops for instruction in technical education.

In the erection of the new Convalescent Hospital, Cults, near Aberdeen (Messrs. Smith and Kelly, Aberdeen, architects), special care is being taken to give efficient ventilation, and to insure entire freedom from draught. Messrs. Cousland and Mackay's "Climax" patent direct-acting continuous exhaust ventilators are being used for the ventilation of the hospital.

The concluding meeting of the current session of the Edinburgh Architectural Society was held on the 10th inst., when Mr. John Murray read a paper on "Scottish Plasterwork," tracing its progress from the Renaissance down to the Adam period, and illustrating such typical examples of ceilings as Winton House, Caroline Park, Hatton House, Kellie Castle, and others scattered about the old quarters of Edinburgh.

COMPETITIONS.

BELFAST CITY HALL.—At the last meeting of the city council, a letter was received from Messrs. Graeme-Watt and Tulloch, 77A, Victoria-street, Belfast, authors of Plan 22, withdrawing it from competition, intimating that they looked upon the decision of the assessors as final, and that no one was more surprised than they were to hear that their design had been placed in the way it was. It was proposed by Sir William McCammond, and seconded by Councillor Barklie: "That the council in committee, acting upon the advice of the assessors, do hereby select three plans for the City Hall, numbered 30, 42, and 43, for the authors to enter into final competition." The motion was carried unanimously.

CHRISTIANIA.—The Secretary of State for Foreign Affairs has received a despatch from Her Majesty's Acting Consul General at Christiania, stating that a notice has been published by the Norwegian Board of Works inviting foreign as well as Norwegian engineers to draw up competitive plans of station arrangements for certain railways having their termini in that city. Four prizes, worth about (10,000, 4,000, 2,000, and 1,000 kroner) £555 10s., £222 4s. 6d., £111 2s. 3d., and £55 11s. respectively, are offered. Plans of intending competitors must be sent in before two o'clock p.m. on March 31, 1897. Further particulars can be had on application to the Railway Office, Board of Works, Victoria-terrace No. 6, Christiania, where also maps and sections, &c., can be obtained on depositing 50 kroner (£2 15s. 6d.). Such further particulars as have been received may be seen at the Commercial Department of the Foreign Office any day between the hours of 11 a.m. and 6 p.m.

SOUTHEAST ESTATE, DARLINGTON.—The result of the competition for the laying out of this property as a residential building estate is that the first premium of £35 has been awarded to Mr. Robert E. Brinkworth, F.S.I., architect, surveyor, and land agent, of Chippenham, Wilts; and the second, of £15, to Mr. S. E. Burgess, C.E., of Stoke Newington, London. There were a good number of competitors.

ARCHITECTURAL & ARCHÆOLOGICAL SOCIETIES.

DUNDEE INSTITUTE OF ARCHITECTURE.—A dinner and "at home," under the auspices of the Institute of Architecture, Science, and Art, took place on Thursday night in last week at the Queen's Hotel, Dundee. The function was the largest and most successful ever held by the Institute, while it possessed the novel feature of the presence of ladies at the dinner-table. Mr. Leslie Ower, F.R.I.B.A., the President, occupied the chair, and reviewed, in the course of an interesting address, the work of the Dundee Institute during the past session. Among the matters which had engaged the attention of the council and a small committee for some time past, was the revision of the rules for the measurement of building work, as desired to be amended by the Master Builders' Association. The rules as revised have now been returned to the Builders' Association for their consideration. Another subject which had engaged attention was the amount of private work done by salaried servants in the municipal offices, and which should fall to private practitioners. Thanks to the ex-Lord Provost Hunter, this had to some extent been remedied, at least for the present. It would be a most desirable rule—one which might be embraced in the new Corporation Bill—that all plans presented for approval to the council should bear the signature of the architect, or engineer, or other person who had prepared them, so that the council might know that they were the production of a man of repute and skill in his profession. The question of a general union of practising architects in the kingdom was one affecting the welfare of the profession, and a movement was now in progress in the large centres in England, which it was hoped would prove productive of some step towards the attainment of that very desirable end. Had the Royal Institute of British Architects espoused the Bill for Registration of Architects instead of opposing it, the profession would have been even by that time in a very much stronger position. He regretted that the local Institute had not yet succeeded in getting committees issuing conditions for competitive plans to make these conditions in accordance with the suggestions of the Royal

Institute. Their municipal rulers could help forward the cause of architecture by encouraging building in the suburbs, by the extension of the tramway system, and by the formation of new streets. He recommended that there be embodied in the new Courts Bill the constitution of a superior Dean of Guild Court. Mr. W. C. Leng proposed the toast of "The Lord Provost, Magistrates, and City Council." Ex-Lord Provost Sir James Low responded. Mr. W. Alexander submitted the toast of "The Guildry." He specially alluded to the recent agitation for the abolition of the office of Dean of Guild, and emphasised the importance of the Dean of Guild Court in that it brought coterminous proprietors to an amicable understanding. Lord Dean of Guild Paul replied. Other toasts included those of "The Master Builders' Association," proposed by Mr. J. J. Henderson, and replied to by Mr. John B. Hay: "The Strangers and Kindred Architectural Societies," given by Mr. H. A. Pattullo, and responded to by Mr. R. G. Gildard; and "The Ladies," proposed by Convener Bell, and acknowledged by Miss Imandt.

GLASGOW ARCHITECTURAL ASSOCIATION.—A meeting of this association was held at the rooms, 187, Pitt-street, on the evening of Tuesday, the 15th inst. Mr. Wm. Tait Conner occupied the chair. Mr. Henry F. Kerr, A.R.I.B.A., representative of Edinburgh Architectural Association, delivered a lecture entitled "Notes on Elgin Cathedral." The purport of the lecture was to show what, in his opinion, had been the original disposition of the early church, which he (the lecturer) had carefully studied for some years. From the standpoint of design, proportion, and detail, few Scottish cathedrals can equal Elgin, and certainly none can excel it. The lecture was well illustrated with limelight views, and was terminated by a vote of thanks to the lecturer.

LIVERPOOL ARCHITECTURAL SOCIETY.—A meeting of this society was held on Monday week in the Law Library, Union-court. Mr. George Bradbury, who presided, expressed regret that Mr. H. L. Beckwith, who had filled the office of secretary for eight years, had felt it necessary to give up that position. Mr. Beckwith suitably responded. Professor F. M. Simpson was appointed honorary secretary, with Mr. Thornley as assistant honorary secretary. Professor Simpson then read a paper on "Architecture During Queen Victoria's Reign." Referring to St. George's Hall, he said that it was gratifying to find that its beauty was recognised from the first even by some members of the opposite school of architecture. Having quoted opinions of eminent authorities as to its being the most perfect specimen of modern architecture, he added that it was a most effective design, and one well worthy of careful study. It had been customary to praise the exterior of the building at the expense of the interior, but there was a good deal in the interior that was also well designed. The lecturer next referred to the changes in style of architecture in respect of churches, houses, and public buildings that had taken place during the past 60 years. He pointed to the Houses of Parliament and the Foreign Office as examples of the architecture of public buildings in the early part of the reign, saying that since then nothing so large had been attempted. Certain important buildings—such as the Law Courts, the Imperial Institute, and the Law Courts at Birmingham—had, however, been erected, and they showed the difference between the work of the present day and that of days gone by. With regard to house and church work, they seemed to be in a more settled state.

PLYMOUTH ARCHITECTS.—Mr. C. King presided on Thursday night in last week at a meeting of the Plymouth, Devonport, and Stonehouse Branch of the Devon and Exeter Architectural Society at Plymouth School of Art. Among those present were Messrs. H. G. Luff, A. S. Parker, R. A. Mill, W. Richards, B. P. Shires, R. S. Baker, J. A. Dwelley, E. M. Leest (hon. sec.), and G. W. Hancock. According to notice, Mr. H. G. Luff urged that some action should be taken respecting public officials competing for private work. This had been a matter, he said, which had occupied his attention for thirteen years. Architects in Devonport were not numerous; but they were boycotted more or less by the officials of the corporate body, who took work and were really robbing the local architects of their bread and cheese. He wanted that society to help architects in Devonport to put a stop to that sort of thing. He proposed a resolution to the effect that the local architects, as re-

presented by the Three Towns branch of the society, humbly submitted to the various local authorities that professional men labour under great hardship and disadvantage from the fact that some of their officials and their assistants were in the habit of undertaking a large amount of private work which should be executed by professional men in private practice. This was prejudicial not only to private professional interests, but also to public interests, inasmuch as all public servants ought to occupy a perfectly impartial and disinterested position in the administration of their departments. They ventured to hope that the various authorities would take such steps as they thought necessary to prevent effectually the continuance of this practice. They also suggested that all plans submitted to the authorities should be signed by an architect or surveyor, and that the resolution be sent to the town clerks of Plymouth, Devonport, and Stonehouse, the Admiral-Superintendent of the Dockyard, the commanding officer of the Western District, and the town clerk of Saltash. Mr. B. P. Shires pointed out that there was no law to compel the local authorities to have the plans signed by an architect. They could only suggest to the local authorities that the plans should be prepared by architects alone. After a brief discussion, Mr. Richards seconded, and the motion was carried, subject to its approval by the council of the society at Exeter. Subsequently Mr. E. J. Jarvis delivered a lecture on "Domestic Water Supply," illustrated by limelight views.

SOUTH-WEST LONDON POLYTECHNIC INSTITUTE.—The first meeting of the engineering society in connection with this institute, which has just been founded for (a) the propagation of building, electrical and mechanical science, (b) visits to places of interest, was held on Saturday last, Dec. 12, to hear a lecture by Professor Schwartz, A.K.C., A.M.I.C.E., A.I.E.E., on "Recent Developments in Electric Supply Stations," when Dr. Garnett, M.A., of the technical education board, occupied the chair. The lecturer of the evening being introduced, a very able lecture, opening up a wide field for thought and for the discussion which followed, was enjoyed, Professor Schwartz dealing more particularly with the new supply station at Leyton, which the society will visit to-morrow (Saturday).

CHIPS.

The Monkwearmouth Hospital, Sunderland, is being warmed and ventilated by means of Shorland's patent Manchester stoves, the same being supplied by Messrs. E. H. Shorland and Brother, of Manchester.

Mrs. Robinson, of Crow Hill, Marsden, who died last week, has left £3,000 to the building fund of St. Bartholomew's Church, Marsden.

Mr. A. Krauss, of Bristol, has just secured the contract for constructing a new sea-wall front and tramway extension at Morecambe. Mr. Krauss carried out a similar work in connection with the sea-wall front at Weston-super-Mare.

The first list of subscriptions to the Benson Memorial Fund shows that up to the present £2,032 have been promised.

At Clacton-on-Sea, the Pier Company are seeking powers to extend their existing pier a distance of 200 yards, whilst powers are also sought to construct a new jetty, pier, and landing station for the town.

The new fish-house at Newhaven, N.B., which has been erected by the Leith Dock Commissioners, at a cost of £20,000, was opened on Friday.

At the annual dinner of the Edinburgh and Leith Master Builders' Association, held last week, it was remarked that there was a movement at present to institute a Building Trades Exchange on lines somewhat similar to the Glasgow Exchange.

The eastern section of the Plymouth tramways was opened on Friday. The new line, which is over a mile in length, leaves the Old Town-street trunk at the junction with Ebrington-street, and after traversing the newly-widened thoroughfare, passes through Ham-street, along Tothill-road, and thence via St. Jude's-terrace and South Devon-place, to Prince Rock.

The Earl of Mayo delivered a lecture on "Modern Irish Furniture" in the Royal University Buildings, Earlsfort-terrace, Dublin, on Wednesday evening. This was the first of a series of eight lectures which have been organised by the Arts and Crafts Society of Ireland. The object of the society is to promote artistic handicrafts, and with the view of furthering this object, workers are admitted free.

TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. All communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondents.]

It is particularly requested that all drawings and all communications respecting illustrations or literary matter should be addressed to the EDITOR of the BUILDING NEWS, 332, Strand, W.C., and not to members of the staff by name. Delay is not unfrequently otherwise caused. All drawings and other communications are sent at contributors' risks, and the Editor will not undertake to pay for, or be liable for, unsought contributions.

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Advertisements for the current week must reach the office not later than 3 p.m. on Thursday. Front-page Advertisements and alterations in serial advertisements must reach the office by Tuesday morning to secure insertion.

SITUATIONS.

The charge for advertisements for "Situations Vacant" or "Situations Wanted" is ONE SHILLING FOR TWENTY-FOUR WORDS, and Sixpence for every eight words after. All Situation Advertisements must be prepaid.

NOTICE.

Bound copies of Vol. LXIX. are now ready, and should be ordered early (price Twelve Shillings each), as only a limited number are done up. A few bound volumes of Vols. XXXIX., XL., XLI., XLII., XLIII., XLIV., XLV., XLVI., XLVII., XLVIII., XLIX., L., LI., LII., LIII., LIV., LV., LVI., LVII., LVIII., LIX., LX., LXI., LXII., LXIII., LXIV., LXV., LXVI., LXVII., LXVIII. may still be had, price Twelve Shillings; all the other bound volumes are out of print. Most of the back numbers of former volumes are, however, to be had singly. Subscribers requiring any back numbers to complete volume just ended should order at once, as many of them soon run out of print.

CHRISTMAS DAY.

THE next number of this Journal will be published on THURSDAY, Dec. 24, the following day being Christmas Day. All Advertisements must therefore reach the Office by FIVE p.m. on WEDNESDAY NEXT to secure insertion.

SYSTEM. (There have been several books published. Probably Batsford, 94, High Holborn, can recommend one.)

J. M. PINE. (Not that we call to mind; nor do we recollect any book on the subject. If there is one, Batsford, 94, High Holborn, will know of it.)

RECEIVED.—M. Bros. and Co.—J. J.—R. D. V.—J. R.—M. and D.—A. L. and Co.

"BUILDING NEWS" DESIGNING CLUB.

PICKLES. (By "parochial purposes" we mean a church school rather than a board school, not that the schoolroom should be designed for use as a parish hall. To be available for such a purpose would, however, be an advantage. The two classrooms should "open out" of the schoolroom, as stated, with running doors, so as to enable the three to be practically thrown into one, though the doors would not be necessarily so tall or so wide as the classroom end next the schoolroom. There should be no passage such as you suggest between the classrooms and the schoolroom.)

FIDGET. (Read the rules, and follow them.)

DRAWINGS RECEIVED.—"The Dingo," "Cheese," "Moss," "Q. E. D.," "The Wolf," "Pebble," "Pickles," "White Friar," "Leemo," "P" in Circle, "Gnat," "Ashleigh," "Enlisto," "Agon," "Percy," "Mostyn," "Don Juan," "Novocastrian," "Tyke," "Forfar," "Nap," "Cyclist," "Aikane," "Ard," "Pickwick," "Zulu," "E. G.," "Scotland," "Baron," "Hi Kiki," "Pantile," "St. Leonard," "B. S. A.," "Geisha," "Ashton," "Gilbert," "Norton," "Nil Desperando," "Side-light."

Correspondence.

BELFAST CITY HALL.

To the Editor of the BUILDING NEWS.

SIR,—As a competitor myself, I am in full accord with your correspondent "City Hall" in the opinion that the provision for a central hall was practically imperative in the Belfast City

Hall plans. When they wrote, they, of course, could not know that upon the very day of your issue (Dec. 11) a member of the corporation of Belfast, Sir James Haslett, M.P., would be stating, according to the Press report, at a meeting specially called to confirm Mr. Waterhouse's selection, that before Mr. Waterhouse proceeded to make his final selection of three plans, he asked, Did the committee want a central hall or no? and that the reply was "They did not." However Mr. Waterhouse may have interpreted his instructions, of his *bona fides*, there will be, amongst architects, no question.

It is, however, a matter of some importance to know how the competitors generally interpreted the printed conditions. The corporation, after some hesitation and a good deal of hard language amongst themselves, have now acted honourably in confirming the assessor's selection; but it still remains to be fully cleared up how the competitors came to be sent upon a wild-goose chase after a "city hall," if the assessor was afterwards to be told to eliminate this from his consideration in making his final award. It is rumoured here that there were divided counsels in the corporation committee that had charge of the competition—one view being in the ascendant when the conditions were framed, and another when the selection of the plans was being made; but, if so, that does not lessen the hardship and injustice of it to the competitors.—I am, &c., F. W. LOCKWOOD.

16, Waring-street, Belfast, Dec. 16.

One of the south windows of the Royal Infirmary chapel, Bristol, has just been filled with stained glass, as a memorial of the late Mr. E. H. Clarke, resident medical officer. The subject is St. Barnabas, the Apostle, who is depicted holding in one hand a missionary staff, and in the other the volume of St. Matthew's Gospel; at his feet is a bag of money. The panel in which the figure is set is formed by canopy work, surmounted by angels holding a scroll inscribed with the Apostle's name. Above and below the figure is grisaille work, with medallions containing shields, on which are the sacred monograms. The window is from the studio of Messrs. Joseph Bell and Sons, College Green, Bristol.

The Lord Chancellor delivered the judgment of the House of Lords on Friday in the appeal of Messrs. Clutton, surveyors and estate agents, Whitehall, against the judgment of the Court of Appeal in their action against Messrs. G. Attenborough and Sons to recover over £3,000, which they alleged had been paid to them by mistake. The question involved in the case was the validity of certain cheques which a clerk in the employ of Messrs. Clutton had misappropriated. The Court of Appeal held that as the cheques were payable to bearer, and the respondents had taken them in good faith, the appellants could not recover, and this decision was affirmed by the House of Lords.

At Southwark Police-court on Monday, Edward Devaney, 33, a general dealer, of Blackfriars-road, was committed for trial, bail being refused, on a charge of the manslaughter of William Densumbe, late a master builder, of Wootton-street, Lambeth. The prisoner was charged at this court on the 9th inst. with assaulting the deceased, and was remanded on bail for a week, as Densumbe was too ill to attend. On the evening of the 8th inst., the prisoner and a friend drove up in a trap to a Liberal Club in Great Charlotte-street, Blackfriars. The deceased was standing by and agreed to look after the pony for five minutes. The prisoner and his companion entered the club, and soon afterwards a man and a woman came up, and, forcing the deceased away, got into the trap and drove away. When the prisoner came out of the club, he knocked the deceased down, his head striking on the kerb. The injured man was removed to Guy's Hospital in an unconscious condition. He never recovered, and died on Monday morning.

The Labour Department, in their report for December, state that in all the more important industries the upward tendency of the labour market has continued during November. The Trade Union Returns show a diminished proportion of unemployed, both when compared with October and the corresponding period of last year, the percentage being lower than at any period since June, 1891. All the changes of wages recorded during the month were in an upward direction. The building trades on the whole continue actively employed. The percentage of unemployed in Unions making returns remains, as in October, at 0.9, compared with 2.1 per cent. in November of last year. The furnishing trades still continue well employed. The percentage of unemployed Union members at the end of November was 2.0, compared with 1.7 in October, and 2.7 per cent. in November, 1895.

Intercommunication.

QUESTIONS.

[11595].—**Wall and Roof.**—I have purchased a house fronting a street. The frontage of the houses are in one line, but at the back my house is wider or deeper by about 2in., 3in., so the roof of my house is higher at the back. The back wall is damp. I had it cemented, but my neighbours object to carry the cement all over the back wall, only to the line of half of the pine end or party-wall. Of course, it matters to them nothing, but want to be unneighbourly and interfere with my work. Will you kindly advise me if they can stop me from carrying cement work from edge to edge of the back wall? Also as to the roof: if at any time the roof requires repairing, can you do it right over the party-wall, as my house is higher in the back than theirs?—PINE END.

[11596].—**Party-Wall.**—(1) Is it the duty of the lessee to inform the freeholder that a party-wall notice has been served on him by adjoining owner to the effect that certain alterations are proposed to be made to party-wall, and is it necessary for lessee, before giving consent, to obtain freeholder's consent? (2) In the event of the lessee allowing adjoining owner to build so that the light to his premises is affected, could the freeholder claim damages from lessee for allowing the value of the property to be depreciated? Could the freeholder take action against the adjoining owner?—LIGHT AND AIR.

[11597].—**Whitewash.**—Could any reader give a recipe for preparing whitewash so that the yellow stains from old beams and walls will not come through? In the case in question these stains have come through four coats?—H. AND B.

CHIPS.

At Okehampton Police court, on Wednesday week, Henry Reynolds, builder, 11, Blackboy-road, Exeter, was committed for trial, bail being allowed, for publishing defamatory libels concerning J. D. Rickman, county coroner and magistrates' clerk of Okehampton.

The annual banquet of the Newport Master Builders' Association was held on Friday night at the King's Head Hotel. Councillor T. Golds-worthy, J.P. (Mayor of Newport) presided; and there was a large attendance. The toast of "The Architects," given by Mr. William Jones, was acknowledged by Messrs. Fawcner and Kirby. "The Building Trade," "Timber and Stone Trades," "Builders' Merchants," and "The Chairman" were amongst the other toasts.

At a meeting of the standing joint committee of the county of London, held on the 9th inst., Mr. A. J. Wood, of 3, Lancaster-place, Strand, was appointed surveyor to the Scissions House, Newington, in succession to Mr. C. H. Howell, to whose practice Mr. Wood has recently succeeded.

Mr. A. Langton Coke, iuspector of the Local Government Board, held an inquiry at Nelson, Lancs, on Friday, into the application of the town council for sanction to borrow £10,000 for purposes of purchasing and laying out 10½ acres of land in public walks and pleasure grounds in the Walverden district of the town.

At the fortnightly meeting, on Friday, of the Strand District Board of Works, presided over by Mr. Walter Emden, J.P., L.C.C., M.S.A., a report was submitted from a special committee as to the appointment of a surveyor and engineer, in reply to the advertisements for which, it was stated, there was an enormous number of applications from all parts of the United Kingdom; but, having been weeded out considerably, there remained three selected candidates—one from Salford, one from Caerphilly, and one from Liverpool. Mr. Robert C. Master, at present assistant in the city engineer's office, Liverpool, was elected.

On Saturday the Bishop of Ripon opened new Sunday-schools, which have been erected at Steeton. The new building, which adjoins St. Stephen's Church, and is in keeping with that edifice, has been erected under the superintendence of Messrs. John Judson and Moore, architects, Keighley.

The New Gallery is to be devoted this winter to a selected exhibition of the work of Mr. G. F. Watts, R.A. The examples to be shown will consist mainly of the series of pictures which the artist has destined as a gift to the nation; but these will be supplemented by such other works, both in portraiture and ideal design, as will serve to render the exhibition as a whole representative of the painter's career.

Mr. Edward Joy died on Wednesday week at his residence, 9, Sussex-avenue, Ashford, Kent. The deceased, who was in his eightieth year, was for many years a member of the building firm of Steddy, Joy, and Steddy, Marsh-street, in that town; but of later years he withdrew from the firm and entered into business on his own account. He was one of the oldest members of the Fire Brigade, of which he was deputy superintendent.

An adjudication in bankruptcy has been made in the case of Frederick Bull, of Southampton, late builder and contractor.

LEGAL INTELLIGENCE.

RE H. H. BRIDGMAN.—The sitting for public examination under this failure was held on the 8th inst., before Mr. Registrar Giffard, the debtor, who is deputy for Cheap, being described as an architect and surveyor, of 42, Poultry. His gross liabilities were returned at £29,820 6s. 7d., of which £5,873 4s. 11d was expected to rank, and the assets were estimated at £11,219 18s. 4d. Creditors who were treated as fully secured held mortgages on freehold and leasehold property at High Barnet, Brighton, Ladywell, Brockley, Kentish Town-road, High-street, N.W., and Union-terrace, N.W. The last sitting for public examination was held on November 18th, but was adjourned until to-day by consent, the debtor in the mean time to file an account showing the disposal of money received by him as trustee of the estate of a person deceased, also showing the disposal of about £4,500 borrowed since 1893, and now appearing as an unsecured liability, and giving other particulars of income, expenditure, &c. Since then he had submitted to his creditors an amended proposal, which had been accepted by them. It provided for the vesting of the estate in a trustee, with power to realise it so far as should be necessary to pay the debts in full. In reply to Mr. Hough, Official Receiver, the debtor stated that he had carried on business as an architect and surveyor in the City for over twenty years. He commenced in 1872, and had traded alone during the whole period, except for a year or two about the year 1892. During the last fifteen years he had been engaged in building transactions. He had owned various properties, built under contract, and acted as architect. It was not mainly through those building speculations that he had come to the court. The chief cause of his failure was the foreclosure in respect of property in Queen-street, Cheapside. He put that property up himself, and lost quite £20,000 by the foreclosure, which was carried out in a cruel manner. During the past year or two his professional business had decreased in consequence of his illness and the time he had devoted to looking after his properties. His income from that source during the last five years had been below £1,000. The cost of the buildings in Queen-street was about £70,000, and part of the money was raised on mortgage. The operations were carried out in 1886, the premises consisting of offices and shops. He bought the freehold, and on the first mortgage raised £60,000, and on a second mortgage £17,000. The second mortgagee was a friend of his, and the money lent by him was almost all repaid, the ultimate debt mainly representing profit to the mortgagee. His friend died, and his wife foreclosed about two years ago. He had previously been offered £95,000 for the property, but he did not accept it, as he thought he could get considerably over £100,000. That was the largest building speculation carried out by him. The foreclosure was so sudden that he was unable to sell the property for sufficient to pay off the second mortgagee in full. After that mortgagee's hostile action he had a ready offer of £85,000, but that fell £2,000 short of paying off the £17,000 due to her. She would not accept the £15,000, and foreclosure followed. The debtor was also examined as to building operations in other parts of London and at Brighton. He denied that he had been unable to pay his debts as they became due since the beginning of 1895, but admitted that that had been his position since the end of that year, owing to his illness and the foreclosure. When he was constructing the Queen-street property about 17 writs were served on him for light and air obstructions. The debtor was also examined as to the disposal of property coming into his hands as executor under the will of his sister. About £1,400 came into his possession, and he made disbursements in respect to the estate of about £189. Legacies to the amount of £636 were to be paid out of the balance, but the accounts had not yet been passed. The money was paid into his banking account, and drawn out again for general purposes. He used it for his own purposes. He was not in difficulties at the time, his bank-book showing that the contrary was the case. Mr. Hough: Can you justify using these moneys yourself instead of paying the legatees? The debtor: Possibly not, but there was a reversion to which my wife was entitled, and which was set aside to pay the legatees if necessary. There was no agreement to that effect, and he would not swear that he had ever mentioned the reversion to the legatees. The appropriation of the reversion to that purpose was not an afterthought. The debtor added that the scheme which he had submitted to his creditors provided for the payment of the legatees in full. The examination was concluded.

A DISTRICT SURVEYOR'S WILLS.—**SMALLPEICE v. CHRISTIE.**—In this suit Mrs. Harriet Susan Smallpeice, widow, claimed to be the executrix of the last will, dated April 16, 1868, of William Smallpeice, late of Gray's Inn-place, district surveyor for Hampstead, who died on Sept. 5, 1896. She claimed to have that will established and probate decreed in solemn form of law. The defendant, Miss Clara Annie Christie, pleaded that the will of 1868 was revoked by one dated Sept. 3, 1895, which she

alleged was the true last will of the deceased, who had appointed her executrix of that will, of which she asked the Court to decree probate. The plaintiff, by her reply, pleaded that, at the time the will of Sept. 3, 1896, was executed, the testator was not of sound mind. Mr. Bargrave Deane, for plaintiff, said that terms had been agreed between the parties which would render it unnecessary for more than formal proof of the will of 1868 to be given. The testator had, by his will of 1868, left all his property to his wife. For some years, however, before his death he had been living apart from his wife and with another lady who is now dead. The will of Sept. 3, 1896, was in favour of a relative of that deceased lady, and certain Masonic charities also benefited under the will. It was perfectly clear that for some days before his death the deceased was quite unfit to make a will, and although he had been living apart from his wife for many years, he had never, until he was practically on his deathbed, attempted to alter his will as made in 1868. Dr. Boulting said that on Sept. 3 the testator was in a state of coma. The deceased could not have had any testamentary capacity on Sept. 3, 1896. Mr. E. D. Mathews proved that on April 16, 1868, he and his brother witnessed the deceased's will bearing that date. That will was duly executed. The President accordingly pronounced for the will of April 16, 1868, and against the alleged will bearing date Sept. 3, 1896.

ARCHITECTS' PROPERTY IN PLANS.—**SKIPWORTH v. SHRINE.**—In the Westminster County Court, on Tuesday, before Judge Lumley Smith, Q.C., the plaintiff, an architect, sued the rector of Leadenham, Lincolnshire, for £32 14s. for visiting the church and making designs in response to a letter from the rector. The plaintiff prepared a drawing of a rood-screen, also one of an east end, one of a pavement, and one of panelling. He estimated the total cost at about £1,300. Ultimately, for various reasons, the plaintiff's designs were not carried out. The defendant was willing to pay the amount claimed if the drawings were handed over to him; but the plaintiff was unwilling to part with them. At the hearing both parties, after some discussion, preferred that the plaintiff's remuneration should be assessed on the basis that the plaintiff would retain the drawings, and the defendant make no claim to them. The plaintiff said that the work was special, and not subject to any scale applicable to ordinary architectural work, and he based his claim on the time occupied, which he estimated at 14 days. His Honour, in delivering judgment, referred to the well-known case of "Ebdy v. McGowan," decided on November 16, 1870, where the Court of Exchequer decided that an architect could not recover for preparing plans unless willing to hand them over on payment. His Honour added that two of the drawings contained much detail which doubtless took time, but it was not clear that so much was required at that stage. In writing to the defendant's solicitor, the plaintiff said that it was only necessary to make diagram drawings sufficient to illustrate the nature of the design, and that such elaborate drawings as his were made on the supposition that he would retain them, and that the drawing of the chancel screen was to be exhibited in the church. In the absence of any agreement between the parties, his Honour gave judgment for the plaintiff for £20, including travelling expenses, the defendant abandoning all claim to the drawings.

ROADWAY DISPUTE AT EPSOM.—In the Chancery Division of the High Court, on Friday, Mr. Justice Stirling gave judgment on a motion arising out of an action, "Murray v. the Epsom Local Board." There is a footpath in the district of the defendant board known as "Madan's-walk." The plaintiff is the owner of property on one side of it, and a Mr. Langlands, a member of the board, is the owner of land on the other side. Being desirous to develop his property as a building estate, Mr. Langlands recently cut a road through it into Madan's-walk, a portion of which he widened so as to admit of vehicular traffic. The plaintiff obtained an injunction restraining Mr. Langlands from using otherwise than as a footway the half of the walk abutting on his (plaintiff's) property. Further litigation followed, and eventually the plaintiff instituted an action against the defendant board to restrain them from removing certain posts he had erected in order to preserve the walk as a footpath. In his statement of claim the plaintiff made various allegations as to the manner in which Mr. Langlands had used his position as a member of the board for his own private interest. The defendants applied that these allegations should be struck out as irrelevant to the issue, and his lordship granted the application, and ordered that the motion be struck out accordingly.

Lord Fitzhardinge has decided to grant admission to visitors to the keep and historic portions of Berkeley Castle, including the rooms of King Edward II., &c., on Mondays, Wednesdays, and Thursdays until further notice, in parties of not more than twenty at a time. The hours will be from 10 to 1 and 2 to 4, the admission fees charged being devoted to local charities.

WATER SUPPLY AND SANITARY MATTERS.

CHRISTCHURCH.—Owing to the increased demand for water, and the extension of the mains for supplying Southbourne, near Bournemouth, as well as Christchurch, the West Hampshire Waterworks Company have, on the advice of their engineer, Mr. St. George Moore, M.Inst.C.E., of Westminster, decided to enlarge their waterworks, and to put down further Candy clarifiers and six additional polarite filters.

CHIPS.

By the fall of a scaffold at the Guardbridge Paper Works, Fifehire, on Monday, two bricklayers, in the employ of Mr. Luke Linden, of Dundee and St. Andrew's, named John Cairnie and William Devery, were killed, and others severely injured.

The memorial stone of the Ardgowan School, Greenock, which is being erected at the junction of Brisbane-street and Nelson-street, at a cost of about £15,000, including site, was laid on Saturday.

In consequence of the damage done to the eastern part of the front at Brighton by the recent gales, the works committee of the Brighton Town Council propose to construct at once a sea-wall with four groynes, extending along Madeira-road from the Aquarium to Royal-crescent, a distance of 1,700ft., at an estimated cost of £27,830.

The arbitration between Mr. Hugh Williams, Nant, and the Penmaenmawr Waterworks Company, which was to have come before arbitrators, was settled on Friday. Mr. W. A. Dew, Bangor, and Mr. T. T. Marks were the arbitrators appointed.

The city council of Truro received at their last meeting a letter from Mr. Councillor Silvanus Trevail, M.S.A., who was confined to bed by a chill, stating that at his request the Drapers' Company of London had granted a donation of £500 for the equipment of the county technical institute proposed to be erected at Truro, thereby supplementing the munificent gift by Mr. J. Passmore Edwards for the same purpose. Cordial votes of thanks were passed to the Drapers' Company, and also to Mr. Trevail.

At the corner of Clare and Marsh-streets, Bristol, new offices are being erected for a Law Union and Crown Assurance Co., from designs by Mr. Henry Wilkins, of Clare-street, in the same city. The builder is Mr. John Perrott, also of Bristol.

For months past drainage and sewerage works on an extensive and expensive scale have been going on in Penrhyn Side, a suburb of Llandudno, where building sites are in great demand. These works have now been completed from the designs of Mr. T. Booth Farrington, C.E., the borough surveyor of Conway, and engineer to the Cowlyd Water Board. To mark the completion of the works, the contractor, Mr. Sheffield, Rhyl, gave a dinner at the Victoria Restaurant on Friday night to the engineering staff, the members of the Penrhyn Parish Council, and the workmen, about 70 sitting down.

Mr. Cotton, C.E., chief engineering inspector, Local Government Board, held an inquiry in the Rathdown Workhouse on Friday, with reference to a loan applied for by the guardians, amounting to £4,000, for enlarging and improving Dean's Grange Cemetery.

Messrs. Wailles and Strang, of Newcastle-on-Tyne, have finished a stained-glass window which is to be erected on the north side of St. Michael's Parish Church, Byker, as a memorial of the late Rev. H. F. Ormerod, B.A., curate of the parish. The subjects are figures of St. Matthew and St. Luke.

The London County Council having approved plans for the widening of Mill-lane, Brixton-hill, S.W., a handsome block of shops will be erected for Mr. P. W. Dobson, J.P., from designs by Mr. Wm. Theobalds, architect, 26, Budge-row, Cannon-street, E.C. Mr. Warman is the builder.

Mr. Harold C. Featherstone, who served his articles between October, 1890, and November, 1893, with C. H. Cooper, A.M.I.C.E., engineer and surveyor to the Wimbledon Urban District Council, was on the 8th inst. unanimously appointed borough surveyor of Chesterfield. Mr. Featherstone acted as junior assistant in the surveyor's office, Wimbledon, between 1893 and January, 1896, when he was elected assistant borough surveyor of Chesterfield, under Mr. N. Dunscombe, and since the death of the latter has acted as surveyor.

To commemorate the 60 years' reign of Her Majesty Queen Victoria, Alderman William Haswell Stephenson, J.P., has offered to erect a branch library (to be called the Victoria Library) at the east end of Newcastle-on-Tyne, somewhat similar to the branch at the west end presented by him in 1895. The offer was unanimously accepted by the city council, and plans are now in course of preparation by Mr. John W. Dyson, M.S.A., architect, of Newcastle.

Our Office Table.

THE annual distribution of prizes and medals to the successful students at the Royal Academy Schools was made by Sir Edward J. Poynter, P.R.A., on Thursday evening in last week, in the lecture-hall at Burlington House. The President devoted the greater part of his address to an appreciative reference to the lives and work of his two immediate predecessors in the chair, Lord Leighton and Sir J. E. Millais, remarking that he did not propose to criticise them. Criticism was easy. To do, to produce, and to create—those were the difficult things in life. In conclusion, he complimented the students on the works which were exhibited there that evening in competition for the prizes and on the unmistakable evidence afforded that, successful or not, all had been putting their best strength into their studies. Next year he hoped to enter in detail into the object and intention of those studies. The list of prize winners will be found, together with some observations on the designs submitted, in an article on p. 870, *ante*.

THE Special Committee of the London County Council appointed to inquire into the administration and financial position of the Works Department held their first meeting on Wednesday night, Sir Arthur Arnold, chairman of the Council, presiding. Mr. E. Waterhouse, F.C.I., and Mr. E. A. Gruning, F.R.I.B.A., are acting as assessors at the inquiry, which is an open one. Mr. Alexander R. Binnie, the Chief Engineer to the Council, was examined at considerable length. He described minutely the routine of the department, and gave general evidence in favour of the quality and economy of the works carried out by the department. Among other improvements in the management of the department, he suggested that a head officer should be appointed whose duties would be administrative. The witness was again under examination yesterday (Thursday).

MR. J. PASSMORE EDWARDS, on Wednesday last, at Shepherd's Bush, unveiled a handsome bronze memorial mural tablet to Charles Keene, the famous *Punch* artist and pen-and-ink caricaturist. This exquisite work of art has been executed in bronze by Mr. George Frampton, A.R.A. It comprises an excellent *stuccato* portrait of Keene, with the inscription "Born August 10, 1823. Died January 4, 1891." The tablet, which is in gold bronze, is mounted on a Sienna marble slab, and the upper contour of the composition is much enhanced by two seated sorrowing statuettes, one of Humour holding his baton, with the head of Punchinello inverted, the other supporting an open folio or scroll of drawings on its knees. These figures rest on brackets, which artistically merge in a plastic way from the face of the medallion, breaking the outline with dignified originality. The memorial was subscribed for by some sixty personal friends of the late artist, and it is placed in the entrance-vestibule of the public library for Hammersmith, which Mr. Passmore Edwards erected in the Uxbridge-road in memory of Charles Keene and Leigh Hunt, who were both Hammersmith men. A view of the building was given in the *BUILDING NEWS* for March 29, 1895, and Mr. Maurice B. Adams, F.R.I.B.A., was the architect. Mr. Edwards, in speaking of Charles Keene, said that while he had delighted thousands by his facile pencil—and powerful indeed was he for good who had the happy facility for making people laugh—Keene had never been known to cause anyone to blush. The late Sir Frederic Leighton, P.R.A., said of him, in his Presidential speech at the Royal Academy Banquet, 1891:—"I cannot pass by in silence the loss which has recently befallen the nation through the death of that delightful artist and unsurpassed student of character, Charles Keene. Never have the humours of the life of certain classes of Englishmen been seized with such unerring grasp as in his works; never have they been arrested with a more masterly, artistic skill. Among the documents for the study of future days of middle-class and of humble English life, none will be more weighty than the vivid sketches of this great humorist." *Punch* added: "The inimitable Charles Keene, universally acknowledged to be the greatest master of black and white technique who ever put pencil to wood-block."

A COMMITTEE consisting of the Right Hon. Sir John T. Hibbert, K.C.B., Mr. T. W. Russell, M.P., Sir Francis Mowatt, K.C.B., and Mr.

H. W. Primrose, C.B., has been appointed, by arrangement between the President of the Local Government Board and the Chancellor of the Exchequer, to inquire into the sufficiency of the clerical staff and secretariat of the Local Government Board, having regard to the duties devolving on the Board, and into the existing divisions of the work, the salaries of the officers, and the organisation of the Department generally, and to recommend what changes should be made in the existing arrangements.

THE annual dinner of the British Institute of Certified Carpenters was held at Carpenters' Hall, London Wall, on Saturday, the 12th inst. The President, Prof. Banister Fletcher, F.R.I.B.A., D.L., J.P., was supported by the vice-president, Mr. W. M. Dixon. The vice-president, in proposing the "Worshipful Company of Carpenters, coupled with the Master and Wardens," touched upon the influence of early carpentry in moulding the mechanical skill and power of the English as a nation. The Master, in replying, touched upon Antediluvian carpenters, and the desire of the Carpenters' Company to promote the welfare of the building craft. Mr. Warden Preston in proposing the "British Institute of Certified Carpenters," remarked upon the growing demand and appreciation of scientifically and soundly-constructed work. Mr. J. Herrin, the retiring secretary, replied, giving a brief outline of the work of the institute in the past. These remarks were supplemented by Mr. T. M. G. Lloyd, the present secretary, who expressed great hopes for the future, and further added his opinion from personal observation that the workmanship of the present compared favourably, and was superior in construction, to that executed in bygone days. Mr. Henry Adams, M.I.C.E., replied for the "Hon. Fellows and Visitors." Professor Banister Fletcher, in replying to the toast of "The President," gave as his keynote the necessity of the dual mind to cope with, and overcome the difficulties that arise in connection with all work. The evening's programme included well-arranged vocal and instrumental music, and recitations, contributed by the president and fellows.

THE battle of the sites for the new town hall for Cardiff has assumed a new and more promising phase. It is now understood that the Marquis of Bute is willing to sell the whole area known as Cathays Park, within three-eighths of a mile from the centre of the built-on portions of the borough, bounded by the dock-feeder, Park-place, Corbett-road, and the North-road, which contains about 52 acres, for £150,000. Of this area, 14 acres are to be appropriated to a park in the centre, and 5 acres to an open space at the southern end, and the remainder—more than 10 acres—devoted to sites for municipal buildings, and for the university college, and any other public buildings which it may be desirable to place there, together with more open spaces, providing another three or four acres. The sides and northern end of the park are laid out as sites for semi-detached villa residences, which, at a ground rent of 3s. 4d. per square yard, would bring in a ground rental of £18,000 a year, space being reserved for four fine roads connecting Park-place, and within Cathays and the districts lying beyond, with the North-road and the town's centre. A further proposal is to construct a new thoroughfare from Corbett-road across the canal, the feeder, the river Taff, and the Sophia Gardens Field to Cathedral-road, thus giving Canton access to Cathays and the Park districts, and avoiding the present long detour over Canton Bridge and along the North-road. The park has been used throughout last summer and autumn for the exhibition, and is being cleared this week of the building materials.

IN the Academy at Moffat, on Saturday evening, Professor Gerald Baldwin Brown, of Edinburgh University, lectured to a large audience on the early use of the arch and vault, and the evolution of the Christian church. The arch, he said, seemed to be unknown among the Greeks. The early Babylonians and Assyrians were the first systematic users of the arch and vault. In Italy there was a tradition of an arch, for the Etruscans utilised it in conduits and gateways. It was not consistently used in the building of Christian churches till about the 12th century. The evolution of the Christian church from the oblong room with the semicircular recess or apse for the accommodation of the officials was described, and as the service became more elaborated, and more room was required for the performance of the ceremonies, a free space the

whole width of the building was made in front of the apse. Then the nave became prolonged, and the apse behind was enlarged for the choir. Builders afterwards commenced to proportion their structures from a square where the transept and nave crossed. Thus the cruciform nature of a church was arrived at. Towers began to come into use, at first being unattached and placed wherever the architect pleased. When added to the church, new features were introduced. North of the Alps the tower came to be part of the building where the transept and the nave crossed.

THE Chorlton, Lancs, Board of Guardians received at their meeting on Friday a report from Mr. J. B. Broadbent, the architect of the new Union Cottage Homes and Schools at Styal, as to the quality of the materials used in the buildings, concerning which complaints had been made at a previous meeting. Mr. Broadbent reported that the brickwork was satisfactory, and notwithstanding the recent heavy rains, showed no signs of weakness; the materials used by the carpenters and tilers, and the workmanship throughout was, he considered, good. The clerk reported that he had written under instructions to the Local Government Board, asking that their architect, Mr. P. Gordon Smith, might be permitted to inspect and report upon the building materials and workmanship at Styal with a view to satisfying the public mind on the question. The assistant secretary to the board had, however, replied explaining that "it would be contrary to the board's practice to allow their architect to undertake the service which the guardians propose in connection with the cottage homes and schools now in course of erection at Styal."

UNDER the auspices of the District Council for Edinburgh and the East of Scotland of the National Registration of Plumbers, Mr. Walter McGregor, superintendent of Public Baths, Dundee, delivered a lecture on "Hot Water and Steam Heating," in the Upper Hall, Queen-street, Edinburgh. Mr. Alexander Allan occupied the chair. Mr. McGregor described with diagrams the system of hot-water heating which he, as manager of the Public Baths in Dundee, had introduced. It was a system of heating which he had found in daily practice give fairly good results. The system was at work daily. The system consisted in the heating of the water by allowing it to pass over a coil in a well before it entered the swimming bath. By this method there was instantaneous heating of the water; a saving of about 6½ hours of time in the winter months; abolition of any disagreeable noise; a saving of 25 per cent. in fuel; the baths were ready for use at an early hour in the morning at the desired temperature, and were emptied daily and filled afresh for customers. The lecturer also explained an apparatus for utilising exhaust steam, and pointed out how he had brought all the piping into line, as it were, in the Lochee Baths. He likewise dealt with the hot-water heating system of these bath premises, and stated that in this case water-heating was preferable to steam-heating. The system of piping was being entirely worked without the aid of steam traps, and in this connection he pointed out the important use of the steam loop in use at the baths.

ACCORDING to a semi-official return just published, the industries of Sweden have shown a remarkable and unprecedented development during the past thirty years, and especially has this been the case in the timber and mining trades. The value of the hewn timber export in 1866 scarcely exceeded 30 million kroner, whereas it has now reached 120 million kroner or more, and Sweden is at present the principal wood-exporting country in the world. The largest saw-mills in the world are to be found in Sweden, and at least 25,000 people are employed at them. At the same time a considerable industry has developed in improved wood goods, and products of this are exported to a value exceeding 20 million kroner a year. Regarding the mining industry, only half a million tons of iron ore were extracted a lifetime ago, whereas now, four times that, or two million tons, a year. The output of pig-iron did not then amount to 250,000 tons a year, whereas it is now 500,000 tons a year. The steel industry, however, shows a still larger development. While in 1860-70 the production was only 7,000 tons a year, it is now 170,000 tons a year.

THE Sun Insurance Company holds as deservedly high a position for its artistic calendars, desk-cards, and almanacs, as for its stability and promptness in the settlement of claims. Of the latter we happen to have had satisfactory

personal experience during the past year—so satisfactory that we promptly lifted another large fire policy into the Sun office. The small card almanacs now before us, with their beautiful coloured views of St. Paul's, the Tower, &c., are really exquisitely produced; the blotting-pads are tasteful and handy, and the desk-cards and wall-calendars all that could be desired.

MEETINGS FOR THE ENSUING WEEK.

SATURDAY (TO-MORROW).—Polytechnic School of Architecture, Regent-street, W. Visit to Messrs. Doulton and Co.'s Works. 2.30 p.m.

South-West London Polytechnic Institution. Visit to Electric Supply Station at Leyton.

TUESDAY.—Institution of Civil Engineers. Discussion on "Steel Skeleton Construction in Chicago." 8 p.m.

Polytechnic School of Architecture and the Building and Construction Classes, Regent-street, W. Distribution of Prizes by A. Waterhouse, R.A., L.C.D. 8 p.m.

CHIPS.

Mr. George Truefitt, F.R.I.B.A., of The Old House, Worthing, was married at St. Mark's Church, Notting Hill, on Wednesday, to Constance, the youngest daughter of John Orrell Lever, formerly M.P. for Galway.

The Christmas Number of the *British Clayworker* is an excellent one. Mr. Arnold Mitchell's sketches of Laver Marney are interesting, and there is a very practical paper on "Finials and Terminals." Readers who may not see it regularly should not fail to send seven stamps for this number of the *British Clayworker* to the manager, at 43, Essex-street, Strand, W.C.

The will of the late Mr. William Morris, of Kelmscott House, Upper Mall, Hammersmith, poet, Socialist, and designer, who died on the 3rd of October last, aged sixty-two years, leaving personal estate to the value of £55,000, has just been proved.

Mr. Alderman and Sheriff Ritchie and Miss Ritchie distributed the prizes and certificates to the evening students and day scholars at the Carpenters' Company's School and Institute, Stratford, on Wednesday night. The alderman was supported by Mr. Alfred Preston, chairman; by the Worshipful the Master of the Company, Mr. Jesse Jacob; by Mr. Stanton W. Preston, the company's clerk, and other members of the court; by Professor Banister Fletcher, and the Principal, Mr. King. Nearly 300 evening students received prizes and certificates, the latter awarded from South Kensington and the City Guild for geometry, mechanics, mathematics, engineering, chemistry, art, carpentry and joinery, plumbing, smithing, building construction, cookery, &c. To the day technical school some 50 prizes were awarded and scholarships won in competition by some 20 boys, ranging from £8 to £20.

At Tuesday's meeting of the Edinburgh Town Council the Public Health Committee recommended general approval of the plans of the new hospital buildings at Colinton Maines, prepared by Mr. Morham, superintendent of works, and asked a recommit to obtain estimates. As before explained, they involved a provision for 512 beds, it having been resolved in committee that two scarlet-fever pavilions and certain other parts of the original plan should not at present be proceeded with.

The final sale of properties at Sheffield belonging to the Lands Allotment Company, one of the Balfour group, took place on Tuesday. The original cost of the estate was £5,000, and the total amount realised has been over £70,000.

In connection with the present Pictou Lecture Hall series of free lectures, given under the auspices of the Liverpool Corporation, an address was delivered last (Thursday) evening by Professor Hele-Shaw, of University College, on "The Flow of Water." A particular interest attached to this lecture in view of the fact that there was called into requisition special lantern apparatus invented by Professor Hele-Shaw, which enabled the actual movement of water and the silting up of channels to be seen by the audience, and such obstacles to river navigation as the Pluckington Bank to be shown on the screen in process of actual formation.

The death took place on Monday of Mr. Simeon Wiltshire, of Swindon, partner with his father, Mr. George Wiltshire, in the oldest established building business in the town. Deceased, who was 50 years of age, had been suffering from rheumatic gout.

At a meeting of Old Wellingtonians held on Tuesday in the Church House, Westminster, it was resolved that a memorial to the late Archbishop Benson, who was the first head master, should be erected at the college, and that it should be connected with the chapel.

Trade News.

WAGES MOVEMENTS.

PENRYN SLATE QUARRIES.—The situation remains unchanged so far. There is no indication of action by the Board of Trade, and the strike has entered upon its eleventh week, representing a loss in wages to the district of over £50,000. The shipping industry of Bangor is paralysed, although there are several loads of slates at Port Penryn, and many of the slate yards in the district continue closed, being unable to obtain material.

The Bishop of Marlborough opened and dedicated on Tuesday a large building as a church institute and parish room in connection with St. Mary the Virgin, Primrose Hill.

The North British Railway Company opened on Monday for passenger traffic a short branch line from Jordanhill to Whiteinch, formerly used only for the conveyance of goods and minerals.

A meeting was held on Tuesday, at the Institute of Water Colour Painters, of the honorary committee for promoting an exhibition to be held at Earl's Court next year, in commemoration of the sixty years of the Queen's reign. The Duke of Cambridge presided. Sir S. Northcote said one of the objects of the exhibition was to enable people to contrast the present state of our art, trades, and industries with what they were in 1837. The members present, chairmen of branch committees, said every effort would be made in their several sections to make the exhibition a great success.

The city council of Bristol have this week had under consideration in committee a scheme and plans prepared by Mr. Joseph Thomas, for improving the accommodation at the council house, including the enlargement of the council chamber to three times its present size, and giving seats and desks for 92 members.

Lord Claud Hamilton and the directors of the Great Eastern Railway have met a deputation of the Lowestoft Town Council in reference to measures for preventing the blocking of the harbour through the formation of a sandbank. Lord Claud announced that the directors would spend £50,000 on a scheme which would double the water space in the harbour, widen its entrance, construct a new pier, and lengthen the south pier so as to make it the finest promenade in the United Kingdom.

The architectural section of the Glasgow Philosophical Society meet on Monday night at 207, Bath-street, Mr. P. Macgregor Chalmers presiding, when the Rev. David Watson read a paper on "Christiau Iconography as an Applied Art." It was no error, he claimed, to speak of applied art. The Church, very early in her career, had availed herself of the help of art. It was the guidance and edification of the faithful which prompted all the multiplicity of statuary and mosaic which transfigured the timber and stone of ancient churches, and rendered them very really houses of God.

The new chapel of Cheltenham College, built from the designs of Mr. H. A. Prothero, M.A., F.R.I.B.A., was opened by the Archbishop of Dublin, on Wednesday.

The Belfast memorial of the Queen's sixty years' reign will take the form of a general hospital. Of the estimated cost, £100,000, £15,000 has been promised.

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ESTIMATES GIVEN ON APPLICATION.

LATEST PRICES.

IRON, &c.

	Per ton.	Per ton.
Rolled-Iron Joists, Belgian.....	£5 5 0 to	£6 0 0
Rolled-Steel Joists, English.....	6 0 0 "	6 10 0
Wrought-Iron Girder Plates.....	6 15 0 "	—
Bar Iron, good Stuffs.....	7 0 0 "	7 5 0
Do., Lowmoor, Flat, Round, or Square.....	17 0 0 "	17 10 0
Do., Welsh.....	5 15 0 "	5 17 6

Boiler Plates, Iron—

South Staffs.....	7 16 0 "	8 0 0
Best Snedshill.....	9 0 0 "	—
Angles 10s., Tees 20s. per ton extra.		

Builders' Hoop Iron, for bonding, &c., £6 10s. 0d. per ton.
Builders' Hoop Iron, galvanised, £13 10s. 0d. per ton.

Galvanised Corrugated Sheet Iron—

	No. 18 to 20.	No. 22 to 24.
6ft. to 8ft. long, inclusive gauge.....	Per ton. £10 15 0	Per ton. £11 0 0
Best ditto.....	11 5 0 "	11 10 0

	Per ton.	Per ton.
Cast-Iron Columns.....	£5 10 0 to	£8 10 0
Cast-Iron Stanchions.....	5 10 0 "	8 10 0
Cast-Iron Sash Weights.....	—	4 2 6

Cast-Iron Socket Pipes—

3in. diameter.....	4 10 0 "	4 15 0
4in. to 6in.....	4 5 0 "	4 10 6
7in. to 24in. (all sizes).....	4 0 0 "	4 2 6
[Coated with composition, 2s. 6d. per ton extra; turned and bored joints, 5s. per ton extra.]		

Pig Iron—

Cold Blast, Lilleshall.....	105s. to 110s.	Per ton.
Hot Blast, ditto.....	57s. 6d. to 62s. 6d.	Per ton.

Wrought-Iron Tubes—Discount off Standard Lists f.o.b.

Gas-Tubes.....	75p.c. fittings	77p.c.
Water-Tubes.....	70 "	72½
Steam-Tubes.....	62½ "	65
Galvanised Gas-Tubes.....	60 "	62½
Galvanised Water-Tubes.....	55 "	57½
Galvanised Steam-Tubes.....	45 "	47½

10cwt. casks. 5cwt. casks.

	Per ton.	Per ton.
Sheet Zinc, for roofing and working.....	£21 0 0 to	£21 10 0
Sheet Lead, 3lb. per sq. ft. super.....	12 15 0 "	13 0 0
Pig Lead, in lwt. pigs.....	11 13 9 "	11 15 0
Lead Shot, in 28lb. bags.....	15 0 0 "	—
Copper Sheets, sheathing and rods.....	55 0 0 "	—
Copper, British Cast and Ingots.....	52 0 0 "	53 5 0
Tin, Straits.....	59 17 6 "	60 0 0
Do., English Ingots.....	63 10 0 "	65 10 0
Spelter, Silesian.....	17 0 0 "	17 5 0

Per ton. Per ton.

Cut Clasp Nails, 3in. to 6in..... 8 5 0 "

Cut Floor Brads..... 8 0 0 "

Wire Nails (Points de Paris)..... 12 13 14 15 B.W.G.

0 to 7 8 9 10 11 12 13 14 15 16 17 18 19 20 per cwt.

TIMBER.

	per load	£11 10 0 to	£16 10 0
Teak.....	—	—	—
Quebec pine, red.....	2 5 0 "	4 5 0	—
" yellow.....	—	—	—
" pitch.....	—	—	—
" Oak.....	5 0 0 "	6 10 0	—
" Birch.....	3 5 0 "	5 0 0	—
" Elm.....	3 10 0 "	4 15 0	—
" Ash.....	2 15 0 "	4 0 0	—
Dantsie and Memel Oak.....	2 10 0 "	3 10 0	—
Fir.....	2 5 0 "	4 5 0	—
Wainscot, Riga p. log.....	2 5 0 "	4 5 0	—
Lath, Dantsie, p.f.....	4 10 0 "	5 10 0	—
St. Petersburg.....	5 0 0 "	6 10 0	—
Greenheart.....	8 10 0 "	9 0 0	—
Sequoia, U.S.A. per cube foot.....	0 2 0 "	0 2 2	—
Mahogany, Cuba.....	0 0 4½ "	0 0 6	—
" Honduras.....	0 0 5 "	0 0 6½	—
Cedar, Cuba.....	0 0 4½ "	0 0 5	—
" Honduras.....	0 0 4 "	0 0 5	—
Walnut, Italian.....	0 0 3½ "	0 0 7	—
Deals, per St. Petersburg Standard, 120—12ft. by 1½in. by 1½in. :—	—	—	—

Quebec, Pine, 1st..... £21 10 0 to £24 0 0

" 2nd..... 15 0 0 " 17 0 0

" 3rd..... 7 0 0 " 10 10 0

Canada Spruce, 1st..... 8 10 0 " 10 0 0

" 2nd and 3rd..... 7 5 0 " 8 10 0

New Brunswick..... 6 10 6 " 7 10 0

Riga..... 8 0 0 " 13 0 0

St. Petersburg..... 8 0 0 " 16 0 0

Swedish..... 8 0 0 " 9 0 0

Finland..... 9 10 0 " 16 0 0

White Sea..... 5 0 0 " 20 0 0

Battens, all sorts..... 5 0 0 " 20 0 0

Flooring Boards, per square of 1in. :—

1st prepared..... 0 9 0 " 0 16 0

2nd ditto..... 0 8 0 " 0 12 6

Other qualities..... 0 5 6 " 0 7 6

Staves, per standard M :—

Quebec pipe..... 35 0 0 " 42 10 0

U.S. ditto..... 225 0 0 " 240 0 0

Memel, cr. pipe..... 200 0 0 " 210 0 0

Memel, brack..... 200 0 0 " 210 0 0

OILS.

Linsed.....	per ton	£15 10 0 to	£16 10 0
Rapeseed, English pale.....	"	26 10 0 "	28 0 0
Do., brown.....	"	24 0 0 "	24 10 0
Cottonseed ref.....	"	15 10 0 "	16 10 0
Olive, Spanish.....	"	29 0 0 "	29 10 0
Seal, pale.....	"	23 0 0 "	24 0 0
Cocoanut, Cochinchina.....	"	28 0 0 "	—
Do., Ceylon.....	"	24 0 0 "	—
Palm, Lagos.....	"	24 10 0 "	25 0 0
Oleinc.....	"	19 0 0 "	20 0 0
Lubricating U.S.....	per gal.	0 6 3 "	0 7 6
Do., black, 1st.....	"	0 4 9 "	0 6 6
Tar, Stockholm.....	per barrel	1 0 0 "	—
Archeangel.....	"	0 12 6 "	—
Turpentine, American.....	per ton	22 10 0 "	22 12 6

LIST OF COMPETITIONS OPEN.

Longton, Staffs—Schools and Free Library (£3,000 limit).....	£75, £25	Geo. C. Kent, Town Clerk, Longton	Dec. 31
Odiham—Board School	No premium	F. S. Chandler, Clerk, Odiham	" 31
Liskeard, Cornwall—Rebuilding Tower, Parish Church (£3,000 limit).....	£50 (merged in commission), £25	Nettle and Bone, Hon. Secs., Liskeard	Jan. 1
Knarborough—Grammar School (£4,000 limit).....	£10	Wallace Gill, Solicitor, Knarborough	" 1
Sevenoaks—Four- and Five-roomed Cottages (£150 each).....	£5	The Surveyor to Urban District Council, Sevenoaks	" 1
Colwyn Bay—Electricity Lighting Scheme	£30 (merged in commission), £20	Jas. Porter, Clerk, Urban District Council, Colwyn Bay	" 12
Tottenham—Higher Grade Schools, Wood Green (900 places).....	No premium; commission 3½ p. c.	J. F. A. Adams, Clerk to School Board, Tottenham	" 15
Sunderland—Technical School (£18,000 limit of cost).....	£100, £50, £25	Fras M. Bovey, Town Clerk, Sunderland	" 16
Cobham, Surrey—Sewerage and Sewage Disposal Schemes	25gs. (to merge in commission)	W. O. Reader, Clerk, Epsom R.D.C., Lonsdale, Epsom	" 16
Worcester Corporation—Sewage Disposal		Samuel Southall, City Clerk, Worcester	" 31
St. Gilles, near Brussels—Town Hall (£12,000 limit of cost).....	£160 and two lesser premiums.	Municipal Authority, St. Gilles, Belgium	Feb. 1
Building Trades Exhibition Poster	£10	The Manager, 43, Essex-street, W.C.	" 1
Dudley—Grammar School and Master's House	£50, £30	Albert Morton, Clerk to Governors, 15, Birmingham-road, Dudley	" 15
Christiania—Railway Terminal Station Plans	£555 10s., £222 4s. 6d., £111 2s. 3d., £55 11s.	Railway Offices, 6, Victoria-terrace, Christiania	Mar. 31
Osgodby, Lincolnshire—Wesleyan Chapel & Schools (cost £690).....	No premium	E. H. Davy, Secretary to Trustees, Kirkley, Market Rasen	—
Eccleshill, Bradford—Sewage Disposal	£20, £10	Jos. Richardson, Clerk, U.D.C., 4, Town Hall-square, Bradford	—
London—Electric Omnibus and Cycles Designs	£150, in three premiums	Sec., London Electric Omnibus Co., 6, Northumberland-av., W.C.	—

LIST OF TENDERS OPEN.

BUILDINGS.

Leeds—Eight Dwelling Houses, Richmond Hill	Board of Guardians	Wm. Joy, 39, Burns-street, Leeds	Dec. 19
Huddersfield—Oven, Crosland Moor Workhouse	Allerton School Board	E. A. Rigby, Clerk, Ramsden-street, Huddersfield	" 21
Allerton Bywater, Castleford—New Schools	R. W. Croft	R. M. McDowall, F.I.A.S., Architect, Castleford	" 21
Bradford—Twenty-nine Houses, St. Margaret's-road	Doek Co.	Abm. Sharp, Architect, Albany Buildings, Bradford	" 21
Newton-by-Sea—Five-roomed Cottage		M. Temple Wilson, Architect, 69, Narrowgate, Alnwick	" 21
Keynsham—Workhouse Alterations		H. M. Bennett, Liverpool Chambers, Corn-street, Bristol	" 21
Halesworth—Three Houses		Owner, Holton-road, Halesworth, East Suffolk	" 21
Exmouth—Three-Storeyed Corn Store		Procter and Sherwin, Architects, 2, Lower-parade, Exmouth	" 21
Marsden—Wesleyan Chapel Enlargement and New Schools	Poulton School Board	J. Kirk and Sons, Architects, Huddersfield	" 22
Cross Keys, Mon.—Schools for 350 Children	Risca School Board	Geo. Rosser, Architect, Victoria Chambers, Aberdeen	" 22
Morecambe—Mixed School at West End		Wm. Tilly, Clerk, Poulton Hall, Morecambe	" 22
Cross Keys, Mon.—School for 350 Children	Grammar School Governors.	T. S. Edwards, Clerk, 20, High-street, Newport, Mon.	" 22
Morecambe—New Chapel and Vestries, Parish Church	School Board	Austin and Paley, Architects, Lancaster	" 22
Morpeth—Science and Art Schools (Separate Trades).....	Bottling Co., Limited.	Geo. Brunell, Clerk to Governors, Bridge-street, Morpeth	" 23
Fenny Stratford—Boys' School	Dr. Chas. Wade	Thos. Best, Clerk, Fenny Stratford	" 23
Darlington—Alterations to Factory, Kendrew-street	Corporation	F. Martin, Architect, West End Buildings, Darlington	" 23
Boscastle—House and Stabling	County Council	Otto B. Peter, F.R.I.B.A., Lancaster	" 23
Halifax—Liberal Club, Claremont	County Council	Jos. Walsh, Architect, Bank Chambers, Halifax	" 24
Derby—Additions to Borough Asylum	Corporation	H. F. Gadsby, Town Clerk, Derby	" 24
Trimley—Additions to Schools	Board of Guardians	J. T. Meredith, Bank Buildings, Kidderminster	" 24
Duns, N.B.—Police Station, Cockburn's-patb	I.W. Board of Guardians	Clerk, Duns, Berwickshire	" 26
Duns, N.B.—Additions to Old Gaol	Urban District Council	Clerk, Duns, Berwickshire	" 26
West Bromwich—Police and Fire-Station		A. D. Greatorex, Borough Surveyor, West Bromwich	" 28
Axbridge—Casual Wards		W. Reece, Clerk, Axbridge	" 28
Ballater, N.B.—School Enlargement	Glennmuick School Board	Clerk, G. L. B., Ballater	" 28
Dewsbury—Two Houses, Moorlands-road	Board of Guardians	Jackson and Fox, Architects, 22, George-street, Halifax	" 28
Chelsea—Alterations, Workhouse Infirmary		W. Miller, Clerk, 250, King's-road, Chelsea	" 29
Parkhurst—Additions to Workhouse		Fred. Stratton, Clerk, Pyle-street, Newport, I.W.	" 30
Dartford—Stables and Mortuary, Overy-street		J. C. Haywood, Clerk, Sessions House, Dartford	" 31
Bridport—Church Restoration		F. A. Turner, 54, South-street, Bridport	" 31
Lowtown, Pudsey—Chapel (1,000 seats)		Spencer's Offices, Back Mills, Pudsey	" 31
Kendal—Additions and Alterations, Castle Green	J. H. Jefferys, J.P.	Stephen Shaw, F.R.I.B.A., Kendal	" 31
Durham—Workhouse Additions	Board of Guardians	H. T. Gradon, Architect, Market-place, Durham	Jan. 1
Blackrook—Nine Dwellings, Temple-road	Town Commissioners	R. F. Heron, Secretary, Town Hall, Blackrook	" 5
Cardiff—Custom House	H.M. Commissioners of Works	Hon. Reginald B. Brett, Secretary, 12, Whitehall-place, S.W.	" 6
Falkenberg—Railway Goods Shed	Official	Railway Inspector's Office, Dessau, Germany	" 7
Derby—Rebuilding Midland-road Branch Post-Office	H.M. Commissioners of Works	Hon. Reginald B. Brett, Secretary, 12, Whitehall-place, S.W.	" 8
Byker-on-Tyne—Victoria Jubilee School	Newcastle School Board	Chas. Waller, Architect, 26, Eldon-square, Newcastle	" 8
Exeter—Demolition of St. David's Church	Restoration Committee	Rev. C. J. V. French, St. David's Vicarage, Exeter	" 9
Exeter—Rebuilding St. David's Church	Restoration Committee	W. D. Carle, F.S.A., F.R.I.B.A., 8a, Whitehall-place, S.W.	" 9
Bury, Lancs.—Baptist Chapel and School, Manchester-road	Trustees	Thos. Nuttall, Architects, 20, Market-street, Bury	" 11
Aberystwith—University College Superstructure		Chas. F. Ferguson, Architect, 42, Clareville-road, S. Kensington	" 12
Wimbleton—Five Cottages, Hubert-road	Corporation	Wm. Cooper, M.S.A., 21, Havelock-road, Hastings	" 14
Birkenhead—Pavilion at Fever Hospital	Admiralty Commissioners	Alfred Gill, Town Clerk, Birkenhead	" 18
Pontypool—Shops and Offices, Crane-street	West Ham School Board	Robert Williams, Architect, Osborne Chambers, Pontypool	" 18
Dungeness, by Dungeness—Officers' House, Coastguard Station	Egyptian Government	Director of Admiralty Works, 21, Craven-street, W.C.	" 22
Stratford, E.—Whalebone-lane Schools	City Council	C. W. Carrell, Clerk, Broadway, Stratford	" 26
Cairo—Arabia Museum and Khedival Library		Office, Ministry of Public Works, Cairo	Feb. 1
Leeds—City-square Improvement (Granite Work)		Wm. Bakewell, F.R.I.B.A., 38, Park-square, Leeds	"
Darnall Hill—Semi-Detached Houses		J. P. Earle, Architect, Norfolk-row, Sheffield	"
Chesterfield—17 Houses		J. P. Earle, Architect, Norfolk-row, Sheffield	"
South Normanton—Hotel		J. P. Earle, Architect, Norfolk-row, Sheffield	"
Subbington, Fareham—Two-Storey Building	School Board	Wilberforce Cobbett, C.E., West-street, Fareham, Hants	"
Nottingham—Higher Grade School, Clifton Estate	School Board	W. J. Abel, Clerk, Victoria-street, Nottingham	"
Nottingham—Enlargement Ncinton School	Building Committee	W. J. Abel, Clerk, Victoria-street, Nottingham	"
Horwich—Foundations, St. Catherine's Church	Corporation	F. Moreton Palmer, Architect, 3, Lee-lane, Horwich	"
Newcastle-on-Tyne—Corrugated-Iron Sheds on Quay	School Board	J. Law, City Engineer, Newcastle	"
Porth—Caretaker's House at Intermediate School		Jacob Rees, Architect, Pentre, Glam.	"
Bristol—Clearing Site of Burnt-out Wesleyan Chapel, Red-land-road	Trustees	H. J. Jones, M.S.A., 12, Bridge-street, Bristol	"
Beeston Hill, Leeds—Seven Back-to-Back Houses	Leeds Industrial Co-operative Socy.	John W. Fawcett, Secretary, 10, Albion-street, Leeds	"
Bradford—Bank Alterations	Bradford Banking Co	T. C. Hope, Architect, Old Bank Chambers, Bradford	"
Exeter—Bandstand on Northernhay	City Council	D. Cameron, City Surveyor, Exeter	"
Cardiff—Rebuilding 30 and 31, Bute-terrace	Messrs. Barry	Jones, Richards, and Budgen, Architects, 13, St. Mary-street, Cardiff	"
Bradford—Houses and Shops, Barker End-road		107, Lonsdale-road, Bradford	"
Bradford—Warehouses, Harris-road		Samuel Robinson, Architect, Cheapside, Bradford	"
Bradford—Hotel and Shops		Jno. Jackson, M.S.A., Barry-street, Bradford	"
Belfast—Nineteen Houses and Shop, Miller-street		J. C. Reid, 5, Ulster Chambers, Belfast	"
Oundle—House in West-street		J. G. Stallebrass, Architect, North-street, Peterborough	"
Pentrefelin, Llangollen—Villa		Foulkes Jones, Solicitor, Llangollen	"
Poole—Longfleet Schools	Urban District Council	Sanders and Stileman, Architects, Osborne Chambers, Bournemouth	"
Wellingborough—Council Chamber	Oliver Barber	Sharman and Arber, Wellingborough	"
Harrogate—Additions to George Hotel	—, Jackson, of Birmingham	Arthur A. Gibson, Architect, Harrogate	"
Killacolla—Dairy Factory		G. C. Slade, C.E., The Crescent, Limerick	"
Leeds—Alterations to Windsor Castle Hotel		Chas. Berry, Architect, 44, Primrose-road, Leeds	"
Lewis Harold—Repairs to Church Tower		Nicholson and Heavittree, Architects, Hereford	"
Building Contracts in Four to Six Lots (£150,000)		Owners, The Firs, Sydenham Hill, S.E.	"
Elkinstowe—Two 12-roomed Houses		E. J. Sherman, Rockburn, Elkinstowe	"
Duxton—House	F. Smallman	Sugden and Son, Architects, Leek and Hanley	"
Bracknell, Berks—Rebuilding two Shops and Houses	Raven, Tappenden, and Kertt	A. E. Sidford, M.S.A., Wollingham	"
Stapleton—Caretaker's House and Cookery Room	School Board	A. Trew, M.S.A., Broad-street, Bristol	"
Kensal Green—School (1,270 places)	Willcuden School Board	W. Vincent, Clerk, Dyne-road, Kilburn, N.W.	"
Arnley, Leeds—Six Through Houses, Bridge-street		Fenton Brothers, Gipton Wood, Leeds	"
Burton-on-Trent—Minister's House, Shobnall-street		C. F. Underhill, New-street, Burton-on-Trent	"
Cadoxton-Barry—Hotel, at Mount Pleasant		H. Tudor Thornley, Architect, 104, St. Mary-street, Cardiff	"
Bracknell, Berks—Two Houses and Shops		A. E. Sidford, Architect, Wokingham	"
Rochdale—Additional Story to Mill		Joseph Stott and Sons, Architects, Clegg-street, Oldham	"
Norden—Workshop and Showroom	Meyrick and Holt, Rochdale	J. W. Sutherland, Architect, Church View, Norden	"
Chiswick—Four Houses, Duke's-road	Wm. Porch	H. W. White, Architect, 318, High-road, Chiswick	"
Mendlesham—Enlarging Endowed Schools		Geo. Barnes, Mendlesham, Suffolk	"
Ilkley—Residence	Corporation	Isitt, Adkin, and Hill, Architects, Presidential Buildings, Bradford	"
Folkestone—Public Baths	Manchester and Co. Bank	Reginald Pope, Architect, Radnor Chambers, Folkestone	"
Glossop—Branch Bank		J. Eaton and Sons, Architects, Ashton-under-Lyne	"
Groetland—Rescuing Wesleyan Chapel		Isitt, Adkin, and Hill, Architects, Presidential Buildings, Bradford	"

THE BUILDING NEWS

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THE OWNERSHIP OF DRAWINGS.

NOTWITHSTANDING the decision of the Courts as to the question of ownership of plans, we find clients still contending for what they regard as their legal right, and the architect as pertinaciously maintaining the usage of the profession in declining to part with documents prepared for his own special use. One would have thought that, after the many disputed cases that have been decided on this question, architects would have shown their appreciation of the old maxim that "Discretion is the better part of valour" by making it a stipulation in their agreements with building-owners that all designs and drawings they prepare should be retained by them, in case of the abandonment of the work from any cause. As the "custom" of the profession in this particular matter has been overruled, and the profession have been straightly told by judges of the law that any rules they make among themselves have no binding force beyond their own societies, it seems all the stranger that members should go on incurring the risk of making claims which they cannot maintain. The property in plans, particular rates of commission, the authority of the architect to bind his employer by all acts and orders, as a general agent, and other matters, are points which are continually being brought before courts of law with the presumption that, owing to the uncertainty of the law, the conflicting opinions of judges and juries, what has been decided before may be reversed. And it is in this "glorious uncertainty of the law" that disputants and their advisers try their luck, even after the points have been theoretically decided against them.

In the particular case to which we refer—the property in drawings—the custom has never commended itself to a court of law, and the celebrated case of "*Ebdy v. McGowan*," tried in the Court of Exchequer in 1870, remains a definite opinion of the Court as to the right of an architect to retain his drawings after his services have been dispensed with. In this instance plans and specifications for a vicarage were made and tenders sent in. During the time the work was in progress the defendant put an end to the engagement and asked for the architect's account, and required him to hand over the plans and specifications, which request was refused by the plaintiff. The Lord Chief Baron's judgment was, as is well known, unfavourable to the claim of the architect, and he simply ruled that if there was no provision made for the architect to retain these documents, he had no right to them. As to the question of custom which was urged, his Lordship said it was unreasonable, and contrary to good sense and justice. This decision was endorsed by Baron Bramwell, and has been cited again and again. Even if the custom had been proved, the Court held it to be unreasonable. Unfortunately, the contention for usage set up by the Institute was seriously contradicted by so eminent an architect as Mr. Smirke, who swore there was no such usage or custom. Unsatisfactory as this decision is, it still remains an indication of the opinion of the law and of public feeling. An authoritative decision on the question, however, has yet to be made in the interests of the profession.

We have not yet very clear legal definitions of the duties of architects in regard to this matter. There are numerous instances where

the architect's drawings and specifications are abandoned through want of funds, or some other reason, and where the client claims the drawings prepared when he pays for them. He supposes he has a right to the work which is represented in the drawings: he thinks naturally that when he comes to build he can use them, or at any rate they will be of service. With a strange perversity such men do not understand what they pay an architect for—namely, his brains and experience—in other words, a design; for the time he has taken in preparing necessary drawings to assist him in carrying out the work, and that if he parts with these he is throwing away his chance of employment another day. If he gets his half commission for the work done so far, it is inadequate in most cases to remunerate him for the study, the labour, and skill. But the same question has been repeatedly before the Courts, the "custom" of the profession has been pleaded over and over again; but, still, the question of retaining plans has been set aside, and the architect's labour is regarded in the same way as that of the land-agent, who, on termination of his employment, is expected to deliver up all maps, plans, and other documents relating to the estates made or collected by him in the course of his employment, whether for his own private use or not. In other cases, as we have seen, the Court has denied the existence of any general or binding custom to the effect that the plans belong to the architect. The decision has a bearing on another important question of much concern to architects. If the client has a right to the drawings, what is there to prevent him from making use of them, or from handing them over to a friend who thinks of building? The old Exchequer decision has not taken this contingency into account. The mistake is, of course, in the idea that the client pays for a design on paper, copyright and all, which becomes his own to do what he pleases with after he has paid his architect. We can imagine a number of different ways by which the client could rob the designer of his skill and labour. For example, a client may want to cover an estate; he obtains plans for a house in this way, paying 2½ per cent., and for a design which he can use again and again. Or a client may want to carry out a design for any decoration, and having obtained the drawings, he could put them in the hands of a workman. Or he may show the drawings so obtained to friends who want ideas. All these ways are wrong and unjust. But as long as the architect retains his plans or his design, he can prevent any appropriation of his ideas—at least, as long as the work remains unexecuted. And there is justice as well as reason in allowing the artist to carry out his own design, and obtain the full remuneration for his labour. He designs a certain building or any decorative work to be carried out, and because he is obliged to put his ideas on paper for the client's approval, he is not thereby called upon to part with it in case the client alters his mind. The contract with the architect is generally that he should submit a design to be carried out, and if, through the client's fault, it is not performed, there is no reason why the architect should be called upon to do more than he intended to do in the performance of such contract. It is quite another matter if the client only asks for a design on paper.

In a case just tried at the Westminster County Court, an architect sued a rector for his charge, £32, for making a design for a rood-screen; also one for the east end of a church, and for other drawings prepared for a pavement and for panelling, estimated at £1,300. The designs were not carried out; but the defendant was willing to pay the amount claimed if the drawings were handed over. The plaintiff declined to do this. After some

discussion, the parties agreed that the remuneration should be assessed on the basis that the plaintiff should retain the drawings. The work was of a special character, and the ordinary scale of remuneration did not apply to it, so the plaintiff charged his time. The judge referred to the case of "*Ebdy v. McGowan*" as to non-recovery of charges unless the plans were handed over on payment; but he added that two of the drawings contained much detail, more than was required at that stage. The plaintiff said that it was only necessary to make diagram drawings sufficient to illustrate the design, and that such elaborate drawings were made on the supposition that he would retain them, and that the drawing of the screen was to be exhibited in the church. His honour gave judgment for the plaintiff—£20, including travelling expenses. The defendant abandoned all claim to the drawings. The ruling does not decide the question of retaining drawings which had been abandoned by the defendant; but opens up another point. For example, an architect may make a design for a screen or some other special work, and he may put more detail and labour in the drawing than is really necessary for practical purposes. He may make, in fact, a show drawing for the purpose of exhibiting his design to an advantage. The extra labour is not required by the duty he owes his client; but it enables a drawing to be made that he can keep. It can hardly be maintained that the client, in the absence of agreement, has a right to ask for such a drawing, and yet it is made expressly for the good of the object—to obtain subscriptions. An architect often makes a perspective of a design which may serve both his client and himself; but surely the time and labour expended on it ought to be remunerated!

CONSTRUCTION AT THE SEASIDE.

THE many tales of destruction that have lately come to us from the coast during the recent gales must have been rather a rude awakening to engineers and builders who have pinned their faith to light iron structures and ordinary modes of building. Construction on the sea-coast is exposed to forces, both atmospheric and tidal, from which building in inland towns is exempt. A house of three or more stories, which would be practically secure in any of our great towns, would scarcely be safe exposed to hurricanes from the south and west. In addition to the great force of wind which occasionally endangers a residence by the sea, the salt air, the force of driving rains, not to say anything of the excessive heat from the sun experienced during many months of the summer and autumn, are agencies which must be borne in mind by those who build at the seaside. In this connection we may simply allude to the difficulties experienced in keeping the walls of the exposed sides of a building dry, of keeping the roofs weatherproof, and in preventing the ingress of moisture through the window-frames, sashes, and casements. During a gale it is often impossible to close a front door or to keep any window secure on the exposed side. These are matters which concern the architect and builder, and which demand special attention. Occasionally we hear of light verandah and balcony coverings, and even roofs, blown bodily off, of windows blown in. Substantial hollow walls, iron stays, roof anchorages, weather fastenings of a particular kind, are amongst the means employed to meet these contingencies; and woe to the architect or builder who thoughtlessly takes no special precautions in his drawings and specification, or imagines that the same kinds of walls, roofs, or windows which are found to be secure in London will be equally so for a house at Dover or Brighton. In short, the

architecture of a coast town must of necessity vary in type, just as vegetable and animal types differ in various localities. The architect is not the only person interested in works in our coast towns. Such works as harbours, sea-walls, jetties, groynes, and iron piers naturally are exposed to the full stress of the weather, and we have something to learn whenever these structures are destroyed or damaged. The damage done at Dover, Brighton, and at other points along the coast, indicate a few of the forces against which the engineer has to contend.

One of the most momentous and destructive of the forces which the architect and engineer have to combat is wind-pressure. Much has been written on this subject; tables have been compiled giving the wind-pressure to which buildings are exposed, and of the resistances offered to the wind by variously shaped surfaces, yet every now and again our theories altogether fail us: a Tay Bridge is destroyed, a high building is swept down, chimneys are overthrown—structures which seem to have been built with particular regard to wind-pressure as understood by us. We have no right to assume that a structure calculated to stand a pressure of, say, 30lb. or 40lb. per square foot, is safe. That we have much to learn is clear. It seems an easy matter to establish a relation between the velocity of wind and the pressure of it, regard being had, of course, to the position and form of surface of the structure against which the pressure is exerted; but the many remarkable cases of destruction which occur show that the law is not clearly understood. When a wind blows against a building or chimney-shaft, and is arrested momentarily by it, it creates a vacuum on the leeward side; the greater the velocity of the wind the more perfect is the vacuum made behind it. Now, according as this vacuum is more or less, it is obvious the pressure becomes dangerous in the same degree. In our tables this fact is not considered, but may not the overthrow of so many of our structures be accounted for by this consideration, that the wind-pressure is considerably increased by the vacuum behind it? The engineer and architect may safely take the ordinary pressures given for ordinary breezes, but when the wind is high, the amount of rarefaction behind the building increases, and a much greater resistance is required. On this subject Abereromby, on the "Weather," may be usefully studied, as he conclusively shows that we cannot fairly measure the velocity of wind, and there is no such thing as an absolute force which corresponds to a given velocity. Although the pressure on a board one foot square may be 20lb., and we may compare it with the force on another board of the same size, yet we should not be justified in asserting that the force of wind was 20lb. per square foot in the abstract, because a board 10ft. square of the same shape gave a different result. A careful observation and record of a number of wind gauges, such as those kept at the Forth Bridge, will alone enable us to understand the complex phenomena of wind pressure, which often ranges from a strong breeze of 35 miles per hour to a hurricane of 90 miles, or about 41lb. per square foot. Another factor of great importance is wave-action. Much has to be learned of this force also, as the engineer who neglects it may find it to his cost. On this difficult and somewhat abstruse subject, we have to refer to the works of Weber and Scott-Russell, amongst many other experimentalists. Of course, it is well known that a wave is not an advancing mass of water, as it appears to the eye; but only the form and energy of the wave is transmitted—not the water. These waves of oscillation are not so destructive as those called "waves of translation" on shallow coasts, which often strike the vertical walls of breakwaters and quays with

great violence. The question of wave-action has been neglected in the construction of many of our sea-walls and groynes, if we may take their structure and shape into consideration. The most destructive wave-action is that in which the waves pass into shoaling water. The friction of the bottom begins to be felt, and a change of the form of wave takes place from one of oscillation to translation, the crest at last breaks, and the wave-stroke is prodigious, being, in fact, the full momentum of the mass. The impact caused by these storm-waves on a wall or pier structure is enormous. The dynamical force of storm-waves has been given as 6,083lb., or three tons, per square foot. If we look at what havoc wave-action has done on cliffs along the coast—blocks weighing many tons lifted bodily and thrown upon ledges several feet in height—we cannot be surprised when we hear of vertical-faced sea-walls being destroyed by the same agency. The "fetch" of waves, the direction of waves affected by contours of the bed, are matters of great importance in the design and construction of harbours and other sea-works. The contour of the sea-bed, by giving a certain direction to the waves, may make all the difference between one site and another.

Then there is the form and shape of walls of masonry and concrete. The sectional form of sea-walls is a subject that is still debated. Modern French experts appear to favour the plane front for resisting wave-action. M. Laroche, engineer-in-chief of the National School of Bridges and Roads, writes: "Practice seems to have shown that for great jetties exposed to violent seas, the curved form of exterior front does not palliate the shock of the waves, at least during the continuance of real tempests." Again his opinion agrees with that of the majority of French engineers, and all breakwaters recently built in France and Algeria, with rare exceptions, have had plane fronts rather than curved. Those who are interested in this important question will find the carefully-written paper on "The Proper Profile for Resisting Wave Action," of Mr. Robert Fletcher, Assoc. Am. Soc. C. E., in the last number of the *Transactions* of that body, instructive. These opinions, it will be noticed, are not in agreement with those of Mr. Scott Russell, Rankine, or Emy, who all advocate either a cycloidal curve of face, or some curved profile, or a stepped face, and for certain situations the curved profile is undoubtedly the more permanent. We have no space to enter into the subject of material or construction, though there is a general agreement as to the value of concrete and Portland cement in sea-works. It may be remarked that at Liverpool, the London Docks, at Glasgow, and other places, hydraulic limes have been used with success. The use of lime has been abandoned by us in such works; but French and Italian engineers have employed it with success in works along the Mediterranean shore, probably owing to the superior quality of the local limes used. On the whole, the history of sea-works is largely one of costly failures, and more has been done in repeating such works than experience has justified. The enormous and destructive action of storm waves is not yet fully understood. Shore protection is one of the matters we have yet to learn much about, and the profession have a large number of disasters and valuable data which they can profitably turn to account.

THE ARCHITECTURAL ASSOCIATION.

THE ordinary meeting for the present session of the Association was held on Friday evening at 9, Conduit-street, W., the President, Mr. Beresford Pite, in the chair. The following new members were elected:—L. Cabasche, W. H. Huxley, K. Macdermott, and C. E. Power. The President announced that the committee of the Classes of Design had resolved to issue a

new syllabus for the Advanced Section from January 1st at half-fec, for the half-session. The subjects would be similar to those of last session.

A PLEA FOR THE APPLICATION OF NATURAL FORMS AS REVEALED BY THE MICROSCOPE.

Mr. W. HOWARD SETH-SMITH, vice-president, then read the following paper on this subject, illustrated by very numerous lantern slides, reproductions firstly of capitals and ornaments representing each of the Orders and Styles, and then a much longer and extremely interesting series—enlargements of the scales of Lepidoptera, and examples of bryozoa, polyzoa, echidna, &c. The lecturer said he proposed to refer especially to the enrichment of architectural features, as distinguished from the work of the decorator or ornamentalist, and he would ask members, moreover, to discuss his arguments and statements by the light of those examples of European architecture which had by the universal consent of experts in all ages been regarded as marking the zenith of their particular style—such examples, for instance, as the best Grecian, Gothic, and Renaissance periods furnished. The plethora of theories as to the origin of the best architectural ornament was the strongest evidence of its obscurity. One school traced its genealogy back to a specific flower or leaf; another assured us that it originated in scroll, zigzag, or other more geometrical forms—that any similarities to the characteristics of natural foliage were super-added refinements, and that in ages of decadence only did we find literal rendering of natural forms. This last statement the author accepts as beyond dispute. Interesting as all such theories are, Mr. Seth-Smith continued: I prefer to adopt—rather than to rush in on such sacred ground of controversy—a broader, yet sufficiently definite ground, this—namely: That in the best periods architectural enrichment, while retaining the characteristic beauties of nature, is so highly idealised as generally to baffle the attempt to identify it with the specific natural forms which originally suggested it or have contributed to its evolution. This applies, of course, to statuary as well as to architectural ornament, and I would suggest that in this ideal character lies the secret of their enduring appeal to the æsthetic sentiment of all ages. We must, however, never lose sight of the fact that these artificial forms, which have lived so long, are the outcome of the improvements of many generations of architects and sculptors. The pleasures we now derive from these ancient forms are probably largely those of the antiquary; the degree of pleasure, therefore, depends essentially upon "correctness" in every particular, whereas living architecture has in the past, and will in the future, depend on the amount of tasteful invention architects are able to import into their work consistently with non-violation of the laws and limits of a strictly constructional art. For this reason I have always strongly advocated a close study of the best contemporary work, and I do not hesitate to affirm that it is the most important study the young practising architect has to pursue. Not, however, to the exclusion of that of the antique. Our taste is formed and refined by such study, to say nothing of the fact that we are constantly called upon to undertake the restoration or alteration of Classic buildings, and are then bound to work more in the spirit of scholars than of designers. The human mind, however, is happily so constituted as to weary of the ceaseless repetition of even the most beautiful forms. The true artist rebels against reiteration, and great as are the possibilities of fresh combination of the best details by thoughtful and clever architects, I am safe in saying we are weary to death with the "orders" of architecture, both Classic and Gothic, and with their ornament. Its interest is gone! It is a dead language! There is an outcry for something fresh, and this yearning is at the bottom of the healthy movement just now so popular with our younger men to become actual builders and craftsmen rather than mere draughtsmen and overseers. This movement is based on common-sense, inasmuch as it admits that architecture is not pure poetry, but insists, nevertheless, that it shall be poetical. Our art is fettered by constructional cost, and many other prosaic and inexorable conditions. There is, however, enough poetry left to sweeten the architect's life, and we owe to the budding architect who, led too far into the arcadia of the fine arts, neglects those limitations. I do not understand this movement to bar the use of all ornamental forms of the past, but to encourage the thought and invention in its use as in

everything else we do. In other words, it is not a revolutionary school of thought. It is reform we need; determination to work in future on the principles which evolved the enrichment of Athenian, Greek, and 13th-century Gothic. If this be the teaching of the school I refer to, and we be true to it, nothing but good can result to us, and we may give it our support ungrudgingly. Will you pardon me if I digress with the object of most humbly offering one piece of advice—not new, I am well aware, but worth emphasising? It is this: To shun pessimism and to face unalterable facts, cheerfully trying to discover in the characteristics of our own age new motives for invention, the new foundation from which to evolve the style of the 20th century. Depend upon it, our times provide ample compensation (even for artists) for the loss of the advantages, too often imaginary, of the romantic ages. It is ours to discover them, certainly not to indulge in railery against the unchangeable in our environment, but to make the most of it. My object to-night is to point out what strikes me as being one of these advantages as affecting our own craft. The natural forms I shall show you were for the most part unknown to the human eye fifty years ago. Twenty years since many of them were discovered by the scientific experts of the celebrated *Challenger* expedition by the aid of the microscope. Amongst this new world of wonderful forms are many so original and so beautiful that I thought it worth while calling your attention to them as singularly suggestive for stone carving or plastic decoration. In doing so I am perfectly aware that it would be unreasonably sanguine on my part to imagine that you will get workable suggestions from all of them. Suggestions from natural forms are our alphabet. We may coin many novel words by their aid; but all will not live and grow to be part of the lithic language of generations to come, as has, for instance, the beautiful egg-and-dart enrichment—the resultant, remember, of many artistic minds. I merely aim to enlarge your vocabulary by introducing these forms to your notice. In making my selection from them, I have, as far as possible, chosen a few typical ones in each class. Nor have I by any means exhausted the classes. If the geological and botanical libraries and museums were searched, many works would be found to yield astonishing and most usefully suggestive forms. The works from which I have reproduced the slides I am about to show you are: (1) "The Report of the Voyage of the *Challenger*"; (2) "Denkschriften," K. Akad. Wissenschaft; (3) "British Crag Polyzoa," Busk; (4) "Bryozoen," Hagenow's; (5) Mr. Richard Kerr's "Hidden Beauties of Nature." The microscope has enabled the human eye to extend its vision to an almost unlimited range, embracing myriads of new forms, and the higher the power we apply, the more intricate, suggestive, and admirable are the forms revealed. If it be true that without constant inspiration from nature our work must deteriorate, let us welcome every new light science sheds on nature. The fact that the Renaissance styles have been devolutionary rather than evolutionary is surely to be accounted for by their designers borrowing their ornament from ancient architecture without consulting either nature or science. Nor let us fold our hands because we believe a genius is wanted to effect a massive adaptation of a new element of design to architecture: no such wholesale or sudden creation of forms has ever yet taken place, and never will. The average man cannot be a great reformer. Let the stand of our criticisms of all contemporary detail be this: Does it contain true feeling for beauty combined with rational construction? or, as Mr. Albert Goodwin puts it, "Our enrichments must be as much the product of our brains as the other parts of our work." Have we, however, no creators among us? There are, I make bold to say, as many men doing original work of a high order as there ever were before, and in architecture, too. I will go further, and say that the last twenty years of English architecture shows a more rapid origination of really beautiful forms than any previous period of the same duration. The scientific discoveries of this century are at the root of its characteristic civilisation, and are artists to be debarred from the new forms science has given them, and the use of which can make their art progressive and accommodative? We have greatly lost touch with the public because we rather plume ourselves upon being non-scientific. Architecture must never be con-

servative: she will always find sufficient static forces in the affections of the public for old familiar forms, and in the restraints of ecclesiasticism to express exuberance. She must be Nature's mistress, and if so will, perforce, ever be fresh and original enough. How many of us are found more often in the Natural History Museum than in the Archaeological Museum over the way! The latter is the place for the student, but not so much for the practising architect. In this connection it may interest you to know that the details of many of the terracotta shafts designed by Mr. Alfred Waterhouse in his Natural History Museum are so similar to some of the Polyzoa shown you to-night, that I asked him whether they were suggested by them. He tells me that it is not the case, but by the forms which you will find in the cases illustrating the coal measures in the Fossil Corals Room. I think when you have examined these slides you will agree with me that they strongly support my arguments in favour of working on these lines, and in this newly-opened field of nature. They are not only original, but beautiful, and harmonise wonderfully with the more historic forms around them. At the same time, let us be analytical students of past architectural ornament. Tennyson was, as a poet, a great student of nature—belived and breathed in it; but his pre-eminence in his day was due to his adding to this great principle of work an extraordinary knowledge of the origin and character of the language in which he expressed nature's inspiration and of the best poetry which has been composed in it before. Any new forms of systems of ornament must at first be supplemental, and not suddenly substituted for those with which the public are familiar, and of which they are fond. If my proposition of the hidden origin of the most beautiful and enduring types of architectural sculpture approves itself to your minds, then perhaps you will agree with me in believing that suggestions borrowed from these microscopic forms will appeal none the less strongly to the public on account of the obscurity of their origin. That they combine sufficient rarity and originality in detail with a certain approximation to many forms of architectural detail which have established themselves in the affections of civilised mankind. That a large proportion of them are of the nature of shells or silicate cases once protecting a living cellular creature. That they are much more adaptable to architectural carving than foliage or flowers, in that they are already lithic in character. If the committee and honorary visitors to the studio of the Association approve of the proposal, and are willing to set the necessary subjects, I shall be happy to offer a prize of £10 10s. in the next session for the best design based upon the subjects of this paper.

The President remarked that Mr. Seth-Smith had touched upon a subject the difficulties of which would appeal to every practical designer. There were few things more difficult to define than beauty and ornament, and he, for one, would not venture to define either the one or the other; yet, doubtless, everyone regarded those things as beautiful which he liked, and those as ornamental which possessed what he regarded as beauty. He feared there was not much suggestion for ornament to be gained directly from the new forms Mr. Seth-Smith had shown them that evening. National history in all its developments was interesting; but its forms emphatically lacked beauty, and if they were displayed upon a building, they might present an expressive and well-marshalled catalogue, but would awaken no emotion, and would therefore fail to elevate the mind of the spectator. Suggestions directly borrowed from natural forms could never make beautiful ornament; we might look at and admire a rose; but a Tudor rose was far more suitable to a building than a copy of the actual flower. The fresh forms would be unrecognised by the majority of people who saw the building, and even those well informed would simply identify the source, and there all interest would cease. However, he trusted that the pessimism in which he had indulged would not damp discussion on a novel subject.

Mr. ALBERT GOODWIN did not understand Mr. Seth-Smith to advocate direct copyism of natural forms, but to use them as the bases for suggestive treatment. His selection of subjects for slides was extremely good, those which promised to be adaptable being thrown on the screen; but it seemed that they would lose much of the effect if every part were rendered in exact replica of one typical example. It was true that beauty was

difficult to define, and that tastes differed; but every painter worked on the assumption that there was a general likeness in men's minds, and that certain things would please the ordinary Englishman. He felt that the suggestions put before them that night needed to be worked up and well digested; the ornamentation of South Kensington Natural History Museum was to him an example of crudely-treated suggestions.

Mr. HAMPTON W. PRATT proposed a vote of thanks to the lecturer for bringing so many fresh suggestions before them. He had been trying to think how they should influence architects, and how they could be adapted to their work, and to him they did not appear so desirable as the tree and plant forms already employed, as they did not suggest in the same way growth and continuity. They might, however, be utilised for diapering or other patterns, but they were suitable for sculpture. To be turned to account, these forms would have to be reproduced before the designer could study their possibilities, as it would be impossible to recall the subtleties of their forms after merely seeing them thrown on a screen.

Mr. E. W. MOUNTFORD seconded the vote of thanks, remarking that he confessed he had not seen any adaptable suggestions. Some outlines shown appeared to him to have adapted themselves from designs in wall-papers by Messrs. Hayward and Sons and other firms.

Mr. A. WALLACE RIMINGTON and Mr. F. INIGO THOMAS also supported the vote of thanks, which was carried by acclamation, and was briefly acknowledged by the lecturer, who urged that fresh forms of ornament would not be less acceptable because people could not readily trace them to their origin.

ADAPTABLE SPECIFICATIONS.—XXIII.*

NOTES ON THE SUPERINTENDENCE OF WORKS.

THE various divisions which, by custom, make up an ordinary specification have now been dealt with. They have come under the following heads:—

- I.—Preliminary, Sundry, and General.
- II.—Excavating and Foundations.
- III.—Bricklayers' Work.
- IV.—Drainage.
- V.—Stone-walling and Masonry.
- VI.—Carpentry and Joinery.
- VII.—Slating and Tiling.
- VIII.—Plasterers' Work.
- IX.—Ironfounders' and Smiths' Work.
- X.—Plumbers', Brassfounders', and Sundry Works.
- XI.—Glaziers' Work.
- XII.—Painters' Work.

It is intended to supplement these by short specifications for other kinds of work which the architect has frequently to arrange for: such, for instance, as heating, gas-fitting, the formation of roads and paths, and similar matters not actually pertaining to building, but often mixed up with it. But at the present stage, where the specification for actual building may be said to terminate, it may be useful to students to say something about getting the specification acted on and obeyed; in other words, about *Superintendence*. Without this, even the most carefully-worded directions will have little value.

From the nature of the case, a chapter on Superintendence can hardly be an example of the charity which thinketh no evil. Experience and observation, unfortunately, rather induce an architect to expect evil everywhere, until he is sure of its absence. If things can go wrong, then in one case or another they will go wrong, and the sooner the wrong in them is detected, the better. But it is by no means to be assumed that the wrong is always due to the contractors. The building trade, indeed, seems to contain rather more than an average proportion of untrustworthy members—a circumstance from which nobody suffers so much as the honest and capable ones. This is not because builders have inherited by nature "a double dose of original sin." It is rather because competition is specially severe amongst them, and because, even more than most other men, they are constantly being driven to choose between the two alternatives of no work and work at a price for which it cannot be properly done. It is the architect's interest as much as his duty to prevent a tender from being

accepted on which the builder is sure to lose heavily, and which may possibly take him into the bankruptcy court. But when the tender becomes a contract, and the work is actually being done, it is too late to consider, in superintending it, whether the builder is doing it at a loss or a profit. The clauses of the specification must then be enforced, or, if the contractor seeks to be relieved from any of them, it must be with the consent of the building owner, and not merely by the sufferance of the architect.

Even with the best of builders, and under the most favourable circumstances, matters are liable to go wrong. *Bona fide* mistakes are plentiful, and sometimes lead the contractor to supply more costly things than were wanted, though not the right things. Workmen, too, for some inscrutable reason, not rarely "scamp" the work they are paid to do properly, though the "scamping" may neither save trouble to themselves nor money to their employer. Persons who supply materials, especially such materials as are sent direct to a building, may send much worse ones than the contractor ordered, though they have no intention of giving him a corresponding allowance in the price. Foremen of different classes have their share in trying to make the specification a dead letter. There is the ignorant foreman, who cannot read it or understand it. There is the stupid foreman, who cannot learn from it, and who, in spite of it, will persist in executing a large public building in the same trumpery way in which he has been taught to build cheap shops and tumble-down "villas." Then there is the sly foreman, who does not consider his duties to be a business, but only a kind of game which he plays, for amusement, against the architect and the clerk of works, and in which he scores a point whenever he can manage, without detection, to carry out some shameful fraud in materials or labour. There is the self-sufficient foreman, cheerfully setting aside the plainest rules and the most emphatic directions. "Leave it to me," he cries, "leave it to me, and you may depend upon it I will make a good job of it. No; it is not done quite as you said, but it will be all right, I assure you. I would not have covered it up if it had not been." He finishes the work and goes away, perhaps never to be heard of again, and a year or two after it turns out that the drains he covered up on his own responsibility had junctions made with brickbats in cement, and that the masonry he was so sure about had half the dowels omitted. If there is any worse foreman than this, it is the one who "does not want to trouble the architect." He is always coming on something he does not understand, or pretends not to understand. In his own way he deals with it, clumsily, cheaply, and badly, and then, when the architect asks why he did not send a telegram, or a letter, or a postcard for instructions, he has one answer always ready, "We did not like to trouble you."

Happily there are plenty of good foremen to be met with; but as the appointment of the foreman rests with the builder, and not with the architect, it is not safe, without sufficient knowledge of him, to assume that he is good. Clients, and especially committees, who are beginning some important building, have been known to say: "We have such a civil, experienced foreman, that we can do without a clerk of works. At any rate, we will try him alone for a time, and see how matters go on." Unfortunately, the time at which they thus try him is the most critical time in the whole history of the building—the time at which the foundations are proceeding. Very civil foremen have been known to put very defective concrete and footings even under tower-piers carrying an enormous weight, and very experienced foremen (in a different class of work) have been known to wedge up pier-bases with nothing better than fragments of soft stone, of brick, and even of wood. If a clerk of works is wanted, he is wanted from the very first, and no trouble is too great to take in selecting a competent, fair, and trustworthy one.

Amongst the first duties in superintendence is to check the setting out of the building on the ground. It must be in the right place as well as of the right size. It is the builder's duty to set it out properly, according to the drawings. The architect, or his deputy, the clerk of works, ought only to correct it when wrong, and not to take any responsibility by doing the actual work. A careless setting-out of foundation trenches may lead to evil subsequently, the footways and walls being placed on one edge of the concrete instead of centrally. Now, if it has not been done sooner, is the time to sink trial-shafts or to

make borings, and so to ascertain exactly what it is that one is going to build on. The cores from the boring tools must be carefully preserved for this purpose—in the order in which they come up. Where the subsoil of the district is known to be uniform for considerable depths, such trials may be needless; but they should not be neglected even for ordinary structures where the ground is variable; nor anywhere in the case of very high or heavy buildings. If all is so far satisfactory, now begins the excavation. Superintendence is doubly needful here. Let no concrete be put in a trench till that trench has been examined and approved. If any has been put in otherwise, have portions here and there taken out: interesting discoveries may thus be made. Look out, in the excavations, for soft places, for loose sand, or any kind of sand liable to escape; for old drains, old foundations, old wells and cesspools; contaminated soil of all kinds, outcrops of rock in the midst of a more compressible soil, large boulders and whinstones, and springs and water-courses. Deal with each of them in the appropriate way. See that the bottoms of the trenches are firm, and not muddy, when the concrete is laid on them. See that their sides have not caved in, and left loose flakes of clay or earth in the trenches. Check the depths and widths of excavations, and make memoranda of variations in these. The level of the ground floor, or some other datum line, should, before now, have been set out on the site to measure from.

When the excavations, or part of them, are approved, the sooner the concrete is put in the better. The lime needs looking after, and still more the cement, where cement is used. Both of them may be inferior in quality, or of a wrong sort. They may have been lying about in the damp and practically set, or the cement, for want of proper "air-slaking," may contain particles of lime, which will cause it to "blow." Selenitic cement, it may be noted, seems a dangerous substance to use in foundations. In a large church near London, where the concrete was made up with this cement some 25 years ago, it had so completely perished that the whole building recently had to be underpinned at a heavy expense. If the lime and cement are satisfactory, the next thing is the ballast. It must be quite free from clay, loam, and dirt. Some clays naturally contain a large quantity of pebbles, and when this happens the builder may want to use in the concrete those he has dug out. If they are really pebbles, and not partly nodules of hardened clay, there is no objection to his using them, provided they are thoroughly washed. But they will want a little sand or fine gravel mixed up uniformly with them. Red brickbats (of sand-faced bricks, and not "pressed" or water-moulded ones) make good concrete if broken up small enough to pass through a 3in. ring; but they are not suitable for carrying very heavy structures. "Burnt ballast"—that is, clay burnt for the purpose by means of small coal—is commonly used, in clay districts, for ordinary concrete. Everything depends on the burning of it. When a quantity is made or delivered on a site, some of it is generally well burnt and some scarcely burnt at all. The only safe plan is to have it all picked over, and to send the under-burnt fragments off the site before any of this ballast is used. It binds well together, especially with a little gravel, but is not suited to carry a lofty building, or a pier on which great pressure comes.

Whatever materials are used, they must be thoroughly and evenly mixed with the lime or cement, and not flooded with water. If cement is used, no time must be lost in filling the concrete into the trenches. The average workman sees no need to hurry about it. It is hard to persuade him that a great part of its strength has gone when it has once begun to set, and he thinks, if he "knocks it up again," it will be just as good as ever. For this reason, it is safer in practice, where there is not a vigilant clerk of works, to specify hydraulic lime in the foundations, and not cement at all. In clayey or loamy soils, again, all sorts of concrete are likely to get injured by admixture with the clay or loam. As far as this takes place, the concrete never sets, or does not set hard enough to be of any use, therefore the trenches should be clean and free from mud, flakes, and fragments before it goes in.

If the depth of the foundation trenches below the datum has been noted, and if, on a subsequent visit of the architect, the depth of the top of the concrete in them is also noted, the difference

between the two depths ought to give the thickness of the concrete. But though it ought, it does not always do so, even when the builder is thoroughly careful and conscientious. He may live at a distance and not know what is going on, and his foreman may be absent or careless, if not worse. Some time ago, a house built in Essex by a contractor of deserved reputation began unaccountably to give way. The materials were good, the foundations were amply large, and the cause of the failure was a mystery. Underpinning was resorted to, and then it appeared that the foundation trenches had first been half-filled with screenings of sand and other rubbish, put in dry, and that this abomination had been carefully covered over with a layer of excellent concrete, which the architect had approved. The site being on a slope, the water had found its way into the rubbish-layer under each wall, and in a few years had carried away much of it, grain by grain. Then, of course, the walls settled more and more. The same fraud, it appeared, had been practised in the foundations of a memorial church in the parish, with another builder and another architect, and both buildings had to be made good at about the same time. This way of doing work may be a local peculiarity; but it shows that concrete is not to be trusted till trial holes have been made through it at a number of spots selected by the architect.

Bricks come next. Those which first arrive are apt to fulfil very imperfectly the direction stating that they are to be "sound, square, and well burnt." There is an idea that any sort of bricks are good enough for footings. Some builders send "rough stocks," bent and cracked in all directions. As soon as any weight comes on them, they break across. Others send clinkers, partially fused into irregular masses. The pressure, therefore, comes very unevenly on them, and they either break, like the rough stocks, or leave the work above balanced unsafely on their projecting angles. "Grizzles" and "shuffs," or their equivalents in extra-Metropolitan districts, are also tried on, and if they are passed, speedily crumble back into the clay they came from. It is well to have a clear understanding at first that "stocks" are to be stocks, though if they are good in other respects, their colour, of course, is immaterial where they will be covered up with earth. Facing bricks and "rubbers" require special care, as do "pressed bricks" of all kinds. With these last, the difficulty is to know when they are well burnt. They may be extremely hard both outside and in, and yet, after safely outlasting several wet summers and severe winters, they may crumble away in batches, all of the same section, perhaps, decaying together. While this happens, those of other patterns may remain sound and untouched, so that the fault is apparently either in the preparation of the clay or in its treatment in the kilns. Sanded bricks, again, like Suffolks, decay where a "splash" is frequently acting on them. They fail next the ground and just above projecting cornices and sills; but it is easier to detect imperfectly burnt ones amongst them than it is amongst the smooth-faced "pressed" bricks of the Midland Counties.

THE ITALIAN RENAISSANCE.*

SOME few years ago a series of very useful lectures were prepared by Mr. William J. Anderson, at the instance of the Governors of the School of Art at Glasgow, on the architecture of the Renaissance in Italy, and with a view of reaching a wider circle than the students of the schools over which the author presided as Director of Architecture and lecturer in Scotland, he has now, with the co-operation of Mr. B. T. Batsford, the well-known publisher of art books, rearranged these original discourses, and gathered them together in a handsome and fully-illustrated, useful volume. The chief change made in the programme of the lectures is that, instead of the first two, which have been relinquished, an introductory chapter taking their place has been written expressly for the book—the remaining five discourses are retained, and furnish the major portion of the volume before us. The endeavour aimed at by the author has been to subordinate anything like a special treatment of particular buildings, particular architects, or particular periods to a more thorough analysis, as a

* The Architecture of the Renaissance in Italy: a General View, for the use of Students and Others. By WM. J. ANDERSON, A.R.I.B.A. London: Batsford, 91, High Holborn. 12s. 6d.



FIG. 1.—CAPITAL AND MEDALLION, PAZZI CHAPEL, FLORENCE.



FIG. 2.—PULPIT BRACKET, SANTA CROCE, FLORENCE.



FIG. 3.—EXTERIOR OF CHURCH, S. MARIA DEI MIRACOLI, VENICE.

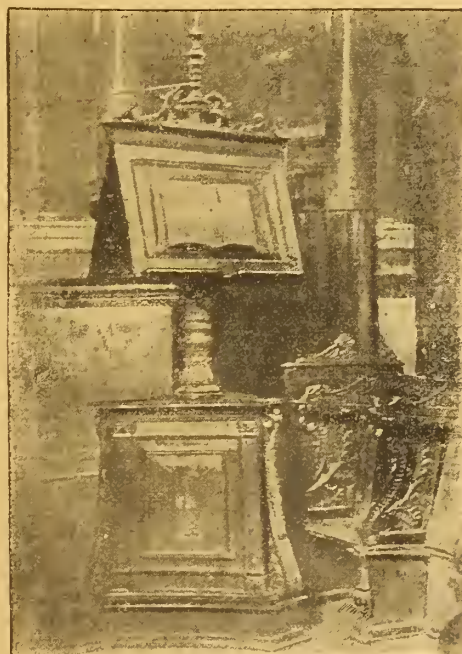


FIG. 4.—CHURCH FURNITURE IN SANTA MARIA IN ORGANO, VERONA.

whole, dealing with the Renaissance in such a broad and concise manner as to enable the student of architecture to form a true conception of its precise meaning, and thus distinguish its different phases. And, in doing this, aided by Mr. Batsford's bibliography, Mr. Anderson has lifted his historical résumé above the mere archaeological dry bones of his subject wherewith to fill his pages, such as discussing dates and tabulating features, classifying mannerisms or comparing schools, a method of study, essentially dilettante, beyond which Mr. Anderson carries his readers by his more comprehensive idea of an architect's aims and practical needs in developing a resourceful capacity for design, by acquiring a knowledge of the traditions of their art in the past, the art of building gracefully to meet the requirements of everyday conditions in a cultured and unostentatious manner. Emerging from the West, the Renaissance distinguished the 15th and 16th centuries as a general phenomenon reinvesting Roman principles and methods, ethnographically limited in their revival by the Latino-Teutonic nations with a racial signification inevitably influenced by the universal law of natural selection, and inspired by an awakened enthusiasm for the beauties of the ancient world suggested by, and permeated with, a superficial paganism, which, to some extent at least, was the product of reaction possibly against the extravagances associated with the piety of the

middle ages. The Italian Renaissance has been claimed as the result of the influence of literature; but literature, while sustaining it in its decline and fall, had scarcely more influence on its origin than the writings of Virgil, Horace, Livy, and Ovid had in the architecture of the Augustan age they adorned. The originality and genius displayed by the architects of the Early Italian Renaissance has never, perhaps, been surpassed, investing, as these masters did, the Roman forms and details with a freshness and freedom from restraint, which at once removed their conceptions from the category of merely imitative design. Brunelleschi's revival out of chaos and confusion discovered the forgotten principles of ancient Rome, and erecting upon them, with audacious brilliancy, new conceptions, contrived with due regard to new environments, the outcome of complex social, historic, and geographical conditions hitherto unknown. The incalculable influence thus exercised upon all subsequent art productions has only to be mentioned to be fully acknowledged. Brunelleschi's greatest work was the dome of the cathedral at Florence; but he laid the foundations of the Renaissance on the broader influences occasioned by his smaller works, such as the Pazzi chapel, which was probably the first ecclesiastic building in a Renaissance style unmatched by any previous work of the same character. The shell treatment of the pendentives here adopted anticipates

Spanish modes of a hundred years later, and here is the earliest use of a row of paterae in the frieze, filled by cherub heads, executed by Donatello and Desiderio da Settignano, of which we give an example in Fig. 1. The Corinthian capital is remarkable, too, as the first of its type employed for centuries; but the original excellence of Greek or Roman detail is only realised in a crude way: the ancient refinement is not attained, of course. The building, though by no means beyond criticism, is well-deserving of the prominence which Mr. Anderson has accorded to it, and the old sacristy of San Lorenzo is in many respects an admirable example. San Spirito, also, at Florence, as well as San Lorenzo, are famous instances by this master, while the portico in front of Santissima Annunziata serve to illustrate types of the Early Columnar arcade arrangement. To notice the several Florentine palaces here would be beyond our scope, and we, at best, can but indicate the scheme followed by the author, who always views his subject from an architect's point of vantage, and, giving credit to the sculptor's influence and the important share which the sculptor always exercised in these works of the Renaissance, including such men as Jacopo della Quercia, Lorenzo Ghiberti, Luca della Robbia, and Donatello, Brunelleschi's companion. It may be useful to bear in mind, too, that Masaccio and Fra Angelico are, among painters, the greatest contemporaries of the sculptors

named, while Philipino Lippi, Ghirlandajo and the still more famous Botticelli occur a little later in the century. The golden age of sculpture, as the middle of the *quattrocento* has been called, it was not till after the end of the century that painting in Italy reached its highest excellence, almost coeval with the meridian of its architecture. Of the works executed by the group of architect sculptors who succeeded the Quercia and Rohia group, we give a sample in the bracket of the pulpit of Santa Croce, Florence (Fig. 2), one of the most renowned productions of Benedetto da Majano executed in white marble. The field of the ornament is laid in with gold. The effects of colours, by the use of materials, except for the unpleasant glazes of the Rohian ware or terracotta, was not a strong point in the work of this period. Form, rather than colour, seems to have been the end aimed at. Our third illustration represents the church of Santa Maria dei Miracoli, one of the earliest and best examples of the period at Venice. The shape of the dome recalls the cupolas of St. Mark's. It also stands over a square, and the composition is very pleasing, though the west front is an unsuccessful composition. The church furniture in Santa Maria in Organo, Verona, shown by Fig. 4, is interesting, as illustrating the thoroughness and delicate character introduced into the most minute details, while the intarsia work in the choir stalls is carried out with a finish unsurpassed elsewhere. In architectural elaboration few examples surpass the refinement, and none in degree of ornate ornamentation, the church of Madonna dei Miracoli at Brescia; but space prevents our pursuing the subject further, and we must leave before arriving at the culmination of the Renaissance in Rome. Those who would learn the causes which led to this, and know how the success of the revival continued after the shaking off of lingering Mediaeval traditions, would do well to follow Mr. Anderson's lectures, which end with Palladio and the decline. We know of no book which furnishes such information and such illustrations in so compact and attractive a form. For greater excellence with the object in hand there is not one more perspicuous, particularly for the architect.

THE WORKING OF THE WORKS COMMITTEE.

THE Special Committee appointed by the London County Council to inquire into the management and financial position of the Works Department and as to its further prospects, held further sittings on Friday in last week and on Wednesday. Sir Arthur Arnold presided as chairman of the Council, and the committee consisted of eight other members, with Mr. Edwin Waterhouse, F.C.A., and Mr. E. A. Gruning, F.R.I.B.A., acting as assessors. Mr. A. R. Binnie stated, on Friday, in reply to Mr. Gruning, that since 1892 there had been considerable difficulty in obtaining tenders from contractors, principally on account of the introduction of the wages clauses in the Council's contracts. Mr. Thomas Blashill, superintending architect to the Council, was the next witness. In settling the cost of buildings, the Works Department and the contractor had been throughout treated in precisely the same way and by the same officers. The committee were aware that, while the tender of an outside contractor was binding upon him, the sum at which the Works Department had accepted the job had not represented the ultimate cost to the Council. He had always been open to submit differences between himself and the Works Department to any competent tribunal. He knew of no case in which the work when contracted for had failed to be carried out at the amount of the tender, corrected for extras and omissions. When the Works Department undertook jobbing works they declined to submit their prices for each separate job. Even if they had done so, it would have been impossible to carry on negotiations upon a great number of jobs that needed to be begun on receipt of order, and to be carried on without delay. When the cost came out very considerably above his estimates, they complained, not without reason, that they were expected to conform to estimates that they had never approved. Nevertheless, similar works had hitherto been done by outside contractors within estimates made by the same officers in the same way, and there was no reason to doubt that outside contractors would have continued to do the like.

From the time of the adoption of the schedule of prices based upon that in use by the School Board for London no question had arisen between him and the Works Department as to the correctness of his estimates for jobbing works. But very soon after the schedule came into operation disputes arose as to the way in which it ought to be applied and the mode of treating particular items. Certain accounts which had been presented to the Council included items which appeared not to have been actually supplied, or not to have been necessary to the work, or not correctly priced according to the schedule. The great question in dispute had been the amount of labour expended. There were a large number of works which could not be measured, and for which charges for workmen's time and materials must be made. When some items which had to be measured and other items which were to be charged by time were going on side by side, it was very difficult to keep an accurate account of the labour, even if daywork vouchers were delivered to the architect. Disputes had arisen as to scaffolding and as to the proper price to be allowed for goods which were not covered by the schedule. He would not prejudice those questions, since he was hoping that the arbitrator whom the Council had agreed to appoint as between the architect and the Works Department would deal with them, and that the whole of the accounts now in dispute might be wiped off. But he ought to say, after many months of discussion, the Works Department had, during the present financial year, ceased to make many of the claims which he thought excessive, and it was worthy of observation that during the same period their accounts of actual cost generally came out at rather less than schedule prices. He was unable to draw any distinction between work done by the Works Department and by contractors. As to workmanship, complaints had not been excessive, and he thought that in general the class of workmen employed by the department and by contractors had been as nearly as possible the same. But as to materials, the complaints on some buildings had been many and troublesome, extending over nearly all the trades. The chief complaint he had recently made against the Works Department was the low quality of the cast and wrought iron in certain buildings where strength was of great importance. He thought the department was unfortunate in its sub-contractors. During the period now under consideration he had had to carry out many buildings with thousands of jobbing works spread all over the County of London at a cost approaching £1,000,000, of which £200,000 worth had been in hand at one time. The architect's estimate for works executed under the architect's direction from February, 1889, to the institution of the Works Department, was £114,182, and the accepted tenders amounted to £112,433. In certain works carried out under the supervision of the architect by the Works Department, the final estimate was £224,416, and the actual cost £232,211. Mr. Blashill said he considered there was great difficulty in the way of the Works Department competing directly with contractors. He thought that if the workmen were placed entirely in the hands of the foreman who was immediately over them better results might be expected. He put it forward for the consideration of the committee whether the manager of the Council's works should not be an officer directly under the Council and placed at the service of all the committees precisely as the architect and other officers of the Council were. They would get a man of experience whose position would be somewhat dignified, and who would not get his time consumed, as it must have been of late years, by attendance upon committees, by reports, by matters which took him away from his real work, which was to manage. He could conceive a state of things in which a stores committee might exist with a firm grip on the property of the Council, and perhaps a comptroller would keep a watch on the money. And he could also conceive that when one of the committees desired to carry out a work they would deal with the manager direct. He denied that he had been more severe to the Works Department than to contractors. He certainly preferred that a contractor should win rather than lose upon his contract. He had no hesitation in condemning bad work done by contractors, but in condemning work done by the department he could see that he was reflecting upon a committee of the Council and its agents. The difference between the

actual cost of the work done by the department and his estimate was not due to any severity displayed by him to that department. The Works Committee had been extremely careful and successful in the purchase of materials. No part of the loss could be attributed to that branch of the committee's work. He saw no difficulty as to the wages clause in the Council's contract keeping contractors from sending in contracts, as at the present time all the best contractors in London had to pay their workmen the same rate of wages as that required by the Council. On the average the work done by contractors was below his estimates, whilst that done by the Works Committee exceeded them.

THE WILLIAM MORRIS LABOUR CHURCH.

AT the time of Morris's death a band of earnest workers were in treaty with the Friends for use of their ancient meeting-house on Overton Bank, Leek, for a Labour Church. It was felt that the time had come for a permanent embassy of humanitarian Socialism in the town, after the desultory efforts—extending over several years—of various devoted enthusiasts who have come and gone. The treasurer of the church having offered (conditionally to the adoption of the memorial name of William Morris) to defray the cost of decorating the edifices, and approaches made to the owners of the building having had a satisfactory issue, it has been undergoing reparation at the builder's hands (Mr. Billing). It is an unpretending, interesting stone edifice, a couple of centuries old, standing in a well-turfed enclosure surrounded by tall old trees, where outdoor meetings may be held under pleasant conditions "in the prime of summer time." It is furnished with old high back pews, and has a comfortable upper chamber for small meetings; it will accommodate from 200 to 300 people if necessary. The walls are being lacquered a rich red with stencil ornaments in colours to designs kindly contributed by Mr. Walter Crane. The ceiling and overhead beams are being finished (as also the barred sashed windows) in pure white, and the woodwork painted a translucent green. The west and south upper windows will be draped with Morris blue velvet fabric, and the gas-lighting is to be incandescent, with pink shades, &c.

The decorations by Mr. J. Ratcliffe are under the general direction of Messrs. W. Sugden and Son, and Mr. Craigmile and Mr. George Rigby (as well as Mr. Crane) are giving valuable assistance. Mr. Rigby has designed a beautiful hook-cloth, lettered in "Kelmescott" by Mr. D. Larnier, which is now being embroidered by a skilled artist on Morris silk, and will be the gift of Mrs. Sugden and Miss Clodd. Miss Larnier, of Hampstead, has presented the blue Morris velvet curtains. Mr. Stephen Webb (one of the founders of the Arts and Crafts, and associated with William Morris at South Kensington) is emblazoning a pair of silk hanners with Morris quotations to hang aloft. The coloured festooned shade to the sunlight is the work of Mrs. W. L. Sugden. The emblematic figures and foliage decoration on the staircase walls are designed by Mr. Rigby.

THE BUILDERS' BENEVOLENT INSTITUTION.

AN election of 12 pensioners on the funds of this charity took place on Thursday, the 17th inst., at the offices, 35, Southampton-row, Bloomsbury-square, W.C. Mr. T. F. Rider presided, and amongst other friends of the institution present, were: Messrs. C. Russell, T. Sterling, T. Sterling, jun., Foxley, J. T. Bolding, and E. V. New. The Chairman said that as the result of the appeal made by Mr. Holloway, the president, in connection with the late festival dinner, the committee were enabled to elect the whole of the applicants. The votes which donors were entitled to give on this occasion would be valid at the next election. The candidates, who were all elected, were as follows:—Men: Arthur Fuller Smith, 53, Mayfield-road, Dalston, aged 66, haulier (second application); Mark Manley, 53, Kenilworth-road, Kilburn, aged 62, haulier (first application); Benjamin Cook, 7, Gresham Almshouses, Brixton, aged 72, haulier (first application); Daniel Badoeck Cross, 498, Edgware-road, aged 87, haulier (first application); John Hayward

Petchy, 44, Bell-street, Edgware-road, aged 75, builder (first application); Henry Thomas Williams, 18, York-road, Lambeth, aged 66, builder (first application); William Sprink, 37, Lancaster-road, Notting-hill, W., aged 69, builder (first application). Women: Mary Ann Healing, 20, Curtain-road, E., aged 66, widow of S. T. Healing, builder (seventh application); Mary Ann Bowley, 4, Tyler's-cottages, King Henry's-walk, N., aged 69, widow of H. R. Rowley, a late pensioner (third application); Eliza Ellis, 46, James-street, Oxford-street, aged 77, widow of E. G. Ellis, who was a subscriber for many years (third application); Ellen Batchelder, 1, Camden-road, Carshalton, aged 63, widow of Charles Batchelder, also for many years a subscriber (third application); and Jane Benham, 331, Stanstead-road, Catford, aged 61, widow of Thomas Benham, late a pensioner.

WELL-BORING.

ON Friday last, the 18th inst., at a students' meeting at the Institution of Civil Engineers, an admirable paper was read by Mr. J. W. Kitchen, the subject being "Wells and Well-Sinking." The author dealt with the practical and interesting operations connected with sinking large wells through various formations, and also of sinking borings or tube wells. It is the latter part of the papers dealing with these tube wells, that may be interesting to our readers and building contractors, as it so often happens that in large works, such as asylums or large workhouses situated in positions where there is no natural supply, the cost of procuring enough water to suffice for all purposes is a large item in the contractor's outlay.

By the methods so lucidly described in detail in Mr. Kitchen's paper it was shown that in cases of this kind a boring may be cheaply and expeditiously sunk to produce sufficient water for such purposes, and for a small cost of £40 or £50 a self-regulating windmill and pump could be erected over the bore-hole, and would deliver the water continuously into a storage tank, from which any part of the works might be supplied.

The paper concluded by urging upon the students the necessity for taking the utmost precaution in dealing with any class of formation, even though such precaution should seem to be unnecessary at the time.

CONCRETE IN COLD WEATHER.

THE pressure of building operations has necessitated many modes of doing work during severe winter weather. One instance of this is the use of concrete and mortar in foundations. The details of some concrete work executed at Helsingfors, Finland, which was recorded in the *Engineering Record* are of some interest in this connection. The concrete work consisted of the foundations of a warehouse and two bridge piers, and was performed in the winter of last year. There was an urgent wish to complete the work for the brief summer season, and the operations were carried on through the winter, although the temperature ranged between 14° above and 40° below zero. The foundations, which were necessary to protect, rested partly on stone crib-work of an old quay and partly on piling, concrete being used to distribute the pressure. The depth of concrete was 31 in., and the breadth 46 in. As this was commenced when the temperature was 4° below zero Fahr., great care was required in the preparation and protection of the concrete. "For this purpose," says our contemporary, "a movable house heated by two coke stoves was mounted on wheels over the trench. It was 26 ft. long and 20 ft. wide, and was mounted on six four-wheel trucks. In this house, during the mixing of the concrete, the temperature was kept at about 54° F. The stone and sand were brought into the house in large quantities, and warmed before using. When mixed, the concrete was placed in the trench through three trap-doors in the floor of the house. To keep the outer air from the trench, the walls of the house were continued down to the ground by movable weather-shields, whose edges were packed with coarse matting and wood-shavings." Means were taken to thaw the ice of the ground-water in the trenches by the use of steam-boilers mounted on wheels, with steam-pipes going down to the surface of trench. When the ground under the house and a little in advance of it, was thawed, a 12 in. layer of broken stone was

packed in. The concrete was mixed by hand, with the water warmed to between 158° and 176° Fahr., and to protect the concrete until set against frost from sides of trench, sheet piling with a filling of broken stone was used. The bed was then covered with a double layer of straw matting, and the trench space covered with planks, matting, and trodden snow. After the house was moved on, the space left was warmed by a kettle filled with burning coke. This kept the temperature of the air about 54°, and the setting of the concrete was thus insured. The details are illustrated in the *Record*, to which we refer our readers. The system is ingenious and practical, and would enable concrete to be laid during the severest weather.

HUDSON AND KEARNS' DIARIES.

MESSRS. HUDSON AND KEARNS' Special Diary Blotting Pads and Architects' and Builders' Diaries once again make their welcome appearance, and remind us of the near advent of the New Year. In each variety the same special provision is made for the needs of readers that has secured the universal adoption of these indispensable accessories. There is nothing else like them. We have used the No. 8a pad and "The Architect's Diary No. 13" ourselves ever since they were introduced, and have found them invaluable, and so will every reader, if there is one, who is not yet acquainted with their merits.

CHIPS.

Mr. James Kidd, builder, of 116, Hampton-road, Forest Gate, E., committed suicide on Tuesday night in last week by hanging himself. Mr. Kidd, who was a deacon of a local Congregational church, and reputed to be in affluent circumstances, had been missing from his home since Tuesday evening, and early on the following morning his body was seen in his workshop in Romford-road, suspended from a beam by a piece of sash-line. At the inquest, held on Thursday afternoon, the jury returned a verdict of "Suicide whilst temporarily insane."

The first section of the Chesterfield to Lincoln portion of the Lancashire, Derbyshire, and East Coast (or East-to-West) Railway, which runs from Edwinstowe through Tuxford, and on to Lincoln, was opened for passenger traffic on Tuesday week.

The town council of Swansea, at their last meeting, agreed to raise the salary of the borough engineer from £375 to £500 per annum. A proposal brought forward to enlarge the town hall by building an additional wing on the site of the weights and measures offices, the elevation of the existing edifice was referred to a committee.

The Glasgow Corporation Tramway Committee have resolved to give all reasonable facilities to a firm who have offered to equip every tramway route in Glasgow with cars worked by mechanical traction, and to run these for seven years at a cost to the tramway department not exceeding the present cost of horse haulage, which is about £100,000 per annum. The firm offer a two months' trial for approval or disapproval.

Now that the Manchester, Sheffield, and Lincolnshire Railway Company are constructing a trunk line to the Metropolis, the old title, which was inconveniently long and inexpressive, has become a misnomer, and it is not, therefore, surprising that they will promote a Bill next session seeking powers to change their title to that of "The Central Railway."

The earthquake reported as having occurred throughout the south and west of England and the Thames Valley on the morning of Thursday in last week, was scarcely more than a tremor, and not to be compared with the shock which wrought so much damage in the neighbourhood of Colchester in 1884. Little structural injury was caused except to chimneys in the West Midlands. The district which suffered most was Hereford, where the upper portion of three of the pinnacles on the cathedral tower were shifted towards the east, the stump of the spire of St. Martin's church (of which the upper part was blown down on March 24, 1895) and the tower below were so cracked as to be rendered dangerous, and pinnacles at the churches of St. Nicholas and St. Peter fell.

The Secretary of State for the Colonies informs the president of the Royal Institute of British Architects that Mr. W. H. Harrison, F.R.I.B.A., of 66, Victoria-street, Westminster, has been selected by the Government of Jamaica to be the architect for the proposed public buildings in Kingston, Jamaica. Mr. Harrison was one of the four nominated by the council of the R.I.B.A. for the work, the others being Mr. Frank T. Baggallay, Messrs. Gibson and Russell, and Mr. Beresford Pite.

ARCHITECTURAL & ARCHÆOLOGICAL SOCIETIES.

ARCHITECTURAL ASSOCIATION OF IRELAND.—An ordinary meeting of this association was held on Tuesday week, in the Grosvenor Hotel, Dublin. Amongst those present were—Messrs. J. Rawson Carroll, V.P.R.I.A.I.; W. M. Mitchell, R.H.A.; J. Howard Pentland, R.H.A.; Fred. Batchelor, Joseph Holloway, J. J. O'Callaghan, F.R.I.A.I. Mr. R. Caulfield Orpen delivered his presidential address, in the course of which he said their association had done wisely in adopting, with only a very few modifications, the constitution and by-laws of the Architectural Association of London. He hoped that by a knowledge of the good work which that association had done they might be encouraged themselves to start the work of their session with a stimulating optimism. The London student of architecture had many advantages which they in Dublin could only share in a minor degree. In the London streets the student who went about with his eyes open had education writ large, sermons in stones, and good in everything. An important section of the English society's work was the visiting of works in progress or lately completed under the guidance of the architect himself or of someone thoroughly conversant with the details of the building. He fully recognised the marked advance made in latter years in the matter of Dublin architecture and the creditable work which in many instances enriched the streets, but he felt that as a community, they were very backward in architectural appreciation. They had, indeed, many true disciples of the beautiful in the arts; but he contended that, in the mass, they gave little encouragement to truly artistic work, which could only be brought into existence and nurtured to a vigorous reality by the patronage of an artistically-minded and discriminating public. He believed the Dublin public cared remarkably little about the æsthetics of architecture; but he hoped that lack of discrimination was not a national characteristic. They should look to their society to create a healthy rivalry among their embryo architects as well as among those who were responsible for rebuilding or adding to the number of the buildings in the city. Good work would result from an anxiety to show the best they could produce. He contended that so long as they had clients who were content to accept uncritically what they gave them, and whose chief anxiety seemed to be that contract plans should be ready in a fortnight, so long would their half-considered and slipshod work be produced in never-varying monotony. He concluded by saying that theirs was a profession of which they might well feel proud, one which called for the exercise of every refined taste and every noble thought which they possessed. Mr. Rawson Carroll paid a high tribute to the excellence of the address and to the interesting and practical information which it contained. Mr. J. J. O'Callaghan, speaking of the specimens of architecture to be met with in Dublin, asked where would they find anything more beautiful than some of the Classical buildings in Dublin, as, for instance, the old Parliament House? It was not necessary for the students to go beyond their own city in search of the most exquisite detail ever put together in the way of Classical work. Mr. J. Holloway thought that Dublin architects showed most strongly their individuality in their designs. He thought this feeling was absent in London buildings, and returned from London about twelve months ago much disappointed with the architecture he saw. Mr. A. I. McGlothin considered that individuality in Dublin consisted of a mere copying their former works, and said that such an association as this was intended to bring one another in contact with different ideas, and so avoid this repetition of mere copyism without any new ideas of design. Mr. Mitchell proposed a vote of thanks to the president for his interesting address. He differed from Mr. Holloway with regard to London architecture, and said that, on the other hand, he had reverence for many of the works there. The address was carried by acclamation.

BIRMINGHAM ARCHITECTURAL ASSOCIATION.—At a meeting of this association held on Friday evening, the architectural aspect of the removal of the city churches was discussed. Mr. T. Naden (who presided) opened the discussion. He said that there were two principal aspects of the subject: first, the architectural merits of the buildings in question; and, secondly, what would most probably take their place if they

were removed? He would consider Christ Church as of the most importance, and though the general opinion, he believed, was that this church was not a thing of beauty, he thought, with the horizontal lines of the Town Hall, the Council House, and other buildings round, the vertical lines of the spire of Christ Church formed a pleasing contrast; therefore the removal of the church would be a distinct loss to the general effect of the group of buildings surrounding the square. If the church were removed, could they hope that a more beautiful building or one better adapted to the position would take its place? The purchase of the site and erection of business premises thereon would be a large undertaking, and would probably get into the hands of a syndicate of speculators, who would want to make the most of their bargain, and would have little regard to the beauty or appropriateness of the building for its position in perhaps the most prominent spot in Birmingham. He was strongly of opinion that the removal of Christ Church would be a distinct loss to the town from an architectural point of view, and he would ask the members to enter a protest against it in the form of a resolution. Mr. C. E. Bateman and others spoke in support of the chairman's views, and the general opinion of the meeting was that it would be very doubtful if any other building would be found to harmonise with the surroundings so well. On the other hand, a small section of the meeting were of opinion that it would be possible to replace the church with something of greater architectural merit, and thoroughly harmonising with the surrounding buildings. On the motion of Mr. Naden, it was resolved, "That this meeting dissents from the present scheme for the removal of Christ Church, and will use all means in its power to oppose it; and that the matter be referred to a sub-committee of the association for further discussion."

EDINBURGH ARCHITECTURAL SOCIETY.—The second annual business meeting of this society was held in Dowell's Rooms on Dec. 16, the president, Mr. A. R. Scott, in the chair. The annual reports of the hon. secretaries and treasurer for 1896 session, which were approved, showed a satisfactory state of affairs. The following office-bearers were elected for the ensuing session:—Hon. president, Mr. R. M. Cameron; president, Mr. J. A. Williamson; vice-president, Mr. W. M. Cumming; hon. secretaries, Messrs. T. R. Patterson and Ramsey Traquair; hon. treasurer, Mr. J. F. Mathew; and hon. librarian, Mr. G. Murray Wilson. The annual dinner took place the following evening at the Imperial Hotel, Market-street, Mr. Sydney Mitchell in the chair, and about 70 members being present.

NORTHERN ARCHITECTURAL ASSOCIATION.—A meeting of the Northern Architectural Association was held on Wednesday week in the Meeting Room, Art Gallery, Newcastle-on-Tyne. Mr. Joseph Oswald presided. Mr. Arthur B. Plummer, at the request of the president and council of the association, again read the paper entitled "A Defence of Two-Gallon Flushes," delivered by him before the Congress of the Sanitary Institute at its last meeting in Newcastle on the subject of results of sanitary tests carried out by the Water Company and the association, and reported in the *Building News* of Sept. 11 last, p. 369. Since that time further tests have been made, and in addition to the facts then given, Mr. Plummer said: Since reading my paper at the Sanitary Congress, Mr. Allen (of Messrs. Harriman and Co.), with as little delay as was possible, had a special model made, and a die thereupon prepared, and afterwards my special form of 6in. sanitary pipes were cast and burnt in the kiln, and laid in the Mauers Yard in the exact position of the former ordinary 6in. pipe. The Northern Architectural Association Sub-Committee were invited, and the same representatives met in order to test the new pipes. The tests were again conducted as follows:—Each closet was charged twenty times in rotation, proceeding from top floor to ground floor and to yard closets, with 6oz. of charge and papers as before, and a two-gallon flush. Throughout the whole of these 60 flushes the whole of the charge from each closet came direct to the trap with the one flush. This was hardly over the case in the whole of the tests conducted previous to the Sanitary Congress. There were openings made in the tops of the pipes for inspection, and in the case of my pipes the charge floated in the water with great ease, whereas in the case of the ordinary 6in. pipe the

charge rubbed, and stuck along the bottom of the pipes. During the course of these 60 tests we again found (on the occasion of the 32nd charge) a slight temporary stoppage in the trap (which was the same Buchan trap that had been used in the former Sanitary Congress tests). We found also, at the 58th charge, a temporary stoppage at the bend, which was also the same bend we had used before, and which had a hole in the top for inspection. However, of the total amount of 360oz. flushed into the drain, 297oz. had been flushed out after the 60th flush, and 28oz. was taken out of the trap, the remainder being in the drain. It was next proposed that another course of tests be started, with a second or alternate flush of water, only without any charge. I, however, felt that a further course of tests, the same as the last, would be more valuable, though severe. The result of this second course of sixty flushes was all that could be desired; every charge again came direct with each flush into the trap, and there was no obstruction of any kind anywhere at any time. 360oz. were again put into the drain, and 367oz. were flushed out, including the slight necessary extra weight of water. Having become convinced, in my own mind, that this form of pipe is an improvement for flushing purposes, I next consider the question of cost. I find that for an ordinary terrace or villa house, the total extra cost of these drains, as compared with the ordinary drains of the same external diameter, would be 2s. or 3s. per house extra. It will be seen from the samples I exhibit that there is no difficulty in connecting this form of pipe with existing drains, traps, and bends. The pipes, I may say, are now to be made with the sockets flat on the underside.—Mr. Frank Caws, Sunderland, in opening the discussion, said they, as an association, should be proud to think that one of themselves had brought about such an important change in drain-pipes. He believed that that pipe would clear all other pipes out of the market, because there was common-sense in it. He moved a vote of thanks to Mr. Plummer for his paper. Mr. Bruce (Messrs. Rudenoch and Bruce) seconded the motion. The chairman, in putting the motion to the meeting, hoped it would not go forth to the public that that association approved of the two-gallon flush. There were miles upon miles of the old class of pipe which could not be taken up for a long time, and he thought they should have as great a flush as possible. The motion was carried heartily, and Mr. Plummer returned thanks. During the evening there were on view the best sets of sketches, submitted in the recent competition, prepared by Mr. H. Ruine and Mr. S. M. Mould, and the best sets of measured drawings by Mr. S. M. Mould and Mr. B. Proctor.

ROYAL INSTITUTE OF THE ARCHITECTS OF IRELAND.—The annual general meeting of the architects of Ireland was held on Tuesday afternoon in last week, at 37, Dawson-street, Dublin. Mr. Thomas Drew, R.I.A., President, occupied the chair. There was a large attendance. Mr. Albert E. Murray, A.R.I.A., hon. sec., presented the annual report, which stated that the continued popularity of the institute had been realised beyond their expectations, eleven new names having been added to the muster-roll during the last twelve months, bringing their numbers up to 82. They held fourteen meetings during the past session, of which eight were ordinary and six special. They had under consideration the best means to adopt in order to prevent work from passing into unqualified hands for execution. They could not expect to see this evil wholly cured, but much might be done towards that end by enlightening public opinion on the subject, and showing that its best interest and theirs are really identical. They also desired to call attention to the way in which the profession was injured by the employment of the salaried officials of large public bodies for private buildings. I.I.M. Board of Works was an old offender in this respect, and before this endeavours were made to have this grievance removed, but so far without success. The stronger the Institute became the more effective would be its action against all such professional abuses. The great strike which paralysed the building trade during the whole of last summer was one of the most noticeable events of the year, and caused an immense amount of disturbance and suffering, the effects of which are still being felt. One of the results of the strike had been to increase still further the cost of building in Dublin—a result to be deplored, and one sure to prove detrimental to the interests of all concerned. It was surely

time that the State should intervene by means of compulsory arbitration, or some such means, in order to prevent the widespread misery and evil passions which such strikes cannot fail to engender. They had a very interesting interview and correspondence with the Master Builders' Association recently. Their society had greatly increased its numbers since the commencement of the strike, and now numbers nearly all the larger building contractors of Dublin. The object of the conference was the desire on the part of the builders that they should adopt a series of recommendations which they had drawn up for their consideration. They related chiefly to the methods they wished them to observe in asking for tenders for buildings so as to secure, as far as practicable, a fair and impartial decision in every competition, and to discourage favouritism and unfair tendering. They welcomed this proposal of theirs as a move in the right direction. Mr. C. Geoghegan moved, and Mr. R. C. Miller seconded, the adoption of the report. After some speeches by Mr. W. Kaye Parry and Mr. G. C. Ashlin, the report was adopted. The auditors' report showed that there was a balance in hand of £85 11s., of which £58 15s. 9d. had been carried over from last year's account. The president then delivered his usual address, in the course of which he remarked that they saw a market price of building, in some of the trades, growing for the public to a point where it became prohibitive in building enterprise. The crafts were in danger. The stonecutters', for instance, was one, and the plasterers' was another. He also referred to the Town Hall competition at Belfast, and expressed satisfaction that the design of Mr. Waterhouse, R.A., the assessor, would now stand. Mr. W. M. Mitchell proposed, "That the members of the Royal Institute of Architects desire to convey to Messrs. Greene-Watt and Tulloch their congratulations on the honourable and professional course taken by them in the late Belfast Town Hall competition." Mr. Murray seconded the resolution, which was adopted. The result of the ballot was declared as follows:—The president, hon. secretary, hon. treasurers, and the auditors were re-elected, and the following were elected as a council:—Messrs. O'Callaghan, McCarthy, Mitchell, Ashlin, Millar, Carroll, Geoghegan, Parry, Pentland, Tennell.

CHIPS.

The town council of Beccles have decided to advertise for a borough surveyor at a salary of £100 a year. Hitherto the execution of works has been supervised by members of the corporation.

The Haxley Memorial Medal Committee have selected Mr. Frank Bowcher's design for the Royal College of Science medal. The competition produced about forty models, and the one adopted bears on the obverse a likeness of the distinguished scientist, and on the reverse a building of Classic design in illustration of a college.

A vicarage is about to be provided for St. George's, Edgbaston, in Calthorpe-road, in that parish, from plans by Mr. E. F. B. Osborn, of Birmingham.

At the Centenary Chapel, York, the unveiling of a tablet in memory of the great Chinese missionary, the Rev. David Hill, took place last week. The tablet has been executed by Mr. G. W. Milburn. The slab for inscription is of white marble, with black letters. A white panel has a bas-relief of David Hill, dressed in Chinese costume, preaching to the natives. There is a white alabaster portrait and two figures representing Faithfulness and Truth. The framework is coloured alabaster.

The foundation stone of the new residence in connection with the Mansfield House University Settlement, in Canning Town, was laid on the 17th inst., by the Master of Balliol. The site of the residence is on the Barking-road, not far from the premises which are now being used, and from the Public Hall. The cost will be about £5,000, of which £5,000 has still to be raised.

The Mayor of Canterbury, Mr. George Collard, presided the other day at a meeting at the Guild-hall, Canterbury, in support of the movement for the erection of a memorial to the late Primate in Canterbury Cathedral. The proposal was adopted, and it was stated that by the late Dr. Benson's desire the effigy will not be an expensive one.

The Congregational Chapel at Spalding was reopened on Wednesday week after renovation. The interior of the church has been reset, a vestibule with cathedral glass windows has been added, and the chapel has been redecorated. The total cost has been about £500, and the work has been carried out under the superintendence of Mr. Mills, architect, of Spalding.

Building Intelligence.

BLAGDON, SOMERSET.—The restoration of Blagdon church tower is now complete. The restoration was intrusted to Mr. Frank Wills, architect, of Bristol, under whose supervision the contractors, Messrs. William Cowlin and Son, of the same city, have carried out the work. No trouble has been spared in searching the neighbourhood, where portions of the original work were supposed to be, and which had been removed when the first so-called restoration took place. The work was commenced about Easter. The whole of the balustrading of the tower has been taken down. The fretted and moulded parapet surrounding the tower has been reproduced, all existing stones being reused and jointed together with slate dowels so as to prevent a repetition of the damage done by the previous use of iron cramps. The roof, being in a bad condition, has been relaid with new lead on fresh timbers and boarding. The ringing chamber has been taken away, and a groined ceiling of Gothic fan tracery of the Somersetshire type has been constructed. The old west window has been taken out, enlarged to its original size, and filled in with cathedral glass. The old west doors have been removed, and massive doors of English oak, with hammered hinges, substituted.

CARDIFF MASTER BUILDERS' ASSOCIATION.—About 150 sat down at the annual dinner of the Cardiff Master Builders' Association, which took place on Thursday night in last week at the Royal Hotel. Mr. W. Symonds (president of the association) was in the chair. Mr. W. Geen proposed "The Army, Navy, and Reserve Forces." Captain C. B. Fowler responded. Alderman D. Jones proposed "The Architects and Engineers." Mr. George Thomas and Mr. E. W. M. Corbett replied. "The Corporate Bodies of Cardiff," proposed by Mr. D. Davies, was acknowledged by the Deputy-Mayor and Mr. Abel Thomas, M.P. and Councillor Ramsdale. Mr. S. Richards (Messrs. Jones, Richards, and Budgen) proposed "The Cardiff Master Builders' Association." The Chairman, in reply, made reference to the good feeling at present existing between master builders and men. Mr. James Turner and Mr. John Gibson also responded. Mr. J. S. Chubb proposed "The Visitors," and the toast was acknowledged by Mr. Dan Lewis and Mr. D. Morgan.

GATESHEAD.—The Savings Bank in West-street is rapidly approaching completion. It will be opened on February 1st. This is a branch of the Newcastle Savings Bank. The style is English Renaissance, with massive granite plinth and doorway. Above the plinth and up to the first floor level is faced with Renton stone, varied with red Dumfries stone. Above the first floor level the facings are Normandy red brick, with stone bands and dressings. The roofs are green slated, and the dome, at angle, is of copper. The windows are steel casements, with upper part filled in with lead glazings. Dimensions of the banking room are 3ft. by 26ft., and the room is entered at the angle through an oak porch. The walls and ceilings are of adamant. There is a dado of panelled oak. A strong-room is on the same level. The board-room occupies the whole first floor, with caretaker's rooms above. The floor of the banking-room is mosaic. The chimney-pieces are marble, with tiled hearths and marble fenders. There are cellars for coal, &c., in the basement. Messrs. Haswell and Waugh's contract for the work was £3,615. Mr. Stephen Piper, M.S.A., 52, Westgate-row, Newcastle, is the architect.

LEITH.—Sheriff Rutherford, by order of the Secretary for Scotland, held an inquiry at Edinburgh Sheriff Court-house recently, with reference to the scheme proposed by the North British Railway Company for providing houses for the labouring classes in lieu of those to be removed for the construction of the proposed loop line from Abbeyhill to the north end of Leith Walk, where a station is to be placed. Mr. Thomas Balfour said there would be affected by the construction of the loop line 543 apartments, with 909 occupants. Mr. Hamilton Beattie, architect, of Edinburgh, said the site for the new dwellings was about 300 yards south of the property to be demolished, being vacant ground at Halmyre-street and Lorne-street. The houses to be demolished were in closely populated parts, and none of them would fulfil the requirements of the

General Burgh Police Act, 1892. The proposed buildings, however, met all the requirements of the Act. The North British Railway Company proposed to erect 16 four-story tenements, containing 526 apartments, quite capable of accommodating 1,076 people, or 10 per cent. more than the number displaced. The moment the company received permission from the Secretary for Scotland they would begin to build. It would take about a year to finish the work, but some of the houses would be ready for occupation by Whit-Sunday next. The old buildings would be gradually taken down as required. The Sheriff intimated that he would report his decision to the Secretary for Scotland.

LIVERPOOL.—The ceremony of opening the William Gossage laboratories at the University College in Brownlow-hill took place the other day. The first section of the chemical laboratories at the college was opened in 1886, and consists of a large theatre, a small class-room, a practical theatre, and several other rooms. The main laboratories were not at that time proceeded with, partly owing to lack of funds, and partly because a portion of the site was not vacant. Mr. F. H. Gossage and Mr. T. Sutton Timmis have since undertaken jointly to build and fit up a further section of the building, including the largest of the main laboratories and rooms below at a cost of £7,000, and to present them to the college as a memorial of the late Mr. William Gossage. Other portions of the buildings are being erected by public subscription. Messrs. Jones and Sons, of Liverpool, who built the original section, have executed the additions from designs by Mr. A. Waterhouse, R.A., and Son, and under the superintendence of Mr. J. T. Dampier, clerk of the works. The new buildings, which complete the Brownlow-hill frontage, include a large laboratory, 60ft. by 32ft., with benches for 44 advanced students, a lecture-room to seat 70 or 80, and three other rooms.

LOWER EDMONTON.—The foundation-stone of the new church of St. Peter the Apostle, Lower Edmonton, was laid last week. The work of erecting the new edifice is in the hands of Messrs. Goddard and Sons, of Farnham, who carried out the extension and repairs of the parish church a few years ago. Their contract price is £4,080, and the extent of the building to be carried out for that sum will be the erection of the four western bays of the nave and aisle in red and yellow brick with stone dressings, and green slate roof outside. Inside, the roof will be open-timbered, the bench seating accommodation will be for 500, the flooring will be of the builder's patent wood blocks, and the edifice will be heated on Grundy's hot-air system. The style will be Early French, with simple lancet windows, and the architects are Messrs. Newman and Newman, of Tooley-street, S.E.

MORTIMER.—The mission church of St. John, at Stratfield Mortimer, Berks, which was built in 1882, has just been more than doubled in size, and was dedicated last week. The mission church, which formerly consisted of a nave, chancel, low tower and north porch only, has now become the south aisle of the new structure. The new chancel is 35ft. 9in. long by 25ft. 6in. wide, and the new nave is 19ft. by 25ft. 6in. At the west end of the old nave, or south aisle, is a semicircular apsidal baptistery, while to the north of this is a new western tower and belfry containing a peal of six bells. The whole of the work has been carried out by Messrs. Wheeler Bros., builders, of Reading, from designs and drawings of Mr. E. Swinfen Harris, F.R.I.B.A., of London, and Stony Stratford.

ROYAL INSTITUTION.—The Prince of Wales opened, on Tuesday, the Davy-Faraday Research Laboratory of the Royal Institution, which has been given to the institution by Dr. Ludwig Mond. The laboratory is situated in No. 20, Albemarle-street, adjoining the institution, the freehold of this house having been transferred to the managers of the Royal Institution by Dr. Mond. Dr. Mond has carried out extensive alterations to the building, and has also equipped the laboratory with apparatus, appliances, &c., for carrying on delicate investigations in physical and chemical science. The laboratory contains:—On the basement—a room for thermo-chemical research, a room for pyro-chemical research, mechanics' workshop, room for electrical work, battery of 26 accumulators, constant temperature vaults, boiler-house and store-rooms; on the

ground floor—a room for research in organic chemistry, a room for research in inorganic chemistry, a fireproof room for experiments in sealed tubes, a balance-room, entrance hall, and cloakroom; on the first floor—the honorary secretary's room, a large double library connected with the library of the Royal Institution; on the second floor—a museum of apparatus; on the third floor—seven rooms for research in physical chemistry; on the fourth floor—a room for inorganic preparations, a room for organic preparations, a photographic room, four rooms for researches in physical chemistry; on the roof—an asphalted flat with a table, gas, and water; all the floors are connected by a hydraulic passenger lift.

WESTMINSTER.—The architects of the Church House, Sir Arthur Blomfield and Sons, have prepared plans and drawings for an extension of the building, and they have been approved by the council. The main elevation will be in Great Smith-street, and the building will occupy the site of the old Westminster Free Library, which has migrated into new quarters on the opposite side of the way. Latterly this old building has formed part of the premises of Church House. A clearance of the site is to be commenced shortly, and the new building, which will constitute an extension of the fine frontage already erected in Great Smith-street, will be commenced as soon as the ground is ready. It is to cost £18,000, and will afford a room for the House of Laymen on the first floor. The new structure will be dedicated to Mr. Henry Hoare.

CHIPS.

At Whitley, in Northumberland, Parliamentary powers are to be sought for the creation of a marine promenade pier, about 1,000ft. in length, extending in a north-easterly direction from the "Corkscrew." There is to be a pavilion at the end, with a landing-stage.

The Duchess of Albany has consented to open the new school buildings which have been erected in Thrawl-street, Spitalfields, for the Gates of Hope, Villareal, and National Infant Schools of the Spanish and Portuguese Jewish congregation.

With reference to the extensive landslip which occurred recently at Folkestone, the Martello Tunnel at Folkestone Junction, near where the slip took place, is to be removed, and converted into a cutting.

A piano warehouse and showrooms have just been rebuilt at Islington-flags, Liverpool, from designs by Mr. Charles A. Hindle, A.R.I.B.A., of Eccles. The builders were Messrs. Raffle and Campbell, of Liverpool.

The town council of Sunderland adopted at their last meeting a resolution, referring to a joint committee the preparation of plans for a new bridge to be erected over the river Wear westward of the existing Wearmouth Bridge, which was built in 1796 at a cost of £32,500. The assumed cost of the new structure is £100,000.

The plans for the new United States Mint, to be built in Philadelphia, at Sixteenth and Spring Garden-streets, have been completed and approved, and tenders for the erection have been invited. The plans purpose a building to cost \$330,000 sterling, exclusive of site. It will occupy the entire square bounded by Spring Garden, Sixteenth, Buttouwood, and Seventeenth-streets, and is arranged as a hollow square with an interior courtyard. The main façade of the building to Spring Garden-street is 316ft. The building has flank frontages to Sixteenth and Seventeenth-streets of 180ft. The architecture is of Classic type.

Spitalfields Wesleyan Chapel, which until recently was worked as a mission centre by the East London Mission, under the Rev. Peter Thompson, and for upwards of half a century had associated with it some of the foremost preachers of Methodism, is about to be turned into a Jewish synagogue.

The death is announced of the sculptor Chatroussé, who was born in 1829. He was the artist of the "Joan of Arc Triumphant," recently inaugurated in Paris, of a group of bronze representing the horrors of war, erected at Nancy, and numerous other monuments in various French towns.

Sir William Coddington, M.P., who acted as arbitrator in the purchase of the property of the Matlock Bath Gas Company by the district council, has given his award. He decides that the price to be paid by the council for the purchase of the undertaking shall be the gross sum of £16,726 3s. 9d., and that the council and the company shall each bear their own costs of the arbitration and half the costs of the award. Worked out, this amount gives just over twenty years' purchase at the net profit of last year's working.

Engineering Notes.

LIVERPOOL.—The southern extension of the Overhead Railway to the Dingle in Park-road, was opened on Monday. The engineers have been Sir Douglas Fox and the late Mr. J. H. Greathead; Mr. S. B. Cottrell was the resident engineer and manager of the company; Messrs. Nowell and Co. were the contractors for the tunnel portion, and Messrs. Pearson and Knowles were responsible for the viaduct portion. The southern extension of the railway, five eighths of a mile in length, commences about 150yd. north of what was the terminus, with a viaduct 250yd. long, crossing Sefton-street and the Brunswick goods yard of the Cheshire Lines Railway—a portion of the Dock Board estate, and entering the hillside at the north-east corner of the Herculeum Dock, and proceeds in a south-easterly direction to Park-road. The tunnelling occupied about 18 months. The tunnel for the station ground is 52ft. span, the arch being segmental, and the largest that has ever been built. At about 170ft. from the entrance the tunnel crosses over the tunnel of the Cheshire Lines Railway, and the greatest distance that could be allowed between the overhead rails and the crown of the Cheshire Lines tunnel was 2ft. 9in. The adoption of girders was found to be impracticable, and it was decided that the only safe way to effectually make the crossing was by turning a segmental screen arch, five rings thick, built with brindle bricks in cement, over the Cheshire Lines arch, and to build side walls of the overhead tunnel on this screen arch. A top heading 120ft. in length was driven along the crown of the Cheshire Lines tunnel, and then 8ft. lengths were excavated, baring the Cheshire Lines arch for that length. The exposed arch was then haunched with concrete, and the screen arch turned on sand, with $\frac{1}{2}$ in. narrow boards placed on it, and when the arch was set, the sand and boards were withdrawn, leaving a clear space of 6in. over the Cheshire Lines arch, so that no additional weight could come on the Cheshire Lines tunnel arch. During these operations all the rock above had to be carried on timber. No mishaps occurred, and not a train was delayed.

PROJECTED GREENWICH AND MILLWALL TUNNEL.—The London County Council are seeking powers next session to construct a subway for foot-passengers only under the Thames, to connect Greenwich with Millwall. It will begin on the Greenwich side a little west of the Ship Hotel, and will emerge in the Isle of Dogs on the eastern side of the North Greenwich station. The estimated cost is £70,500, including the approaches. Access at each end will be afforded by a spiral stairway, constructed in a shaft about 40ft. deep on the northern side, and 50ft. deep on the southern side. The structure of the subway will consist of cast-iron tubing, lined inside with concrete faced with glazed tiles. The external diameter will be a little less than 13ft., the internal dimensions admitting of a footway 8ft. wide, with a headway measuring a few inches more than 9ft. in the centre, reduced to a minimum of 7 $\frac{1}{2}$ ft. at the sides. The subway is to be lighted by electricity. Should it be thought necessary at some future time to introduce hydraulic lifts in place of the spiral stairways, the shafts would afford ample room for the purpose. If sanctioned, the tunnelling will be carried out, as at Blackwall, by the compressed-air system. Soundings and dredgings have been effected in order to ascertain the engineering difficulties, and no danger is apprehended in the execution of the proposed works. The proposed subway could be completed in two years from commencement. The need of such a subway is shown by the circumstance that more than a million persons use the Greenwich ferry in a year, each person paying a toll of a penny per journey.

The reconstruction of the Seena River Bridge on the south-east branch of the Great Indian Peninsula Railway, which was washed away by the heavy rains of September, 1895, has cost close upon two and a half lakhs. The first rough estimate for the work amounted to a little over a lakh and a half.

Some time ago the old Free Church, Muthill (from which the congregation had been evicted, owing to some legal difficulties in the charter) was purchased by Mr. G. T. Ewing, architect, who had the building converted into a public hall for the village. On Friday night the hall was formally opened by Provost Finlayson, of Crieff.

COMPETITIONS.

LITTLEBOROUGH, LANCs.—A POOR LOOK-OUT.—At the last meeting of the Littleborough Urban District Council, the clerk read a letter received from Messrs. Clark and Hutchinson, of London, the architects who were awarded the premium when the council invited plans for their proposed new offices some time ago, asking whether it was the intention of the council to erect their new buildings next spring, because if this was the case they would be pleased to proceed with the working drawings at once. A member suggested that the council should allow this matter to stand over for the new council to decide. Littleborough had better do without a town-hall at present. Another member declared that the council had no money, and moved that Messrs. Clark and Hutchinson be written to to the effect that on account of the pressure of other work the council cannot at present see their way to commence the building of the new offices. The motion was carried.

LONDONDERRY LUNATIC ASYLUM.—The governors of this asylum proceeded at their last meeting to nominate eight architects to compete for plans for the new asylum. The vote was taken by ballot, each member writing not more than eight names of architects and handing it in after signing his paper. The resident medical superintendent, Dr. Hetherington, read the names of 15 architects; but it was explained that a governor could write the names of any architect he chose, no matter whether on the list or not. The voting resulted in the following being chosen by the number of votes mentioned:—W. H. Byrne, 17 votes; Dean and Stewart, 14; A. C. Adair, 13; C. A. Owen, 12; E. J. Toye, 9; Wm. McElwee, 7; W. Pinkerton, 7; J. Lanyon, 5.

CHIPS.

The Hackney Vestry having applied to the Local Government Board for sanction to borrow a further sum of £18,000 for the completion of the public baths, an official inquiry was held at the town hall on Tuesday by Mr. Frederick H. Tulloch, M.I.C.E.

The Clevedon Urban District Council are, at the present time, by planting shrubs and erecting ornamental rustic railings in various spots, endeavouring to enhance the natural beauties of the place. They have also erected a much-needed shelter seat on an exposed part of the esplanade.

A destructive fire broke out on Sunday morning at the Royal Dockyard Wharf, Woolwich, upon premises owned and tenanted by Messrs. Arnold and Co., timber merchants. A range of buildings of one and three floors, used as stores, saw-mills, and engine and boiler-house, were gutted. The buildings extended 150ft. in one direction, and nearly 100ft. in another, and were heavily stocked with timber. The flames burst across to a second large building of one floor, also used by Messrs. Arnold and Co. as a saw-mills, which was much damaged.

Colonel Marsh, one of the Inspectors of the Local Government Board, held an inquiry at Leicester last week into a proposal of the corporation to borrow about £50,000 for street improvements. These included the acquisition of four blocks of property in High-street near the Clock Tower, and a most central thoroughfare. Two of these were acquired at about £65 a yard, one at about £58, and the third, and more distant from the Clock Tower, at £26 a yard. A few months ago one property on the opposite side was acquired at £120 a yard.

After all, the collection of fossils formed by the late Sir Joseph Prestwich is not to be brought under the auctioneer's hammer, Lady Prestwich having decided to present it to the nation. It will accordingly soon be on view at the Natural History Museum, where it will serve to fill some important gaps in the national collection there. Many of the specimens relate to the late geologist's numerous papers and memoirs. The donor has also sent to South Kensington a series of interesting palaeolithic implements.

The Guildhall School of Music on the Embankment is not large enough to accommodate the pupils who seek instruction there. The Sub-Music Committee is therefore preparing a scheme for the utilisation of the vacant ground at the rear of the building and facing John Carpenter-street, which was reserved in view of a probable extension of the school. The land is about 70ft. long by 50ft., and will, if built upon to the same elevation, give twelve additional classrooms. The probable cost will be a little over £10,000, and early next year the Court of Common Council will be asked to find the money for the extension.

TO CORRESPONDENTS.

[We do not hold ourselves responsible for the opinions of our correspondents. All communications should be drawn up as briefly as possible, as there are many claimants upon the space allotted to correspondents.]

It is particularly requested that all drawings and all communications respecting illustrations or literary matter should be addressed to the EDITOR of the BUILDING NEWS, 332, Strand, W.C., and not to members of the staff by name. Delay is not unfrequently otherwise caused. All drawings and other communications are sent at contributors' risks, and the Editor will not undertake to pay for, or be liable for, unsought contributions.

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NOTICE.

Bound copies of Vol. LXIX. are now ready, and should be ordered early (price Twelve Shillings each), as only a limited number are done up. A few bound volumes of Vols. XXXIX., XL., XLI., XLVI., XLIX., LI., LIII., LIV., LVIII., LIX., LX., LXI., LXII., LXIII., LXIV., LXV., LXVI., LXVII., LXVIII. may still be had, price Twelve Shillings; all the other bound volumes are out of print. Most of the back numbers of former volumes are, however, to be had singly. Subscribers requiring any back numbers to complete volume just ended should order at once, as many of them soon run out of print.

RECEIVED.—L. R. and Co.—S. E. Barham.—B. A. C.—Anxious.—F. J. B. (Northwich).

Correspondence.

THE INSTITUTE OF BUILDERS AND CONTRACTORS.

To the Editor of the BUILDING NEWS.

SIR,—During the last few months, several inquiries have been made at this Institute with reference to the new form of contract recently issued by the Royal Institute of British Architects, and I am directed to give you the following information on the subject. In the year 1890 the Royal Institute of British Architects desired to arrange with this Institute a new form of contract to supersede the form settled between the architects and builders in 1871, and which has, since that time, been in constant use. The builders were not anxious for any alteration in the old form, as it was well understood by both architects and builders; but at the instance of the architects they discussed the form of contract submitted to them, and the negotiations extended over a period of some four or five years. This Institute, with a desire to meet the views of the architects, reluctantly assented to adopt the phraseology upon which the architects laid great stress in various portions of the contract, expressly on the condition that the Arbitration Clause should be framed in a mode approved by this Institute; and on this footing the negotiations proceeded.

When the time came for settling the Arbitration Clause, this Institute were advised by Sir Richard Webster and Mr. A. A. Hudson that the form of Arbitration Clause which the architects, after long discussion, required the builders to accept, would not give the builders the protection they required, and that they should, therefore, decline to adopt it. The architects, however, were equally determined not to adopt the

Arbitration Clause in the form the builders were advised was necessary for their protection, and thereupon the negotiations were broken off.

The architects have since issued a new form of contract without the approval of the Institute of Builders, and which, indeed, the builders are advised, if used at all, should only be with an Arbitration Clause in the form the builders were willing to agree to.

This Institute, therefore, repeats the advice and recommendation they gave after the negotiations had broken off in 1895—viz., that the old form of conditions agreed between the architects and builders in 1871, and which are so well known in the trade, should be used as the standard form. They do not recommend the use of the new form of contract put forward by the architects except with the Arbitration Clause in the form the builders are advised is effectual.

Copies of the Arbitration Clause recommended can be obtained at these offices.—I am, &c.,

R. S. HENSHAW, Secretary.

31 and 32, Bedford-street, Strand, W.C.;
London, Dec. 16.

BRICKWORK TESTS.

SIR,—As one who was present at the reading of papers by Messrs. W. C. Street and Max Clarke on the above subject, I should esteem it a favour to be permitted to make a few remarks suggested by the discussion arising thereon.

In the first series of tests, the papers and the resulting discussion and correspondence played round the question of the kind of bricks used in the tested piers, coupled with the use and position of the closure, in which there was a general agreement, as far as one could learn, that the closure constituted the real source of weakness in the initial line of cleavage or fracture (a conclusion which I fail to see has yet been upset), and this would be more especially so in practice as compared with the tests. For, in the one pier yielding the greatest result in the second series of tests, Mr. Max Clarke told the meeting that all the queen-closures were cut by himself (doubtless true and workmanlike); whereas, on the building, unless under strict supervision, any brick spalls often serve for interior closures, with an abundance of mortar to make up for the deficiency of brick. The president, in dealing with the subject of supervision, and the great difficulty of carrying out the same conditions in their entirety on the building as in the case of the tests, remarked that the bricklayer has to do a day's work, a sentence into which may be read more than one meaning. And, for that reason, any ultimate conclusion arrived at from data obtained by these tests, must, to be of any value, be based on a large margin of difference between the conditions of testing, and the conditions of building in actual practice.

In the second series of tests, the subject has been dealt with more as a whole—especially so with respect to the all-important questions of sand and supervision—and if architects would always specify river sand, failing which, that pit sand shall be sharp and clean-washed, free from loam and other impurities, we should be working on lines that make for good results. The engineer is no less concerned about the quality of his sand than that of his cement. He bases his faith in methods and conditions, knowing that if these be good satisfactory results must ensue.

It would be interesting to know whether the piers tested were built with bricks wetted to saturation (not the Staffordshire Blues), and allowed to drain, or whether they had been wetted at all. Whether the mortar (lime or cement) was mill-made (ground) or hand-made, conditions which materially affect results in practice, it being generally accepted that hygro-metric conditions of atmosphere affect the ultimate strength of brickwork in course of erection; or, in other words, that a wet building makes a dry house, and *vice-versa*; the best results, as far as strength goes, being obtained in water-bound brickwork where crystallisation has been induced by the continued presence of moisture.

Another interesting experiment would be with similar piers built with mortar newly made up, which one so often sees specified, and which my own personal experience teaches me is wrong in principle and practice, except during the winter months, and with mortar that had been made up so me time, and rettempered before use.

Though the frog in a brick be admittedly a source of weakness in the brick itself by reason of the diminution of material substance, yet the

frog is necessarily one of the conditions which make for the production of a good brick and for good brickwork, on account of the facility of manipulation in the easy solid bedding which it affords, and should, therefore, as a *built brick*, be considered a source of strength rather than of weakness. We are, of course, now speaking of the ordinary-sized frog of the stock brick, for instance, not of the double frog intended to reduce the cost of freightage. The whole question of brickwork requires overhauling, and in this, so far as the tests have gone, the R.I.B.A. is conferring a benefit on the British public.—I am, &c.,

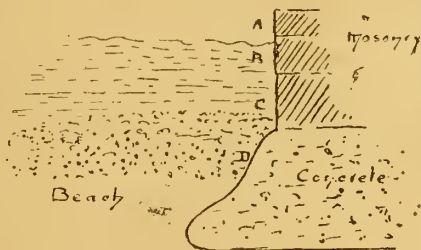
F. WALKER.

RESISTANCE TO WAVE-ACTION.—SEA WALLS AND JETTIES.

SIR,—Although I am not an engineer or architect, but am only interested in such matters, would you permit me to make a comment upon the above subject, which appeared in your issue of Dec. 11 last? Towards the end of the article referred to the following occurs:—

"A sea-wall generally wears away at the foundations or lower courses, which is no doubt caused by the suction and downward motion of the water at the foot of the wall. The vertical-faced wall is always found to give way at the foot, and hence the necessity of slopes or a curved surface."

May I ask, Would not *all* sea-walls have a tendency to give way at the foot first, seeing



that the head of water must be greatest at that point? I cannot see very clearly myself what else could be expected, more especially as waves do not often approach an embankment at right angles, and the least deviation from that direction is bound to exert a "washing-away" effect—which would be the more destructive—I should think, in proportion as the water is deeper.

It was on account of noticing the undermining effect of the sea on the sea-wall at Hastings some little time ago, that the construction given below suggested itself to me as being one which might minimise to some extent the destructive influence of the sea at the lowest points of structures resisting that element.

I should think that, by making the lowest course the deepest (*i.e.*, vertically) where the pressure is greatest, and gradually diminishing each course as the wall grows, we should then have a resisting surface which, whilst possessing the fewest joints where the action of the water is greatest, would possess the additional advantage of withstanding proportionately the amount of pressure brought to bear upon it. Why it appears to me that there ought to be fewer joints at the foot rather than at any point higher in the wall is not solely because the pressure is greatest there, but because the action of the water continues for a longer period.

I trust I may be pardoned for presuming to offer suggestions to such a body as you represent; but should any reader more qualified to deal in such matters think it worth while to criticise my remarks, I should feel that I am not advanced upon your space fruitlessly.—I am, &c.,

R. GARNELL.

Holywood, Co. Down, Dec. 12.

NEW ZEALAND TIMBERS.

SIR,—In Article No. VII. of "Adaptable Specifications," in the BUILDING NEWS of September 4, there appears on p. 330, under the heading of "Different Kinds of Wood in Use for Building," the following:—"New Zealand produces a kind (Nauma) which is lighter than cork, and another (Ninau) which is stated to be incombustible." Perhaps some further particulars of the timbers alluded to may be acceptable, as coming direct from the Antipodes.

I am unable, either by research among the New

Zealand timber literature of the well-equipped Australasian department of the Sydney Free Public Library, or by inquiries or investigations elsewhere, to learn the existence of any timbers named as above; and I conclude, therefore, that they are the subject of a not unnatural printer's error, and should have appeared respectively as "Hauama" and "Hinau." The author of the article in question will perhaps bear me out in this. Assuming that I am correct, I may refer to some particulars of hinau which appeared in the same issue as the observations I allude to, and will be found on p. 335 *ante*, under the heading of "The Non-Coniferous Timbers of New Zealand," in No. XIV. of my "Timbers of Australasia." In my desire to avoid prolixity, I said less of hinau than I should otherwise have done, or than was, perhaps, due to it; but as it is particularised in "Adaptable Specifications" I ought, I think, to afford some supplemental information.

Hinau, then (*Elæocarpus dentatus*—Nat. Or. Tiliaceæ), though it often reaches 60ft. in height, rarely exceeds 25ft. in the height of its trunk. The sapwood is strongly defined from the heartwood, and the light brown colour is that of the former, the heartwood being much darker, and in old specimens nearly black. This "Black Hinau" is specially valued by settlers in the southern part of the North Island, on account of its great durability. In the province of Otago, in the South (or, more properly, "Middle") Island, hinau is confused with, and called, "Pokaho," a nearly allied species (*E. Hackariana*), but yielding a different and altogether inferior timber, against which contractors and others in the Old World, who may be disposed to give hinau a trial, should be cautioned. In the North Island, however, the difference between the two species is distinctly recognised. In the Wellington district the timber is fairly plentiful; but in many other localities it is very thinly scattered. Curiously, in the Auckland district it has been almost entirely neglected, though elsewhere it has been largely used for bridges, culverts, sleepers, piles, posts, &c., with the very best results. Though it can scarcely be said to be "incombustible," it certainly burns with great difficulty, even when dry—a property, however, which it shares with a variety of other Australasian timbers, as those who have done me the honour to become my readers may remember. The following are the more important of the figures with reference to hinau given by Mr. J. M. Balfour, C.E., in his "Experiments on the Strength of New Zealand and Other Colonial Timbers." (The experiments alluded to were made in 1865, at Dunedin, for the Commissioners of the New Zealand Exhibition, and were in continuation of those which had been conducted in Paris by Capt. Fawke): Specific gravity, .562; weight in pounds per cubic foot, 35.03; elasticity, 200.7; ultimate strength in pounds, 125.

Hinau might undoubtedly be employed with advantage in Europe, both for building and engineering purposes, especially in positions where there is a liability to ignition—to say nothing of tanning, for which the bark is extremely valuable (though it is rarely used), containing, as it does, 20 per cent. of tannin. The New Zealand natives (who, by the way, use the fruit of the tree for food) prepare a black dye from the bark. Those who may be disposed to experimentalise with this timber may be recommended to put themselves in communication with the N.Z. Agent-General in London, Mr. W. P. Reeves. Indeed, as regards the Australasian timbers generally, the latest and most trustworthy information as to current prices, sources of supply, &c.—matters which, from their constantly varying nature, could not be dealt with in the articles on these timbers which have appeared in the BUILDING NEWS during the past year—may always be the most readily and satisfactorily obtained from the respective Agents-General of the various colonies. There is a specimen of hinau in the Sydney Technological Museum.

Hauama (*Entelea arborescens*—Nat. Or. Tiliaceæ) is a Maori synonym for "Whau," under which other native name the "corkwood" of the settlers is more properly (or more generally) known. Without entering into the history of either the discovery or nomenclature of this handsome and interesting shrub, or small tree, which attains a maximum height of 25ft., with a 4in. to 9in. stem diameter, I may state that it furnishes one of the lightest woods known, the weight of some specimens hardly exceeding half the weight of

cork. The wood is porous, very open in the grain, and of rather uneven texture; in transverse section it appears as if formed of exceedingly thin tubes of woody fibre, the interstices (which are sometimes $\frac{1}{16}$ in. wide or more) being filled with cellular tissue; but when cut plankwise and carefully glass-papered, it presents the appearance of solid wood. The following are the figures given by Balfour:—Specific gravity, .189; weight in pounds per cubic foot, 11.6 (in the case of one specimen, 8.29 only); elasticity, 41.03; ultimate strength in pounds, 32.

Whau is employed by the Maoris for the fenders of boats and floats for fishing-nets. It might be used for many purposes to which cork is applied, by reason of its lightness; but as the tree is becoming rare, except in almost inaccessible situations, cultivation would have to be resorted to did any large demand for it arise. (It was from this circumstance, added to the fact that it can scarcely be regarded as either an engineering, building, or cabinet-making timber, that I omitted it from my lists of the Australasian timbers which I regard as suitable for export.) Whau, however, is easily raised from seed, and can be cultivated without difficulty in situations sufficiently sheltered to prevent injury to the young plants by frost.—I am, &c.,

J. G. DE LIBRA.

Sydney, N.S.W., Oct. 31.

On the site of the old John Knox Church and the adjoining stoneyard, at Newcastle, a temperance hotel is being erected. There will be, in addition to the usual reception rooms, close upon 100 bedrooms, and a passenger lift, the contract for which has been let to the Otis Elevator Company. The general contract for the building is placed in the hands of Messrs. J. and W. Lowry. Messrs. Oliver and Lesson, Bank Chambers, Mosley-street, Newcastle, are the architects.

Major Marindin, of the Board of Trade, on Saturday made an official inspection of the extensions of the Edinburgh tramways, which have just been completed under the superintendence of Messrs. Cooper and Colam as engineers. The extensions in question are from Powburn to the south end of Craigmillar Park; from Comiston-road, opposite Morningside Drive, as far south as the Braid Hills Hotel; and from the present Coltbridge terminus west as far as Murrayfield-avenue.

A commencement has been made with the further extension of the West Blandford-street warehouses and offices at Newcastle-on-Tyne, for the Co-operative Wholesale Society, in accordance with designs by Messrs. Oliver and Leeson, Bank Chambers, Mosley-street, Newcastle. The building will have a frontage of 211ft. to Blandford-street West, and will consist of five floors, the basement, ground and second floors being utilised for warehouse purposes, while the first floor will be arranged as offices and committee-rooms. On the third floor will be the assembly hall, capable of accommodating about 1,500 persons, a dining-room to seat 250 persons, cloak-rooms, and cooking and administrative department. The elevations will be carried out with red pressed bricks with stone dressings, and the roofs slated with Lancashire slates.

A new theatre seated for 1,800 persons was opened in Front-street, Consett, Co. Durham, on Saturday. There are three main entrances from Front-street, and there are three emergency exits, besides those from the stage. The auditorium is 43ft. wide by 52ft. 6in. in depth. The pit floor has a slope of 2ft. 6in. from the back to the proscenium, and will seat over 600 persons. The stage is 37ft. 6in. wide, by 31ft. in depth. The ceiling of the auditorium is done in Lincrusta Walton and decorated, and the circle and gallery fronts covered with asbestos decoration and rendered fireproof. The theatre has been built by Mr. Richard Murray, of Ford Hall, Sunderland. The plans were designed, and the building carried out, under the supervision of Mr. W. S. Shell, M.S.A., of Consett.

In regard to the application made on behalf of William Henry Crossland (described in the receiving order as W. H. Crossland), Great George-street, Westminster, S.W., late Upper Bedford-place, Russell-square, W.C., architect and surveyor, the discharge from bankruptcy has been suspended for two years and six months, ending May 18, 1899. In that of Percy Royal Hubbard, of Croydon, builder and decorator, the discharge has been suspended for three years, ending Oct. 6, 1899; while in that of James Michael Wilson, of Newcastle-on-Tyne and Whitby, the discharge has been refused.

The Bishop of Marlborough on Saturday opened the temporary church for a new ecclesiastical district of St. Luke's, in Kidderpore-avenue, West Hampstead. Mr. Basil Champneys has been chosen as the architect of the permanent church, which is to provide accommodation for about 700 worshippers.

Intercommunication.

QUESTIONS.

[11598].—**Mortar with Sugar.**—I should like to know if any reader could give a recipe for preparing mortar with sugar or any other ingredient, so as to protect the same from frost?—J. OLDROYD.

CHIPS.

It is announced that a donation of £50 from the Royal Bounty Fund will be given to the widow of the late Mr. F. A. Skidmore, of Coventry.

The new mission-room of St. Chad's, in Green-lane, Walsall, was dedicated on Thursday in last week by the Bishop of Lichfield. The architects were Messrs. Bailey and McConal, of Walsall, and the builder was Mr. Wooton, of Bloxwich.

The Archbishop of York, on Wednesday week, dedicated a new organ in All Saints' Church, Huntington, near York, built by Messrs. Foster and Andrews, of Hull.

An inquiry was held on Thursday in last week, at Southampton, in regard to the sudden death of Bertram George Morley, aged 56, a carpenter, of Kingston-road, Freemantle, which occurred on the previous evening. The evidence of the widow and medical men showed that deceased, who was confined to bed suffering from heart-disease and bronchitis, was startled by hearing a nail being knocked into the wall of the next house, adjoining his bedroom, and died from syncope. A verdict in accordance therewith was returned.

Besides a statue of the Queen, Dundee is now aiming at founding a home for incurables at a probable cost of £50,000, as a memorial of Her Majesty's long reign.

A bricklayer's apprentice, named William J. Cuthbert, was working on a building in course of erection at Hull on Friday, when he fell from the staging on to the ground, a distance of 40ft., and sustained fracture of the jaw and concussion of the brain. He died a few hours later.

In the case of the widow of Digby, one of five men who were poisoned in a sewer at East Ham, and who sought to recover from the Urban District Council of that place compensation for the loss of her husband, Mr. Justice Cave recently held that there was no evidence of negligence on the part of the defendants, for whom he entered judgment. After hearing arguments on Saturday, the Court of Appeal considered the trial of the case was unsatisfactory, and directed a new trial.

Lord Roberts performed in Dublin, on Saturday, the ceremony of unveiling a statue to the late Surgeon Parke, of the Emlu Pasha Rescue Expedition. The statue is erected on the Leinster Lawn, in front of the Royal Dublin Society's Museum, and close to the statue of the late Prince Albert.

The Bishop of Stepney held a special service at St. Peter's Church, Dartmouth Park-hill, Highgate, on Saturday, and dedicated a rededication, which has been erected as a thank-offering for the twenty-one years' ministry of the vicar, the Rev. John Francis Osborne.

The London and South-Western Railway Company intend to construct at the Woolstou-yard, Southampton, a coal dock similar to one recently made on the west bank of the Itchen, at the back of the north-east quay of the old outer basin. The work will be carried out by Messrs. John Aird and Sons, the contractors for the Dock Extension works, who constructed the existing coal-dock about three years ago.

Mr. A. J. Jenkins, of the borough engineer's department, Rochdale, has been appointed assistant waterworks engineer of Cardiff.

Mr. John T. Bishop, who died in Baltimore, Md., December 6, was a contractor who had built many churches and public buildings in that city, and also several tunnels for the Baltimore and Ohio Railroad.

At the annual supper of the Old Students' Club, held on Saturday at the Working Men's College in Great Ormond-street, a portrait of the late Mr. Tom Hughes, formerly principal of the college, was presented by the painter, Mr. Lowes Dickinson. The portrait is a replica of that painted in 1893 by Mr. Dickinson, and now in the possession of Mrs. Hughes.

The Canterbury Cathedral Thirteenth Centenary Restoration Fund now amounts to £13,632.

The fifth of the series of the Glasgow Corporation fortnightly lectures on art subjects was delivered in the Galleries, in that city, on Saturday evening by Mr. F. H. Newbery, headmaster of the School of Art, the subject being "Art and Commerce."

The ratepayers of Lowestoft have decided, by a majority of 1,006 votes, to purchase the local water and gas company's property.

The remains of a Roman dwelling with its hypocausts have been found in a field on the Court Farm, Burham, Mid-Kent, about 30 yards from the Old Pilgrim Way.

Mr. Edward de la Motte, 27 years professor of landscape drawing at the Royal Military College, and for ten years drawing master at Harrow School, died on Friday last at Camberley, Surrey, aged 73 years.

The petitions for Private Bills for the Session of 1897 were deposited in the House of Lords on Friday. There are 248 Bills of all descriptions—railways, canals, tramways, gas and water, &c.—as against 199 last year.

The Edinburgh Town Council have approved generally of the plans for the new fever hospital at Colinton Mains, prepared by Mr. Morham, and remitted to the Public Health Committee to obtain estimates of the cost of buildings capable of accommodating four, five, and six hundred patients respectively.

The Mayoress of Chester (Mrs. B. C. Roberts) performed on Friday the ceremony of switching on the electric light, which has just been installed in the city. Under the advice of Lord Kelvin, the corporation have adopted the continuous-current, three-wire system.

There will shortly be laid before the corporation of Glasgow a scheme for straightening the River Clyde at the Flesher's Haugh, in the east end of the city, at Glasgow Green, and entirely rearranging the Green at that point. The Clyde makes a considerable bend in a south-easterly direction just above St. Andrew's Suspension Bridge, and does not return to the original course again until Rutherglen Bridge is reached; and the new scheme proposes to cut a new channel across the King's Park. The original waterway would, it is suggested, either be filled up and used for building purposes, or added to the Flesher's Haugh, which would then be on the south side of the river, for public park purposes.

The Oswaldtwistle Local Authority has resolved to appeal against the recent decision of Mr. Justice Charles with reference to the compulsory use of public sewers for the removal of manufacturers' effluents.

The St. Luke's Vestry have accepted the resignation of Mr. Mealy, surveyor and wharf superintendent.

His Honour Judge Sir Horatio Lloyd, Recorder of Chester, has suggested to the citizens the propriety of erecting a statue to the Duke of Westminster, Lord Lieutenant of the county, in the Town-hall square, to perpetuate the Duke's generosity to Chester institutions.

New business premises are about to be erected at Redruth, on the site of the late Druid's Hotel and two adjoining shops. The building will be built from the plans of Mr. Sampson Hill, architect, Mr. Arthur Carkeek being the contractor, and will include a shop on the ground floor measuring 90ft. by 90ft. The entrance will be through a vestibule 18ft. by 18ft., opening out from the shop front, the latter being set back from the line of the street frontage to form an arcade.

The aggregate of last week's business at The Mart this year was £80,953, which contrasted very well with that of the corresponding week of 1895, when £4,920 was registered. Business is now, of course, at a standstill, and is not likely to revive until the New Year is fairly well advanced.

The Archbishop Benson Memorial Fund now amounts to over £3,000. This sum includes one donation of £100, with a promise of an additional £100, provided that the nave of Truro Cathedral is completed as a part of the memorial.

The name of Arthur Young, of Idlesleigh Mansions, Victoria-street, Westminster, architect and surveyor, appears in Tuesday's list of receiving orders, and among the adjudications is that of George James Clark, of Bowness, architect and surveyor.

The death is announced, at the age of 56 years, of Mr. F. T. C. Linton, engineer to the Edinburgh and Leith Gas Commission, who was formerly connected with the Edinburgh and Leith Gas Company.

In the case of Joseph Halse, of Filmer-road, Fulham, S.W., builder and contractor, the order for discharge from bankruptcy has been suspended for two years, ending Nov. 28, 1898.

The promoters of the Lauder Light Railway have deposited a draft of the proposed order, plans, &c., with the county clerk and clerks to the West District Committee of Berwickshire County Council. The railway will connect Lauder with the Waverley line of the North British Railway at Fountainhall Station. The total length will be about 10½ miles, and the cost is estimated at £48,000. The engineers are Messrs. Cunningham, Blyth, and Westland, Edinburgh.

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ILLUSTRATIONS.

"LA MADONNA DI FOLIGNO," BY RAPHAEL.—INTERIOR OF ST. CUTHBERT'S CHURCH, KENSINGTON.—KING ARTHUR'S CASTLE, TINTAGEL.—NEW PREMISES, XXXV. OLD KENT ROAD.—STONE CHIMNEYPIECE, FROM THE MUSEUM OF CLUNY.—ENTRANCE TO THE ASHMOLEAN MUSEUM, OXFORD.—FIREPLACES IN COLLEGE GREEN, BRISTOL.—RESIDENCE AT HARTFORD, CONN.

Our Illustrations.

OLD MASTERS ON THE CONTINENT, NO. XLII: "LA MADONNA DI FOLIGNO," BY RAPHAEL.

A REPRODUCTION of this famous Madonna makes a fitting subject for the Christmas Day number of our series of Old Masters. It was painted by Raphael as a processional banner picture for the church of St. Maria in Araceli at the expense of Sigismondo Conti, secretary of Pope Julius II. The painting was transferred to Foligno, and occupied the post of honour in the church of St. Anna delle Contesse as the altar-piece. The French under the First Napoleon took the picture to Paris, where it was subjected to the process of transference from wood to canvas, and this rendered retouching necessary. In 1815, after the Conclusion of Peace, the picture was restored to Italy and presented to the Pope, who caused it to be preserved in the Vatican, where it is now. The name of this Madonna was acquired by the representation of the town of Foligno, which occupies the background of the scene, encircled by a rainbow. To the right, in front of the landscape, St. Jerome approvingly recommends to the Blessed Virgin the donor of the picture Sigismondo Conti. To the left kneels in ecstatic adoration St. Francis of Assisi, while St. John the Baptist points to the Saviour, shown resting playfully in the lap of His Holy Mother, who is seated in a golden glory 'midst the clouds, and surrounded by the Heavenly Host worshipping the new-born Son. The composition resembles the more well-known Madonna di San Sisto by the same master, and now the most treasured possession of the Royal Gallery at Dresden. The winged cherub in the centre of the Foligno Madonna holds a tablet, on which the name of the donor of this votive painting could formerly be deciphered. An engraving of the work was executed by Desnoyers; but our double-page lithograph was taken direct from the original by Sig. Alinari, of Florence, by photography.

INTERIOR VIEW OF THE PROPOSED ALTERATIONS AND DECORATIONS, ST. CUTHBERT'S, KENSINGTON.

THIS is the last of the series of the three drawings of this work shown in the Royal Academy last summer. It shows the entire scheme for the decoration of the church, including the new wood vaulting to the nave and aisles, the walls of which, together with the roofs, are designed to be raised, converting the present clerestory into a triforium. The walls, not being considered strong enough to bear stone vaulting, wood has been substituted, and, in order to show the material used, the filling-in between the ribs is composed of open tracery; the ribs, bosses,

&c., are intended to be relieved in colour. The high altar (shown by our illustration last week) is seen beyond the wrought-iron screen beneath rood-loft. The canopy over the pulpit is to have panels in coloured gesso, representing the Four Evangelists and the Four Greater Prophets. The walls are shown covered, as portions are already, with carved stone diaper patterns. Marble will be used for the vaulting shafts, &c., and the pavement of the choir and sanctuary will be of various coloured marbles. The architect of these works is Mr. Cyril E. Power.

KING ARTHUR'S CASTLE HOTEL, TINTAGEL, CORNWALL.

THIS hotel is to be erected from the designs of Mr. Silvanus Trevail, F.R.I.B.A., of Truro. It will occupy a fine site immediately overlooking the ruins of the far-famed castle of King Arthur, which dates about A.D. 500, and is the scene of much of the legendary romance of the late Lord Tennyson's "Idylls of the King." Some of these ruins are still to be seen on the island. The fortress is the property of the Prince of Wales, Duke of Cornwall. The Earl of Wharfedale, lord of the adjoining manor, is the custodian of the castle. The hotel is designed in a castellated style, and there is a tower at each corner. It will not be devoid of modern comforts and appliances. There are to be hot and cold sea-water baths, with the supply pumped from Merlin's Cave by electric-motors, which will also supply the lighting, and work the passenger and luggage-lifts, as well as supply the accumulators that will be used for the electric cars intended to take visitors to and from the hotel and the railway station. The material in the building will be native stone raised on the spot, with rough-cast facing, the roofing will be mostly lead, the windows throughout glazed with plate glass below the transoms, and scenes from Arthurian history will be worked in leaded glazing above. Internally fibrous plaster and tapestry are to be used with Arthurian characters and subjects. There will be 80 bedrooms, and the usual reception-rooms. It is hoped to start the work early next year, and get it completed in 1898 in time for the season.

NEW PREMISES, XXXV. OLD KENT-ROAD, S.E.

THIS building is now approaching completion in Old Kent-road for Mr. E. R. Goodrich. It comprises one large shop on the ground floor, with ware-rooms over, and the top floors are arranged as a residence for the manager. The fronts are faced with red bricks, and Ancaster stone dressings. The building is being erected by Messrs. Mark Patrick and Son, from the designs of the architects, Messrs. Wigg, Oliver, and Hudson.

STONE CHIMNEYPIECE, CLUNY MUSEUM, PARIS.

THIS drawing, also by Mr. Rickards, represents a hooded fireplace of Gothic type, now located in the Hotel de Cluny. The sections and plans accompanying the perspective view supplement it usefully, while the chairs give it scale.

ENTRANCE TO THE ASHMOLEAN MUSEUM, OXFORD.

THERE is not much to add about this sketch by Mr. E. A. Rickards, beyond what may be seen from his spirited study of Wood's design of the entrance to the Ashmolean Museum, Oxford. It was built in 1682 by Wood, an Oxford architect, and the general ascription of the work to Sir Christopher Wren is a mistake.

FIREPLACES: HOUSE OF THE BISHOP'S REGISTRAR, LOWER COLLEGE GREEN, BRISTOL.

THESE three fireplaces, illustrated by Mr. Rodway's drawings, are examples from an old 17th-century house within the cathedral precincts; the house was built by one Nicholas Pownell, bishop's registrar in 1664, as shown by the carved monogram and date on two of the fireplaces. The exterior of the house is of no interest, but the interior contains some fine plaster work, and a good staircase of the same date as the chimney-pieces: this is of deal—a rather unusual thing for this period. The house is at present in a very ruinous condition, and the Dean of Bristol contemplates making some necessary alterations under the direction of Mr. H. Dare Bryan; but the three fireplaces shown will still remain.

RESIDENCE OF GEORGE W. POMROY, PROSPECT AVENUE, HARTFORD, CONN.

WE illustrate to-day the residence of Mr. George W. Pomroy on Prospect-avenue, which has been

recently completed by F. R. Comstock, architect. The underpinning is of Longmeadow stone, the chimneys being of buff brick, the one on the exterior having a handsome terracotta tablet at the second story. The dimensions of the house are 33ft. by 63ft. At the main entrance is a vestibule, 8ft. by 9ft., with a dome over it, the ceiling of which is handsomely decorated. The central dome is 6ft. in diameter; at the back of the main cornice and dome are incandescent electric lights 18in. apart. The staircase hall forming the reception-room is 15ft. by 23ft. The staircase is finished in white enamel with cherry treads and handrail. A feature of the hall is a nook under landing, containing a fireplace, and lighted by art windows. Over the nook at the landing there is a stained-glass window, 5ft. by 10ft., giving an abundance of light to the room below. We gave a view of this hall in our issue of the 11th inst. On the main floor there is also the reception-room, 15ft. by 18ft., finished in bird's-eye maple; the library, 13ft. by 17ft., in cherry; the dining-room, 13ft. by 16ft., in quartered oak, besides the kitchen, pantries, &c. The partition between the library and hall is of column and spindle work. On the second floor there is a den with window-seat in ash, stained green; a sitting-room and family chamber in white enamel; a dressing-room with complete lavatory; three chambers and a handsome bathroom fitted up with enamel tub, shower bath, Tennessee marble fittings, &c. The attic contains the servants' quarters, billiard-room, &c. Across the front of the house is a piazza, 10ft. wide, with a spacious circular end. The house is heated by hot water, and wired for electric light.

CHIPS.

The Kingswood Urban District Council received on Monday a report from the assessor on the sewage schemes recently submitted in competition. He reports that the proposal under motto "Valves" was the best submitted; but if that or any other of the plans sent in were adopted there would be needed considerable remodelling. Too much reliance must not be placed on any of the competitors' estimates. After discussion, consideration of the report was adjourned until Wednesday in next week.

A stained-glass window representing the "Parable of the Talents" has been placed in the south transept of St. Thomas's Church, Werneth, near Oldham.

The annual meeting of the Luckie Horseshoe Sick Benefit Club was held at Messrs. Harry Hems and Sons' Studios, Exeter, on Saturday, Mr. Frank Dyer, sen., being in the chair. The report, presented by the hon. sec., Mr. H. T. Hems, jun., was of a satisfactory description. During the past year only six members had received sick-pay, and after carrying forward £5 of the funds in hand to start the New Year with, a bonus of 7s. per head was available to be paid back to every member.

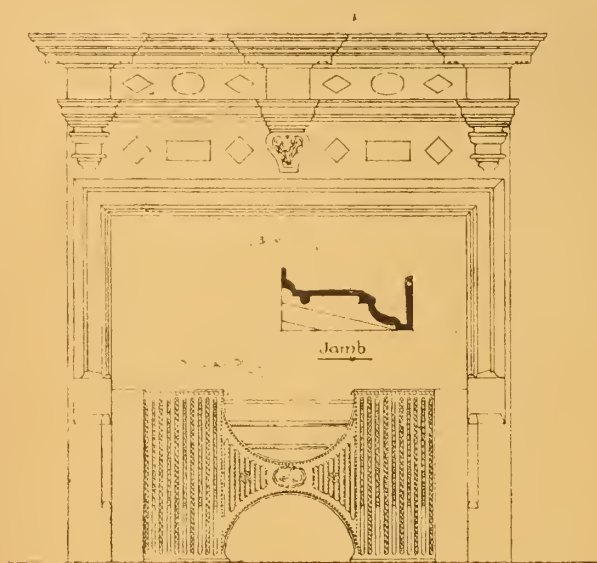
The Corporation Property Committee of Leeds received on Friday a letter from Alderman Harding offering, at his own expense, to provide and erect in the centre of the City-square a bronze equestrian statue of Edward the Black Prince, mounted on a pedestal of granite and bronze, the whole monument to be about 30ft. high, in general accordance with a model prepared for the donor by Mr. Thomas Brock, R.A., and now exhibited in the Leeds Art Gallery for the approval of the council. Mr. Harding also offered to provide, at his own expense, eight bronze figures about 6ft. high, required for the circular balustrade of the square, in general accordance with the models of "Morn" and "Evening," prepared for him by Mr. Alfred Drury, and now exhibited in the Art Gallery. The same pair of figures would be repeated at each of the four entrances to the balustrade. The gifts were accepted with thanks, as was also a granite fountain offered by Alderman Scarr.

At the last meeting of the Mersey Docks and Harbour Board, Mr. John Brancker, the chairman, referred at length to the work which had been done to improve the facilities of the port of Liverpool. There were extensive operations in progress, especially in connection with the new deep-water entrance at the Sandon Basin. The Prince's landing-stage was now half-a-mile long, and the new wool warehouse had met with the entire approval of the trade. The dredging operations at the bar had been attended with success, there being only occasional soundings where less than 25ft. of water at low spring tides were shown.

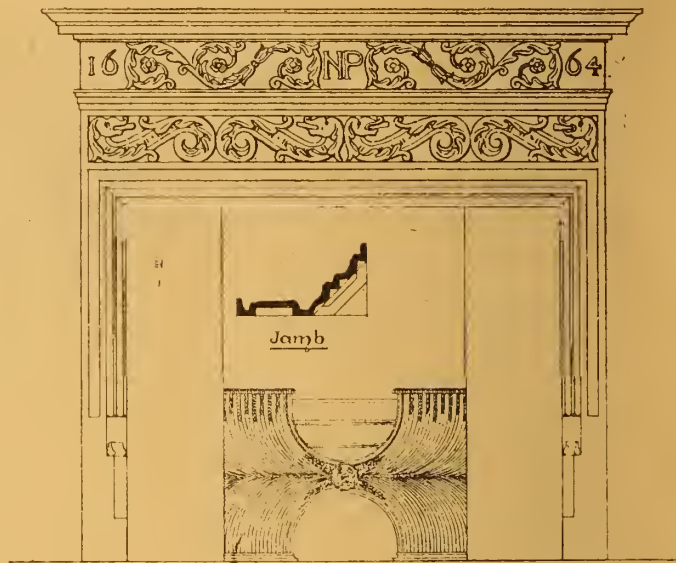
The Royal Hotel in Prince Consort-road, Gateshead, has just been opened. It has been built by Messrs. T. and R. Lamb, of that town, from designs by Mr. Joseph Oswald, of Newcastle, and is three stories in height, and English Renaissance in style.

FIREPLACES.

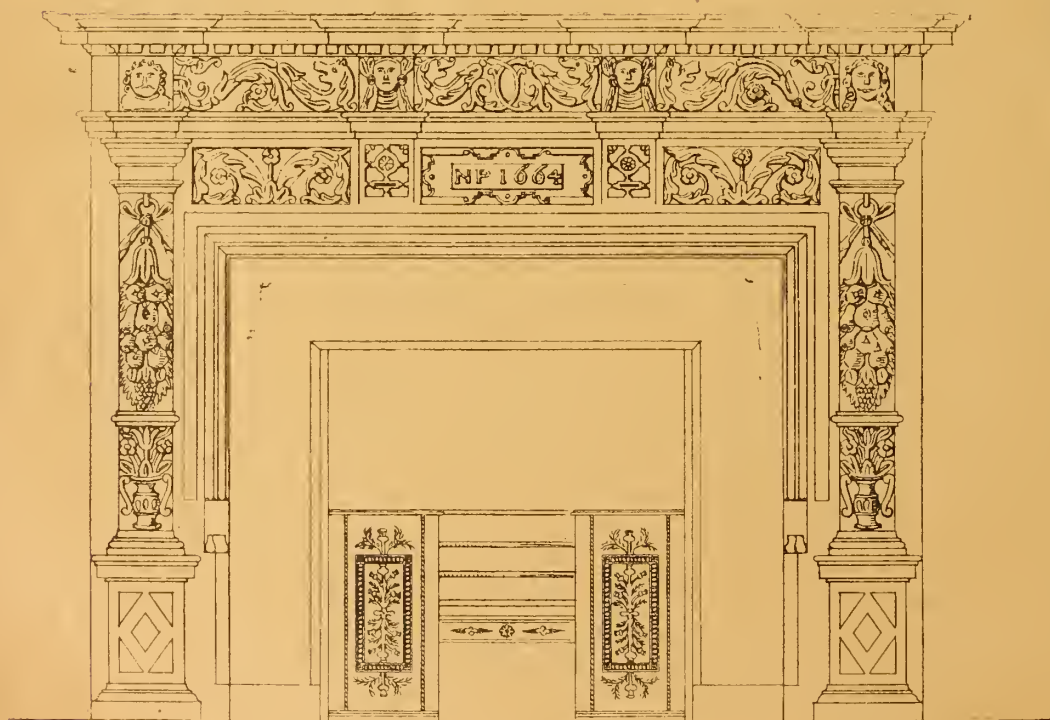
HOUSE IN LOWER COLLEGE GREEN BRISTOL™



ELEVATION



ELEVATION



ELEVATION

Section



PLAN





NEW PREMISES 35 OLD KENT ROAD SE WIGG, OLIVER & HUDSON
7 Bedford Row & 80 Leaman St





"Photo-Tint" by James Akerman 6, Queen Square, London, W.C.

OLD MASTERS · ON THE · CONTINENT · N° 42 ·

LA MADONNA DI FOLIGNO (VATICAN · ROME) BY RAFFAELLO SANZIO (RAPHAEL) B 1483 · D 1520 · UMBRIAN · SCHOOL

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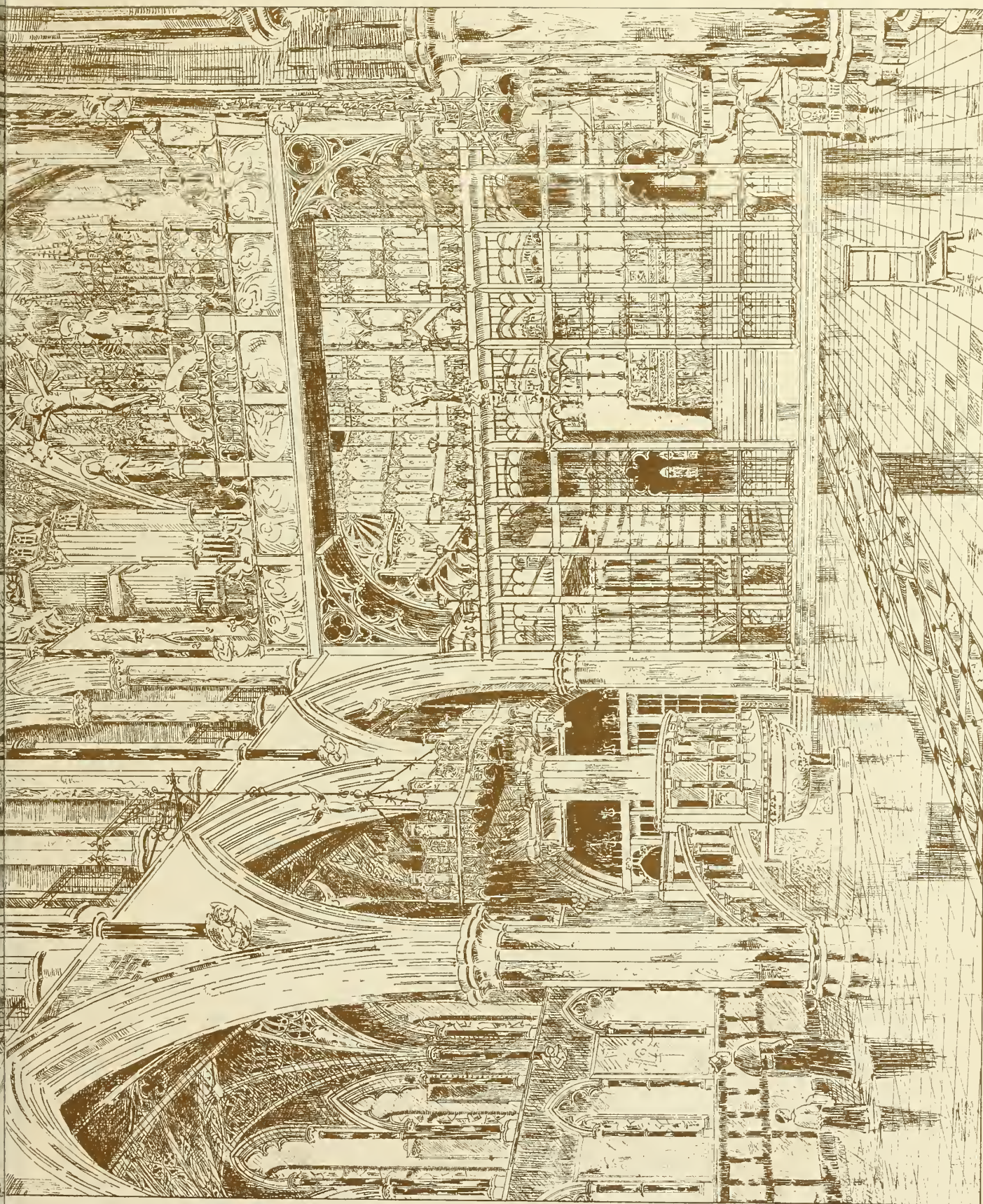
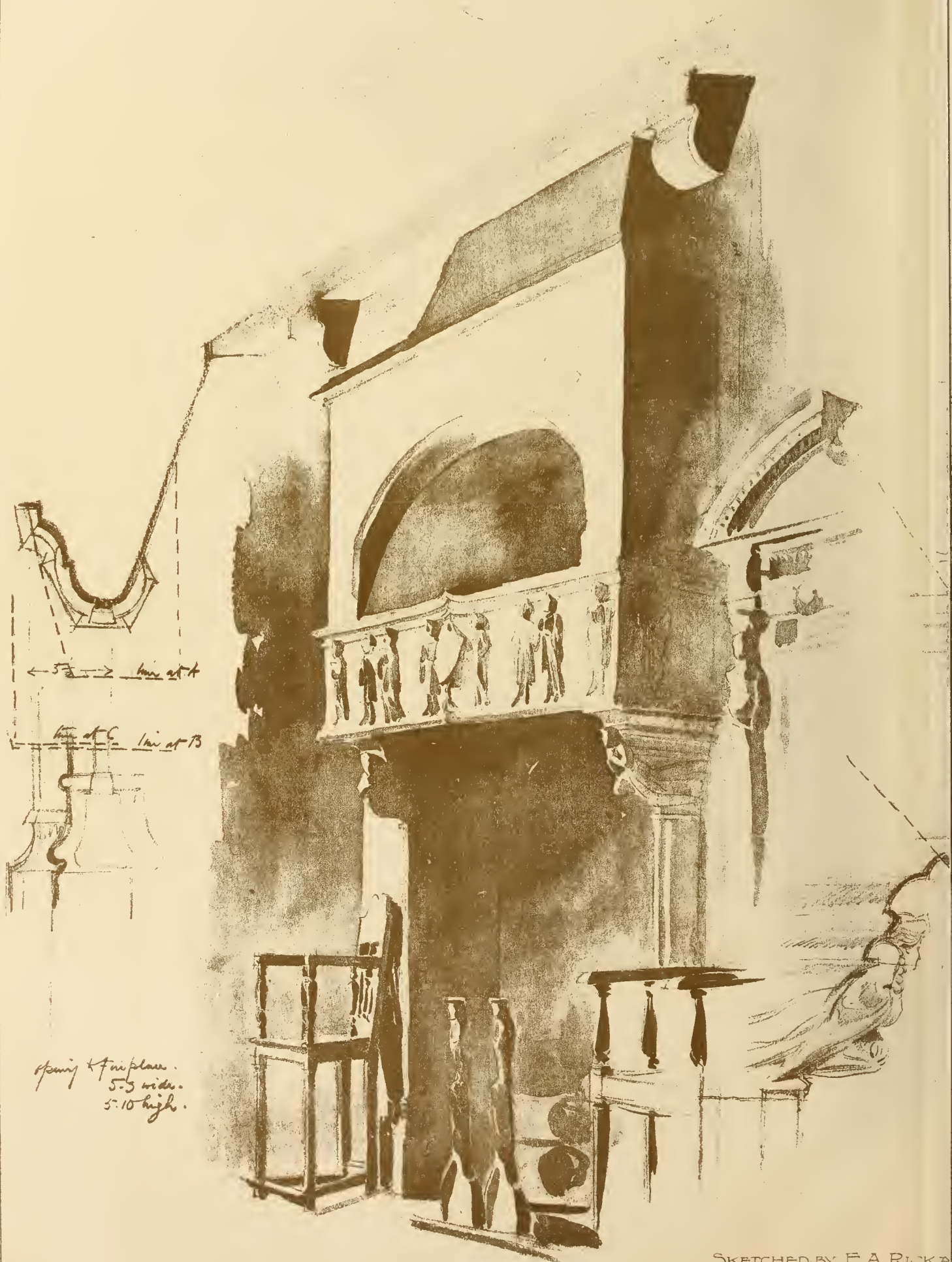
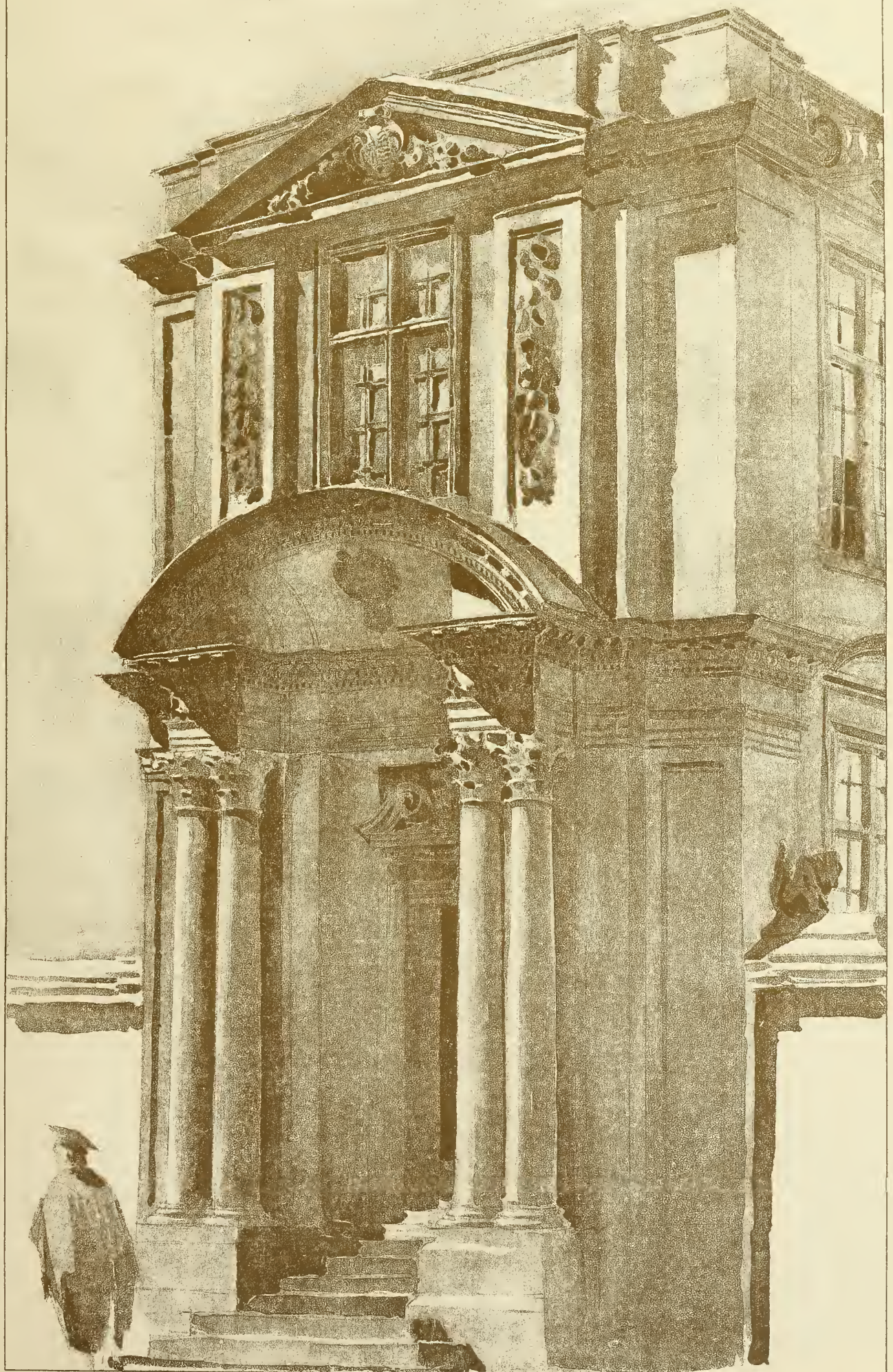


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STONE CHIMNEY-PIECE HOTEL DE CLUNY - PARIS.



ENTRANCE TO THE ASHMOLEAN MUSEUM OXFORD.

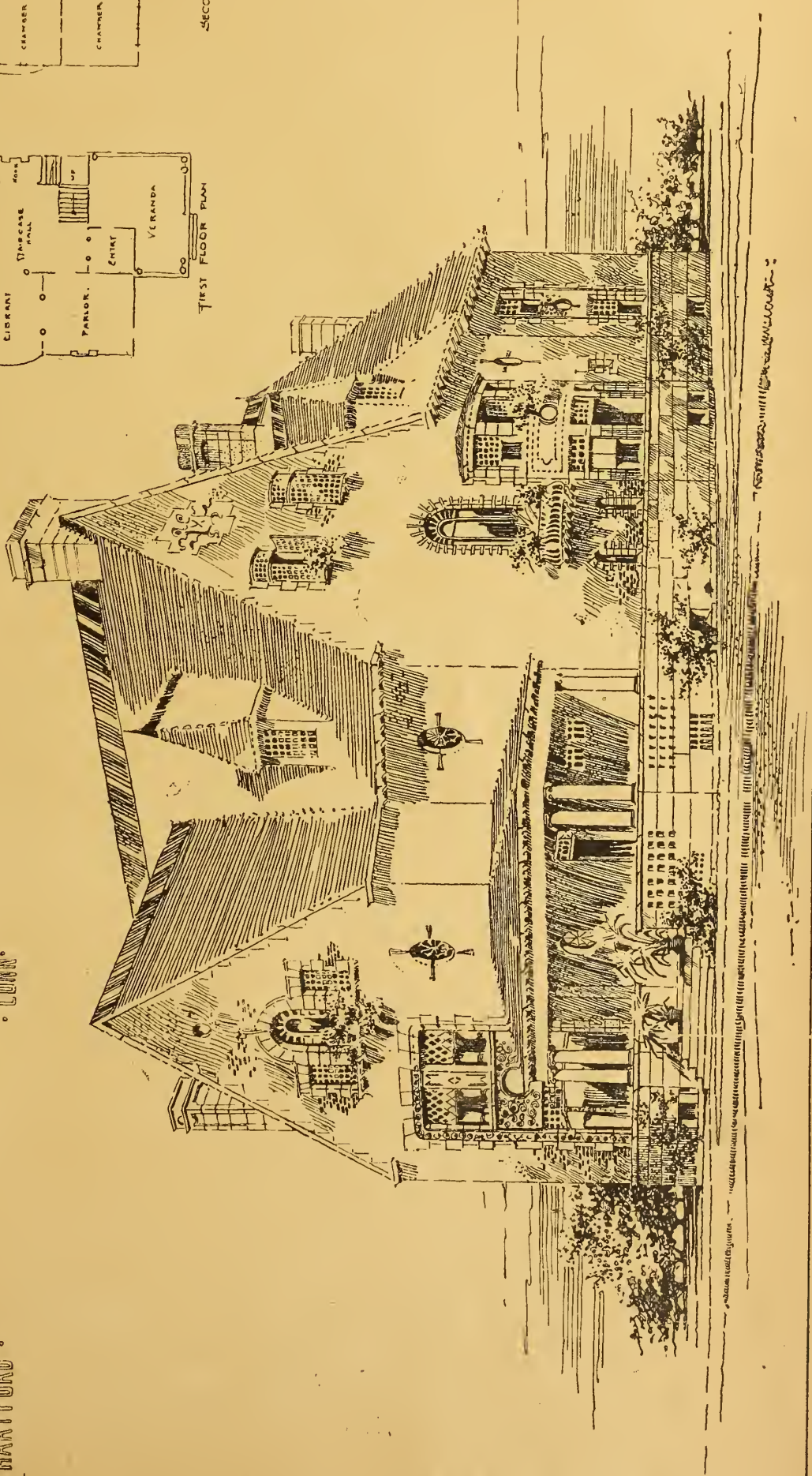
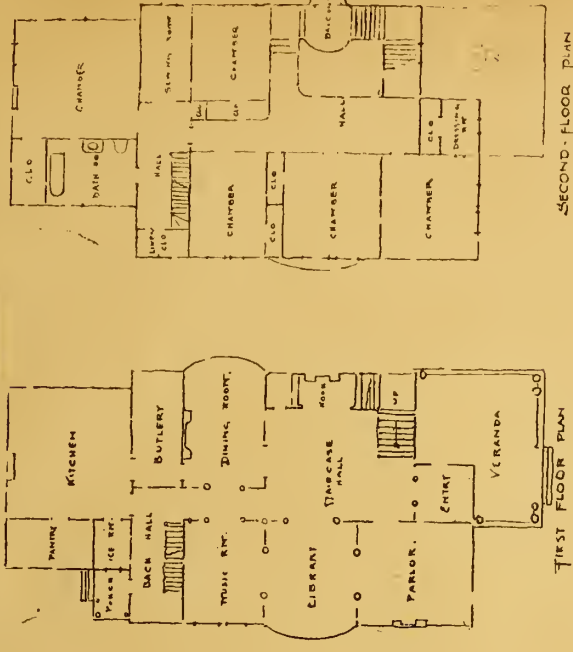


KING ARTHUR'S CASTLE HOTEL
TINTAGEL, CORNWALL.
SILVANUS TREVAIL, F.R.I.B.A. ARCHT



"PHOTO-TINT" BY JAMES AKERMAN 6 QUEEN SQUARE LONDON W. 1

RESIDENCE FOR MR. G. W. POMROY.
 PROSPECT AVE. HARTFORD, CONN.
 F. R. COMSTOCK, ARCHITECT.
 HARTFORD, CONN.



OBITUARY.

MR. EDWARD FALKENER, architect, author, and archaeologist, died at his house, Glargmor, St. Clears, Carmarthen, on December 17, in his 83rd year. After gaining the gold medal for architecture of the Royal Academy in 1839, he travelled in Europe and the East for seven years. In the spring of 1847 he had, at his own expense, a house excavated at Pompeii, called the House of Marcus Lucretius, in which all the loose articles were left where found. On his return to London he engaged in private practice; but the principal part of his time was devoted to publications on Classical antiquities and to drawings of Classical restorations, many of the latter being exhibited at the Royal Academy. He edited the "Classical Museum," and contributed many papers to it. He published in 1854 a pamphlet entitled "A Description of some Important Theatres and other Remains in Crete," in which was an account of the acoustic vases found in one of the theatres; and published "Dædalus on Greek Sculpture" in 1860. In 1861 he issued a pamphlet on "The Hypæthron of Greek Temples," in 1862 "Ephesus and the Temple of Diana," and lately "Games, Ancient and Oriental," and he was preparing a book on Greek houses until his last illness. Some of his sketches were used by the late James Fergusson in his "History of Architecture." Shortly after the publication of his first three books he gave up practice, and retired to South Wales. He was a member of the Academy of Bologna, of the Archaeological Institutes of Rome and Berlin, a Knight of the Dannebrog, and J.P. for Carmarthenshire. In the spring of this year he was elected by acclamation an Hon. Fellow of the Royal Institute of British Architects. He married a daughter of Dr. Benjamin Golding, and leaves a son and three daughters.

MR. OWEN MORRIS ROBERTS, M.S.A., an architect well known in North Wales, died on Tuesday night in last week at his residence at Portmadoc, after a long illness. The deceased, who was 63 years of age, and leaves a son and three daughters, had designed and carried out many important public buildings and chapels in Anglesey and Carnarvonshire and Merioneth, and his design was recently selected in competition for the proposed Anglesey County Council buildings at Llangefni. At one time he represented Portmadoc on the Carnarvon County Council. He became a member of the Society of Architects last year.

THE late General HENRY ST. CLAIR WILKINS, R.E., who died suddenly on the 15th inst., aged 68 years, devoted his attention to the study of architecture, and designed and superintended the erection of many public buildings, hospitals, colleges, and palaces, notably in New Bombay, Puna, and Bhuj. He also remodelled and partially rebuilt many ancient buildings in India, in order to adapt them for present requirements. He was the author of "Reconnoitring in Abyssinia" and a "Treatise on Mountain Roads, Live Loads, and Bridges."

ALDERMAN JOHN JOSHUA BROOK, J.P., of Huddersfield, the principal of the firm of Hanson, Dale, and Co., lead pipe manufacturers, of Cole-road, in that town, died on Sunday, aged 57 years. He served as mayor of the borough in the two years 1893-4-5, and during that term of office much important business was transacted, including the inception of the hospital scheme and the final adoption of plans for a new police-station, the development of the gasworks, and the opening of the Lindley recreation-ground. He was Provincial Grand Junior Warden of the West Yorkshire Freemasons, and was also deacon of a Congregational church. He leaves a widow, three sons, and two daughters.

A Local Government Board inquiry has been held at Heywood by Colonel Cope, C.E., into the application of the Heywood Town Council for permission to borrow £35,000 for waterworks purposes and £1,000 for the purchase of a new steam fire engine.

The Lords of the Admiralty have definitely resolved upon the extension of the Naval Depot at Chatham. Two schemes are to be carried out—namely, the erection of naval barracks on a considerable scale, and the building of a new hospital for the reception of naval patients, Royal Marines, and dockyard accident cases. The expenditure, which will be spread over several years, will amount to one and a-half million of money.

WATER SUPPLY AND SANITARY MATTERS.

RAWMARSH SEWAGE WORKS.—These works were formally opened on the 17th inst. They include high and low-level mains, pumping station, with pumps capable of lifting 40,000 gallons per hour through rising main to the outfall works, two miles distant, where nine precipitation tanks and oxidising polarite filters are provided to purify the sewage after treatment with ferrozene. Mr. J. Platts, of Rotherham, is the engineer for the scheme.

STOWUPLAND AND COMBS, SUFFOLK.—The scheme of sewerage and sewage disposal for the parishes of Stowupland and Combs, as organised under the East Stow Rural District Council, has been sanctioned by the Local Government Board without alteration, as designed by Messrs. Taylor and Sons and Santo Crimp, and the consent to the loan of £5,000 has also been given. The system is that known as simple irrigation on to land lying on the side of the Gipping close to the chemical works, 14 acres having been acquired for the purpose. The sewage will be pumped up from a small site adjoining the gas-works on to this elevated land, and thence it will flow by gravitation on to the prepared land. There are to be two dynamos for the pumping, one wire being carried to Combs which will work the pump at Combs Ford, and send back the whole of their sewage through a 2in. pipe on to the prepared land at Stowupland. Three pumps will be worked by the dynamos, one of them being utilised for working the electric pump in connection with the water supply for the parish of Combs.

CHIPS.

The late Mr. J. Denovan Adam's picture, "September at Balmoral," has been purchased by the corporation of Glasgow for 300 guineas. It will be hung in the permanent collection at the Corporation Art Galleries in that city.

A new clock with four 6ft. dials, and striking the hours, has just been erected on the parish church tower at Heath Town, Wolverhampton, as a memorial to the late Mr. William Pool, goods agent of the L. and N. Western Railway, Wolverhampton. John Smith and Sons, Midland Clock Works, Derby, carried out the work.

Messrs. Hems and Sons, of Exeter, are executing a memorial to stand upon the grave of the late Mr. C. L. Coode, son of Mr. W. Coode, of Trevarna, St. Austell, who died in the autumn of 1894 at Lauka, near Quahatti, in Assam.

Some progress is being made with the construction of the temporary Vauxhall Bridge over the Thames, between the Tate Gallery in Grosvenor Bridge-road and a point on the Albert Embankment just west of Messrs. Doulton's works. The work of construction is divided between the Works Committee of the London County Council, who are carrying out the foundations, piers, and approaches, and Messrs. Braithwaite and Kirk, of West Bromwich, who have undertaken to carry out the iron superstructure simultaneously from both ends, the plans being prepared by Mr. A. R. Binnie, engineer to the County Council. The estimated cost of the works which are being carried out by the Works Department is £15,057 9s. 3d., and the contract price for supplying the iron girders by Messrs. Braithwaite and Kirk is £13,917 18s. 7d.

The west window of the north aisle of St. Nicholas Church, Birmingham, has been filled with a memorial to the late Miss Hartley, the subject of which is the Charity of Dorcas, which occupies a space in the centre of the two lights with a light canopy and base. The window is from the studio of Mr. T. W. Camm, Smethwick, near Birmingham.

The third annual report of the Labour Department of the Board of Trade (1895-96) shows that, on the whole, employment was better in 1895 than in 1894 and 1893, and slightly better than in 1892, but did not reach the level of 1891. The improvement was most marked in the latter half of the year. The building trades continued well employed during the year (with an average proportion of 3·8 per cent. unemployed), while the engineering, metal, and shipbuilding trades showed some improvement, the percentage of unemployed having fallen from 11·3 in 1894 to 8·2 in 1895.

A stained-glass window, the work of Mr. Framp-ton, of Buckingham Palace-road, representing the Call of St. Matthew and The Feast in St. Matthew's House, has recently been placed in the church of St. Matthew's, Ealing-common, in memory of the late Bishop of Antigua, who was a resident in Ealing for many years.

The Finance Committee of Islington Vestry in a report direct the attention of the vestry to the discrepancy between the aggregate amount of the contracts and other liabilities incurred for alterations and extensions at the Caledonian-road Baths, namely £16,099, and the amount originally estimated to be required for these works and sanctioned by the vestry on November 18, 1895, namely £3,839.

The Devon County Council have decided to approach the Duchy of Cornwall with a view to purchasing of Dartmoor, comprising 130,000 acres, on terms satisfactory to the Treasury and the Prince of Wales.

A special service was held in Heath Town Church, Wolverhampton, on Saturday evening, for the dedication of the clock which has been erected in the tower of the church in memory of the late Mr. William Pool, formerly goods agent of the London and North-Western Railway, in whose service he was engaged for fifty years. The clock was supplied by Messrs. John Smith and Sons, of the Midland Clock Works, Derby. It has four 6ft. dials, with copper-gilded figures and minutes, and strikes the hours. The cost of about £150 has been defrayed by public subscription.

The Cecil-street Chapel, Carlisle, is being ventilated by means of Shorland's patent exhaust roof ventilators, the same being supplied by Messrs. E. H. Shorland and Brother, of Manchester.

During the restoration of Llanblethiau parish church, near Carbridge, under the supervision of Mr. C. B. Fowler, F.R.I.B.A., of Cardiff, a number of discoveries have been made, including two Early eighteenth-century sepulchral slabs, a fourteenth-century piscina a headless effigy, a Norman consecration stone, and many pieces of carved masonry.

The corporation of Morley invite architects to send designs for new public baths on or before Jan 25th. Premiums of £30 and £15 are offered to those placed 1st and 2nd respectively in the competition, but the premium awarded to the architect (if any) whose design may be selected, will, as is now too usual, be merged in the commission. Particulars and conditions of the competition and plans of the site may be obtained on application to Mr. M. H. Sykes, the borough surveyor, on receipt of 10s. which, it is promised, will be returned on receipt of a design.

An addition to the sick children's hospital, at Aberdeen, is to be made in the form of a home for nurses, and yesterday the plans were passed by the town council committee. The home will be situated on the east side of the hospital, and of three stories in height, with attic and basement floors. Provision is made for dining-room, study, and servants' pantry, besides twenty-eight bedrooms and accessories. The estimated cost of the building is £2,000.

Mr. Justice Charles gave judgment, on Monday, in the action brought by Mr. Leonard G. Stileman-Gibbard to prohibit the vicar of Sharnbrook Church, Bedfordshire, from erecting new choir-stalls in the chancel of the church upon a site to which the plaintiff claimed that he had both a freehold and a prescriptive right. He held that the plaintiff, as owner of Sharnbrook House, had made out his case, and he directed a writ of prohibition to issue.

The unveiling of the monument to Donatello, in the church of San Lorenzo at Florence, took place on Monday, in the presence of the King and Queen of Italy.

The only large famine relief work at present in progress in Upper Burma is the earthwork on the Meiktila-Myingyan Railway, on which there are now about 10,000 persons employed. It is expected that the Mandalay Canal scheme will be shortly sanctioned, and this, too, will be made a famine relief work. This irrigation scheme is estimated to cost 32 lakhs, and provides for a canal 39 miles long and distributaries of a total length of 86 miles, irrigating 72,000 acres.

About a fortnight ago Mr. E. T. Lewis conducted an arbitration for the purpose of determining the amount to be paid by the Bristol Corporation to the Russell Trustees in respect of the Ship Inn, Hotwell-road, which is required for street improvement purposes. The amount claimed was about £4,500, and the value placed upon the property by the corporation valuers was about £2,300. The arbitrator has just made his award in favour of the Russell Trustees for £3,818.

We have received from the Gloucester Railway Carriage and Wagon Co., Ltd., Gloucester, a copy of the "Gloucester Diary" for 1897. The new features introduced into the book, include a "Director's Calendar," and a note on each day throughout the diary to enable the periodic recurrence of fixed engagements to be recorded. Brief particulars are given respecting the Severn "Bore," the Gloucester "Mop" and the "Festival of the Three Choirs," which is perhaps the oldest and most important annual musical meeting held in Great Britain, the Welsh Eisteddfodd alone excepted.

The ceremony of opening the new post office at Tipton took place on Monday. The building, which stands at the corner of Horseley-road, Dudley Port, was designed by Mr. Henry Tanner (chief architect of H.M. Office of Works), Mr. J. Mallin, Church-field, West Bromwich, being the builder, and Mr. Atkinson clerk of works. The size of the sorting-room, 45ft. by 27ft., is much in excess of the present requirements.

LEGAL INTELLIGENCE.

CHANCEL SCREENS AND GATES.—A sitting of the Consistory Court of the diocese of Rochester was held on Saturday before Mr. Chancellor Dibdin. A petition was presented by the churchwardens of St. Matthias, chapel of ease, Richmond, Surrey (built in 1857), with the wardens of the mother church as co-petitioners, for a faculty for a chancel screen to be erected in the church of St. Matthias with chancel gates and the figure of our Lord on the Cross, upon the centre of the screen, with the figures of the Virgin Mary on one side of it and of St. John on the other. The petition was unopposed. It was submitted that the desire of the petitioners and co-petitioners, coupled with the resolution of seat-holders and in the absence of any opposition, was satisfactory evidence of the wish of the parish and of those who attended the church. The case of "Peck v. Trower" was quoted; and the Chancellor considered the evidence was sufficient under the circumstances of the case. In support of the argument for the chancel gates the cases of "Re St. Agnes, Kennington Park," "St. James, Norland," were cited to show the change that had taken place since the decision of "Bradford v. Fry," and that chancel gates are recognised as permissible for the protection of choir-books and other property in the chancel. With regard to the images on the screen, it was submitted that there was no probability of their being abused; this was the test laid down by the Privy Council in "Phillipotts v. Boyd," and referred to by Lord Justice Lindley in "Reg. v. Bishop of London," and by "The Chancellor v. St. John, Penderbury"; in the case of "Clifton v. Ridsdale" there were circumstances, such as "honouring" the image with candles and stations of the Cross, associated with the adoration of the rood, which were regarded as evidence of the probability of abuse; in the case of St. John, Timberhill, there were similar circumstances, and the faculty was refused, but in the Barsham case there were no such circumstances, and the faculty for the figures was accordingly granted. The Chancellor, in giving judgment, said that he considered he was fettered by the decision of Lord Penzance in "Bradford v. Fry," and must refuse the faculty as to the chancel gates; the case of the figures on the screen was covered by the decision of Lord Penzance in "Clifton v. Ridsdale," which, in his opinion, decided that the crucifix, with or without figures, on the chancel screen by reason of its history was illegal; the position of the figures was alone sufficient evidence, without any other circumstances, of the probability of their being abused. The only way, therefore, of obtaining a faculty would be to take such a case as the present one to a higher Court. A faculty for the chancel screen, without the gates and figures, would be decreed if desired, but as to the gates and the figures on the screen, the petition was dismissed. It was stated that there was a desire to appeal.

EMDEN V. LAMBERT AND OTHERS.—The plaintiff in this action, heard by Mr. Justice Cave and a Special Jury on Friday, was Mr. T. W. Emden, architect and surveyor. The defendants were Mr. Ernest O. Lambert, Mr. Herbert Parry Okeden, and the Brewery Joint Stock Syndicate (Limited). The plaintiff claimed £5,400 for work done and money paid in his capacity as an architect. The defendants denied liability. Mr. Rose-Innes, in opening the plaintiff's case, said that the plaintiff was the vice-president of the Society of Architects and a member of the Institute of Surveyors. In 1895 the defendants were promoting the Crown Lease Proprietary Company (Limited), and wished to erect on an empty tract of land, opposite the Haymarket Theatre, an opera-house, shops, chambers, and a restaurant. The plaintiff was introduced by Colonel Mapleson to the defendants, and was engaged as architect and surveyor, by the defendant Lambert, who agreed to pay 2½ per cent. commission on the contract price of the work, and also certain outgoings. Mr. Emden was engaged on the work from seven to nine months. He prepared designs and obtained the approval of the Law Guarantee Society, who were mortgagees of the property, and of the Commissioners of Woods and Forests, and of the London County Council, the approval of these bodies being necessary. The plaintiff's charges were on the scale approved by the Institute of Architects. Mr. T. W. Emden gave evidence in support of his counsel's opening statement. Mr. Egan, plaintiff's managing clerk, gave evidence as to the time taken by the work in question. Mr. Pilditch, architect, was also called, and spoke to the reasonableness of the plaintiff's charges. Mr. Cock, Q.C., for the defendant, said that the question for the jury was whether Mr. Lambert had made himself personally liable. Colonel Mapleson introduced the defendant to Emden in April, 1895. Before that time Emden had been contemplating a scheme for building on the vacant land at the bottom of the Haymarket, and had already made elevations and other drawings of the proposed building. His idea was the formation of a company to carry out the scheme. He brought the matter before the defendant, and at a meeting of the Brewery Joint Stock Syndicate it was agreed between

Emden and the syndicate that he should be architect and should be paid by the proposed company. This was confirmed by the minutes of the meeting. The company was formed under the name of the Crown Lease Proprietary Company, but it came to grief about December, 1895, and the scheme fell through. Till that happened there was not a single letter from the plaintiff saying that he held the defendant responsible. But in January he sent in claims to Lambert, to Okeden, to Everden, and to the syndicate. Mr. E. O. Lambert, the defendant, was called, and bore out Mr. Cock's statement. He said he was managing director of the Brewery Joint Stock Syndicate. Everden was also a managing director, and the other two directors were Cottam and Bonner. He denied that there had been any suggestion that he should be liable to Emden for the fees. In cross-examination, he stated that the syndicate was now in liquidation, and that the plans had been prepared by Emden on instructions given by him as managing director of the syndicate. His offices were at 5, Fenchurch-street. No one, he said, was to pay Emden if the company was a failure. Mr. Everden was called, and gave similar evidence. He stated, in cross-examination, that the subscribed capital of the syndicate was £700 out of a total capital of £43,000. Mr. Cottam and Mr. Bonner also gave evidence on behalf of the defendant. Mr. Justice Cave summed up, and the jury found a verdict for the defendant. Judgment accordingly.

A NOTTINGHAM ARBITRATION.—Proceedings, which began on Wednesday week, were concluded on Tuesday at the Surveyors' Institution, before Mr. H. J. Dowden as umpire, and Mr. Elwell and Mr. E. W. Richardson as arbitrators, in which the executors of the late Mr. Richard Birkin claimed £3,300 from the Manchester, Sheffield, and Lincolnshire Railway Company in respect of the Royal Oak beerhouse, York-street, Nottingham, the site of which the company require for the construction of their new station at Nottingham. Mr. Atherley-Jones, in opening for the claimants, said the subject of the claim was let in 1891, on a repairing lease, to the Nottingham Brewery Company, with some other property, at an aggregate rental of £430 a year, there being a proviso that, if the railway were to acquire the Royal Oak, the aggregate rents of the other properties should be reduced to £330 a year. The Royal Oak was the most valuable property comprised in the lease, and its rent might be taken at £100. The capital value put on the property, £3,300, was a very moderate estimate. Mr. Coward, for the company, asserted that the total claim was highly inflated and the fixing of the rent at £100 ridiculous. He believed the clause in the lease as to the reduction of rent, if the company required the premises, was inserted with the full knowledge that the company was likely to take them, and therefore it had nothing to do with fixing the rent or value. The site of the house was 48 yards square in area, with a frontage of 13ft., the house was in very bad repair, and everywhere there was a tendency to sink. According to the other side, the Nottingham Brewery, who were the lessees, must be losing £74 a year on the leasing and releasing of the property. The company held that a fair rent would be £35 gross or £32 net, and capitalising that figure at 30 years' purchase, and adding the usual 10 per cent., they brought out the value to the freeholder at about £1,050. The umpire reserved his award.

TEMPORARY SEATING AND THE BUILDING ACT.—**VENNER V. M'DONNELL.**—In the Queen's Bench Division, last week, Mr. Justice Wills and Mr. Justice Wright heard an appeal in this case stated by a Metropolitan Magistrate for the opinion of the Court whether or not the appellant is compelled, whenever, for the purposes of an entertainment in the Agricultural Hall, he desires to erect portable seating, to give notice, under the London Building Act, to the district surveyor. It was suggested that, if such an obligation were imposed, it might extend to staging erected in a private house for a children's party, or on a gentleman's balcony abutting his drawing-room on some occasion of private entertainment. It was further pointed out that the Hall is licensed for music and dancing by the County Council, and that to confer this power upon the district surveyor would set up a dual control. Mr. Justice Wills asked Mr. Avory, who appeared for the respondent, whether he would apply the power claimed to an erection on the stage which enabled the hero and heroine to escape up the mountain side, followed by the shots of their pursuers. Mr. Avory replied that the district surveyor would not interfere in such a case if he acted on his advice. It was a mere coincidence that the County Council had licensed the hall for music and dancing, and they supported the district surveyor in this matter for the sake of the public safety, which rendered desirable a supervision of erections intended for them, so that there might not be a repetition of disasters, which had been frequent. The argument which followed was of a purely legal character, and was largely directed to the point how far the words "public occasion" could be extended. Mr. Justice Wills observed that a reasonable construction must be placed on

legislation dealing with these matters. If they were interpreted too widely, the Metropolis would not be fit to be lived in. Mr. Avory submitted that the seating in this instance was a structure within the meaning of the Act, and that the magistrate was right in so deciding. Mr. Macmorran, Q.C., for the appellant, broadly contended that such portable seating as that used in the Agricultural Hall could not be considered a structure within the meaning of the Act; it was a mere fitting or arrangement of the permanent building, and could not exist apart from the building. To hold otherwise would operate tyrannously, because in a case where the superficial area was so enormous as that of the Agricultural Hall, the fees would be something enormous. The Court reserved judgment.

A BADLY-DRAINED HOUSE.—**GREEN V. SYMONS.**—This action, heard by Mr. Justice Lawrence and a common jury on Dec. 15, in which the plaintiff claimed that he had been induced to rent a house which belonged to the defendant upon a warranty that it was well drained and dry, and that it turned out not to be in such a condition. The defendant denied that there was any such warranty, and asserted that the plaintiff took it after having fully inspected it. The plaintiff was a clerk to the Local Government Board, and the defendant was a lady who lived at Redhill. The plaintiff in 1894 lived in Angell-road, Brixton, and had seven children, who were fairly healthy, but not robust, and principally for the sake of their health and comfort he became desirous of living out of town. In March, 1894, he saw an advertisement as to the letting of Earlsbrook House, Earlswood, and went to see the house, of which the defendant was then in occupation, she and her family having lived there for many years. It turned out, according to the case for the plaintiff, that the house was damp and ill-drained, and his children became ill with diphtheritic sore throat, diarrhoea, tonsillitis, and so on, which it was suggested was a consequence of the condition of the premises. The case for the defendant was in direct conflict with that of the plaintiff. The house was built by Miss Symons's father 30 years ago; it stood upon clay, and was, therefore, probably not so dry as it would have been upon gravel, but the defendant and her family had never heard of any defective drainage. Mr. Green made himself thoroughly acquainted with the house before he took it, and he drew up the agreement of letting. This document said nothing whatever as to any warranty as to drainage and dryness; it contained the contract between the parties, and it was submitted that evidence as to things outside ought to be admitted as showing a contract between the parties. Beyond this there never was any warranty as to the condition of the premises. The jury, having heard a great deal of evidence, expressed their opinion that there was an oral warranty that the house was not damp and the drains were not defective. The verdict was for the plaintiff, damages £50.—This case came up for further argument on Friday, Mr. Robson, Q.C., who appeared for the defendant, having contended that judgment should be entered for the defendant. At the trial objection had been taken to any verbal evidence being given in respect of the warranty, because as there was a written agreement it was not admissible. The learned judge, however, directed the jury that the warranty was a collateral agreement which could be given evidence. Mr. Robson, Q.C., cited the following cases in support of his former contention:—"Lougman and wife v. Blount and wife," "Kennard v. Ash," "Butler v. Goundry," "Burton v. Bianchi," "Angell v. Duke," and "Saunders v. Pauley." There could be no term which more required to be put into writing than a warranty of this kind. There was no authority to show that an allegation of the existing facts could be taken to be part of the contract. This was quite a different thing from a promise to do something. Mr. E. de Witt, for the plaintiff, cited "Allen v. Pink." He also pointed out that the action was one for tort and not one for contract, and urged that therefore the evidence was admissible. Mr. Justice Lawrence stopped him and said he would enter judgment for the plaintiff, but would grant a stay of execution to give an opportunity for appeal if the defendant desired to do so.

LLANDUDNO ANCIENT LIGHTS CASE.—**BROOMFIELD V. WILLIAMS.**—In the Chancery Division of the High Court of Justice, before Mr. Justice Kekewich, this action came on for hearing last week. It was one brought by the plaintiff, who is the owner of a semi-detached house at Llandudno, to restrain the defendant, the owner of adjoining land, from interfering with the light coming to the plaintiff's house. It was stated by plaintiff's counsel that the action was not founded upon any claim for ancient lights, but was rather founded upon implied obligation, covenant, or contract. At the time of the conveyance of the plaintiff's house, the piece of adjoining land over which the plaintiff claimed a right of light was known to both parties as building land. The other houses in the same road and neighbourhood had been built in such a way that there was at the least 8ft. between the several houses where there were windows in the gable

end, and the plaintiff's claim was that, having regard to the facts and circumstances, he was entitled to have a passage on the defendant's side of his boundary wall, equal in width to the passage which now existed between the boundary wall and other houses. The defendant had built his house at a depth of 14ft. 8in. from back to front against the boundary wall. The consequence was that between the plaintiff's window on the ground floor and the wall built opposite there was a distance of only 6ft. 3in. Mr. Justice Kekewich thought that there was a substantial interference with the access of light to the plaintiff's house. Evidence having been called in support of the defendant's case, Mr. Justice Kekewich, in the result, held that the plaintiff's case failed, and gave judgment for the defendant, with costs.

ARCHITECT'S PROPERTY IN PLANS.—**RANSOME V. DE CASTRO.**—In this case, heard at the Westminster County Court on Dec. 15, before Judge Lumley Smith, Q.C., his Honour said that the plaintiff, an architect, made plans and obtained tenders for two cottages which the defendant was willing to erect at a cost not exceeding £400. The tenders exceeded that sum, and the cottages were not built. The plaintiff received from the defendant the 3 per cent. on the lowest tender, which was the ordinary remuneration for what he had done. Some five years afterwards the plaintiff, at the defendant's request, obtained a fresh tender, without result. He also made some slight alterations in the plans. He then suggested to the defendant that, for the purposes of economy, a builder might be trusted to do the work under the control of the district surveyor, without the supervision of an architect, in which case he would charge the builder two guineas for a set of tracings. This was not agreed to at the time; but eventually a builder volunteered to the defendant to do them for £400. The defendant applied to the plaintiff for the plans and specifications, and the plaintiff supplied copies, but sent with them a claim for two guineas. The defendant replied that as he had paid the defendant for making the drawings they were his property, and though he was willing to accept copies instead of the original drawings, he would not pay for them. When the plaintiff commenced his action he limited his claim by his particulars to two guineas for making alterations in the drawings and specifications, but those alterations were unsubstantial, and there was no promise, either express or implied, on the part of the defendant to pay anything for them. The claim therefore failed.

EXTRAORDINARY TRAFFIC.—Before the Master of the Rolls and Lord Justices Lopes and Rigby, judgment was given, on Friday, in an appeal of Lord Gerard against a judgment of a Divisional Court, reversing a decision of the East Kent Quarter Sessions. Lord Gerard, in 1893 and 1894, was carrying on building operations at Eastwell-park, which involved excessive traffic by traction-engines along the high road. The Kent council made a claim at petty sessions for damage done to the highway by this traffic, and the justices decided that Lord Gerard was liable to pay £750 for damage thus done. The Quarter Sessions, on appeal, decided that Lord Gerard was not liable. This finding was reversed by the Divisional Court, which restored the order of the Petty Sessions. Lord Gerard appealed, and their lordships now allowed the appeal, Lord Justice Lopes dissenting.

IS A GAS-ENGINE A CHATTEL OR A FIXTURE?—In the Court of Appeal, on Saturday, judgment was given by the Lord Chief Justice and Lords Justices Lindley and A. L. Smith in an appeal, "Hobson v. Gorringe," from a decision of Mr. Justice Kekewich. The question involved was as to the right of the vendor, under a hire and purchase agreement of a gas-engine which he had allowed the purchaser to affix to his land, to recover possession thereof, on the failure of the purchaser to pay the stipulated instalments, as against a mortgagee in possession of the land. Mr. Justice Kekewich decided in favour of the defendant, the mortgagee in possession, and their Lordships, holding that, as a fixture, the gas-engine had ceased to become a chattel, and had become a part of the freehold, affirmed this decision, and dismissed the appeal, with costs.

THE RESPONSIBILITIES OF HOUSE OWNERS.—At the Salford Hundred Court of Record last week, before Mr. H. G. Shee, Q.C., judge, William Skerratt and his wife, living in Portugal-street, Oldham-road, sought to recover £50 from the Refuge Assurance Company, Limited, for injuries received by Mrs. Skerratt in consequence of the company's alleged negligence. The plaintiffs recently occupied the house, No. 2, Vale-street, Oldham-road. The defendant company owned a house and ventilating shaft connected therewith in No. 2, Walker-street, the back of which was opposite the back yard of the plaintiff's house. It was shown in evidence that whilst Mrs. Skerratt was in the yard of her own house the ventilating shaft fell partly into the yard, knocked her down, and injured one of her arms. It was alleged that the shaft was dilapidated and partly decayed. The

defendant company, while denying some of the allegations, paid £10 into court as an alternative. Medical evidence showed that the plaintiff had sustained partial paralysis of the arm. For the defence, it was stated that two days after the accident the plaintiff paid rent to the company's agent, and at that time made no complaint of having been hurt or of the shaft having fallen. On behalf of the company, medical men had examined the plaintiff's arm, and they were of opinion that she was not suffering from any injury. The jury awarded £25 damages to the plaintiffs.

LOCAL AUTHORITIES' RIGHT TO REJECT PLANS.—The case of *Smith v. The Chorley District Council* was before Mr. Justice Kennedy in the Queen's Bench Division on Friday for further consideration. The action was brought by a builder at Chorley for a mandamus to compel the Council to pass the plans of a house in Back-lane, Chorley. The District Council declined to pass the plans on the ground that if the house was built it would make the street 24ft. wide instead of 36ft. 6in., which was the minimum width allowed by the by-laws. The plaintiff contended that Back-lane was not a new street. The case was tried before Mr. Justice Kennedy and a special jury at the last Manchester (resumed) Assizes, when the jury found that Back-lane was not a new street. The counsel said that a writ of mandamus was not the proper remedy which was the point to be argued. Mr. Sutton, on behalf of the plaintiff, asked for judgment on the finding of the jury. His Lordship intimated that he should reserve judgment.

CHIPS.

On January 1 the L. and S.W. Railway Company will open for traffic the extension of railway from Plymstock to Turnchapel. The line is a little over a mile in length, and there will be a small intermediate station at Oreston.

The directors of the Redheugh Bridge Co. have decided to rebuild their suspension bridge over the Tyne, connecting the western districts of Newcastle and Gateshead, in accordance with plans by Messrs. J. Watt Sandeman and Moncrieff, of St. Nicholas-buildings, Newcastle. The new bridge is to consist of two spans, each of 248ft. centres of bearings; two spans each of 168ft. centres of bearings, and eleven spans each of from 27ft. to 29ft. centres of bearings, together with cylinder foundations, steel braced river piers, steel gas and water mains. Tenders are now invited for the work, which will include the removal of the existing bridge.

The urban district council of Heaton Norris, near Manchester, decided on Friday to purchase land in Thornfield-road, Heaton Moor, for £1,226, as a site for their proposed new offices.

The Indian Government have just placed with two Staffordshire firms an order for 120 miles of wire fencing. This is believed to be the heaviest order of the kind that has ever been given out by a Government department. The barbed wire will be supplied by a North Staffordshire firm, and the iron rails by a Wolverhampton firm, who, in order to complete the contract, will be kept busily employed until April.

A new free library is being erected at Hampstead, and special consideration has been given to ventilation, which will be carried out entirely on the Boyle system.

The new parochial hall, which has been erected in close proximity to Shawford Railway Station, Hants, was opened on Wednesday week. The hall was designed by Mr. J. B. Colson, F.R.I.B.A., of Winchester, a member of the Compton Parish Council, and has been erected at a cost of about £600 by Mr. Bascombe, of Winchester.

At a meeting of the Scottish Faculty of Advocates, held at Edinburgh, on Friday, a letter was read from Mr. Lockhart Thomson, S.S.C., offering a medallion of Scott for the acceptance of the Faculty for erection in the hall of the Parliament House, or other suitable place. The Faculty accepted the gift on the conditions stated, and appointed a committee to fix where the medallion should be placed, and to report.

Our New South Wales exchanges announce a marked revival of the building trades in Sydney and surrounding districts, it being reported that large buildings, villas, houses, and shops are in course of erection in every suburb of that capital.

At a special meeting of the City Churches Preservation Society, held on Tuesday, it was reported that the Parliamentary notices for the demolition of St. Mildred's Church in Bread-street, for the purposes of the Electric Railway, had been served upon the authorities, as well as on the owners of adjacent property scheduled, and in nearly every case a dissentient reply had been returned. It was arranged that a joint conference of the members of Parliament and of the council of the society should be held at the end of January to arrange joint action in opposing the scheme.

Our Office Table.

A *SMOKING conversation* was held by the Society of Architects in their meeting-room in St. James's Hall, Piccadilly, on Thursday evening in last week. Mr. Henry Lovegrove, vice-president, occupied the chair at the preliminary business meeting, at which it was decided to send a letter of condolence to the widow of the late Mr. Walter Thomas, of Southampton, and formerly borough engineer of Dover, who had been a member of the Society since 1885. The following eleven architects were elected as members:—Frank Thomas Cawthorn, 33, New-road, Brighton; John Hoy Dunn, 17, Oxford-street, Stroud Green, N.; William Duval Goodwin, 14, Great St. Thomas Apostle, Queen-street, E.C.; William Ernest Knapman, 2, Sea View-road, Barry Dock; Frank Morton Palmer, jun., "Wilderswood," Horwich, Lancashire; David Angus Ross, 7, Charlwood-road, Putney, S.W.; John Daniel Swanston, 196, High-street, Kirkcaldy; William Rice Symons, Poplar House, Topsham, Devon; John Cyril Thompson, 13, Kingsdown Parade, Bristol; Charles George Williams, Weyside Villa, South-street, Farnham, and Tom Woolnough, 17, Bryanston-road, Crouch End, N. An informal conversational discussion on topics of interest to the Society, including the Registration question, and the recent tests of brickwork piers carried out by the Sheffield Society of Architects and Surveyors and a R.I.B.A. sub-committee, followed.

On Thursday, January 14, a general assembly will be held at Burlington House for the purpose of choosing an Academician and two Associates. The first election, that of an Academician, is likely to result in the return of one of the senior associates, Mr. B. Williams Leader, the landscape painter. Mr. Leader, who was defeated by only three votes at the election last November, has on several previous occasions been within an ace of victory. Mr. E. J. Gregory also has many supporters. The chief interest of the January elections will, however, centre in the choice of the Associates. In this connection the names of Mr. Alfred East, Mr. Alfred Parsons, and Mr. A. S. Cope have been suggested. All have received votes in former elections.

SEVERAL additions have just been made to the pictures in the British Section of the National Gallery. The pre-Raphaelite work, "The Last Day in the Old Home," by Robert B. Martineau, exhibited at the Academy in 1862, has been presented by the artist's brother, Mr. E. H. Martineau, and will eventually be hung in the Tate Gallery. A still more important gift is a series of six works by Gainsborough, presented by the Misses Lane, daughters of the well-known engraver, the late Richard J. Lane, R.A., a grand-nephew of the painter. They consist of a life-size oval portrait, in brilliant condition, 29in. by 24in., of one of Gainsborough's daughters, the head nearly in profile; a portrait of two dogs, Tristram and Fox; two small landscapes of woodland scenes, each 9in. by 7in.; and two sketches in monochrome. The Misses Lane have also presented a small bust full-face portrait of Gainsborough by Zoffany. Out of the Lewis Fund have been purchased for the Gallery a "Winter Scene on the Ice," by Hendrick van Avercamp, and a portrait of Gilbert Stewart, the American artist, by himself.

THE London County Buildings Bill deposited this week recites that the Council have no central office or premises adequate for the conduct of their administrative business, and no sufficient accommodation for their officers and staff: that it is impossible to provide at the present premises of the Council and adjoining buildings such accommodation, and that the business of important departments is necessarily conducted in such scattered houses as can be procured in different streets. Estimates have been prepared by the Council as to the amount which they will require to expend for the purposes of the Act, and these estimates amount to £851,000. A clause in the Bill proposes that if, and when, the Commissioners of her Majesty's Works decide to form a new thoroughfare between St. James's Park and Charing Cross on the southern side of the land proposed to be utilised as a site for county buildings and offices, it shall be lawful for the Council to enter into agreements with the commissioners with respect to the formation of such thoroughfare, and to grant or

convey for that purpose any portion of the lands acquired by them, and effect exchanges of such land or any part thereof with the commissioners.

A REPORT by the special committee, consisting of the chairman, vice-chairman, and deputy chairman of the Council, appointed to inquire into the allegations made by Mr. Burns, M.P., against Mr. Walter Emden, was brought up at Tuesday's meeting of the London County Council as a matter of urgency. Mr. Burns had stated in the Council that Mr. Emden had suggested to the Highways Committee that they should make use of artificial stone in place of natural stone in the erection of a wall round the Victoria Embankment stoneyard under the Charing Cross Railway Bridge, for "the good and sufficient reason that up to March, 1896, he (Mr. Emden) held 145 shares in an artificial stone paving company." The committee say in their report that Mr. Emden came before them and made a full statement, and they also heard several other parties on the subject. Mr. Emden admitted that he recommended a particular artificial stone to the Highways Committee, and that he did not inform any of the members of the Council, or the assistant engineer, of his connection with the company that would supply it. His recommendation of the artificial stone was made in the autumn of 1895, at which time he was chairman of the company in question. The recommendation so given was acted upon, and the material was found to be satisfactory as well as economical, effecting a considerable saving on the price of Portland stone. Mr. Emden has informed the committee that in November, 1895, when there was likelihood of an order for artificial stone from the Council, he renewed to his colleagues in the company the desire he had previously expressed to get rid of his shares. He was willing to part with them at a reduced value, so that he might be free from any complication. The result was that in March last the shares were so transferred. The committee conclude by saying:—"The order [amounting to £240 9s. 6d.] involved a profit of £14 4s. 3d. to the company, and the Council's order was announced on the trade cards used by the company's agents and travellers. We are satisfied that the economic interests of the Council have not suffered; we believe that Mr. Emden had a genuine conviction as to satisfactory character of the material; but we regret that Mr. Emden did not disclose to his colleagues on the Council, with whom he was in active communication, that he was interested in the artificial stone which he recommended to the highways committee." After some discussion, in which Mr. Emden expressed his regret that it did not occur to him to tell the Council or the committee that he was interested in the stone he recommended, the report was adopted.

THE Marquis of Bute, who recently had the remains of the Black Friars' Monastery in the grounds of Cardiff Castle unearthed and restored in outline, has recently commissioned Mr. C. B. Fowler, F.R.I.B.A., of Cardiff, to explore the still more obscure traces of the Grey Friars' Monastery, founded a generation later in the same Castle gardens in the area now bounded by Queen-street and the dock "feeder." The exact position of the establishment and its gate were till recently unidentified, but when excavations were begun numerous walls were struck about 2ft. 6in. below the surface, the ancient ones being crossed by more modern ones. When trenching on the outside of the monastery, the angle of one of the pier foundations of the nave at the church was found, and following up this clue it has been possible to lay bare the whole ground plan of the church, while sufficient mullions, columns, bases, and capitals, window heads, &c., have been disinterred to give a clear idea of the style of the work. The church consisted of a nave, with north and south aisles, and a large chancel, 30ft. wide, the total length being 180ft., and the width across aisles 62ft. Over thirty skeletons, some in a very perfect state, were unearthed inside the walls of the church. Lord Bute has decided to mark the position of the old walls by building walls upon the old foundations in buff and grey bricks, 18in. above ground, in a similar way to the Black Friars' Monastery, which is now completed.

At the Carpenters' Hall, on Tuesday night, Major-General Sir John F. D. Donnelly distributed the prizes gained by the students of the Trades Training School at 155, Great Titchfield-street, and also the certificates and medals awarded in connection with the Carpenters' Company's

examination in sanitary building construction and in carpentry and joinery. The Master of the Carpenters' Company (Mr. Jesse Jacob) presided. Professor Banister Fletcher, F.R.I.B.A., said that the work of technical instruction carried on by the Carpenters' Company at their hall included popular lectures on subjects principally connected with carpentry, architecture, and engineering. In every respect these lectures had been a great success. Their lending and reference library was greatly appreciated, as was also their museum, which, he believed, was the most complete of its kind in London. In their work at Great Titchfield-street they were associated with five other City Companies, representing different branches of the building trade, and the Institute of British Wood Carvers. The associated companies were delighted with the progress that the school had made during the short time it had been established. At the end of the last term there were no fewer than 285 individual students belonging to the various classes. After the distribution of prizes, Sir John Donnelly congratulated the prize winners, especially Mr. H. Smith, who carried off the gold medal. He understood that the classes at the Great Titchfield-street School were only open to persons actually employed at a particular trade. Whether that was a wise restriction was, he thought, open to consideration. There were many young men, such as the articulated pupils of architects, to whom an acquaintance with the various branches of the building trade was necessary, and he thought there was a good deal to be said in favour of throwing open the classes to them.

THE annual distribution of prizes to the students attending the architectural and engineering schools in connection with the Regent-street Polytechnic took place on Tuesday evening in the large hall of the institution. Mr. Alfred Waterhouse, LL.D., R.A., the president of the Polytechnic School of Architecture, made the distribution. He said he found that he had not only to hand prizes to the students of the architectural and engineering classes, but also to distribute about 600 marks of distinction to those who had taken the foremost places in the allied studies which had met with so much success in that institution. He was much gratified at observing the quality of the instruction given there and its lucid thoroughness. He could not help contrasting the present state of things with that which prevailed half a century ago, when he was a student seeking for information. At that time he was not able to get any regular instruction in architecture, but was obliged to pick up a scrap and a crumb here and there. Now everything was changed, and for the better. Students at the present time only wanted a certain amount of enthusiasm to succeed. He urged them to persevere in their studies for the sake of the credit of the institute, and advised them to pass the examinations of the Royal Institute of British Architects.

THE origin of the plumber was discussed by Professor Glaister, of St. Mungo's College, Glasgow, in a paper on "The Evolution of Sanitation in Relation to the Plumber," read a few nights since before the members of the Edinburgh Branch of the National Registration of Plumbers. An interesting study, he said, was afforded by the origin of new occupations in the advance of mankind from the primitive to the civilised, and not the least interesting aspect of the study was that presented by plumbing. Very early in the history of the world references were found to those who worked in metals—Tubal Cain was the first recorded example—and it would appear as if the ancients were particularly well acquainted with lead and its properties. The division of crafts in metals would be conjectured to begin with this metal because of its plasticity and obvious utility, and the lead-worker became literally a plumber—the Latin *plumbum* signifying lead—although, as a matter of fact, he was also an artificer in brass, iron, and zinc. Probably the earliest occupation was that of the builder, but as architecture became more ambitious in its designs, and the arts of the carpenter and mason were found insufficient to make fabrics watertight, the plumber found his occupation, first in laying leaden roofs, afterwards in fitting pipes in some of the principal buildings which sprang up in the palmy days of Rome, and further in connection with those giant aqueducts which, as at Lyons and Rome, attest the engineering and sanitary achievements of the ancient Romans. With these as a starting point, Professor Glaister traced the career of the

plumber through the ages to the modern era of sanitation and scientific plumbing.

THE German Consul in Vancouver, British Columbia, in a recent report states that Vancouver now possesses twelve large saw-mills. Although the innumerable forests of British Columbia are rich in conifers of various kinds, there are only three the timber of which is exported, the Douglas pine, the giant cedar, and the spruce fir. The first of these is the main object of export; it is shipped to all parts of the world, and forms a serious rival to Norwegian timber. The Douglas pine is chiefly used for masts, on account of its combining with great strength the requisite height and elasticity; it is also used for bridge-building and railway carriage making. In the form of masts it attains a height of 120ft., with a diameter of 28in. Cedar is mainly used for the manufacture of doors and windows; Japan imports it largely for the production of lead pencils. The wood of the spruce fir gives excellent timber for chests, and is largely shipped to Australia for that purpose. Of the total area of British Columbia, 75 per cent. is forest land.

A RETURN has just been issued giving the following list of those buildings of architectural and historic interest in the United Kingdom, of which the structure and fabric are maintained by the War Office:—North-Western District: Carlisle Castle, Chester Castle (a portion of). North-Eastern District: Tynemouth Castle and Priory; Clifford's Fort, North Shields; Richmond Castle; Holy Island Castle, Scarborough Castle. Eastern District: Abbey House, Colchester, gateway and wall; Weedon: three pavilions erected at the beginning of the present century as a palace. Thames District: New Tavern Fort (Chantry), Gravesend; Tilbury Fort. Home District: Tower of London; Hampton Court Old Barracks; Kneller-hall, Hounslow. Southern District: Round Tower, Point Battery, Portsmouth; Semaphore Tower, north-west end of Saluting Battery, Portsmouth; Garrison Chapel, Portsmouth; Southsea Castle; Lion, Landport, and King James's Gates; Calshot Castle; Hurst Castle; Yarmouth Castle, Isle of Wight; Portland Castle. Western District: Plymouth Citadel; Pendennis Castle; St. Mawes Castle; Dartmouth Castle; Fowey Coast Battery; Monmouth Castle. South-Eastern District: Dover Castle; Walmer Castle; Deal Castle; Foundation of Church of Knights Templars, St. Martin's Priory, Dover; Bredenstone in Drop Redoubt, Dover. Woolwich: Rotunda. North British District.—Berwick-on-Tweed Ramparts; Edinburgh Castle; Blackness Castle; Dumbarton Castle, Stirling Castle; Broughty Castle. Ireland: Carrickfergus Castle; Enniskillen Castle; Dungarvan Barracks, wall and two towers erected in the reign of King John; Duncannon Fort, part of wall and small tower; Roscrea Castle; Limerick Castle; Clare Castle; Cat Fort, Cork; Elizabeth Fort, Cork; Charles Fort, Kinsale; Cave Fort, Queenstown; Carlisle Fort, Cork; Athlone Castle; Galway Castle Barracks; Cromwell's Tower, Galway.

Trade News.

WAGES MOVEMENTS.

THE PENRHYN SLATE QUARRIES.—There is at length a prospect of change in the situation, as the strike committee and quarrymen's union decided at a meeting, held on Monday night, to meet the requirements of the Board of Trade, so as to expedite arrangements for negotiations. The quarries continue practically closed, and there is no notification when the Conciliation Act will be brought into practical operation. The strike entered on Tuesday upon its twelfth week, and the loss in wages must exceed £60,000, not to speak of the number of men who have elsewhere been thrown out of employment owing to contractors being unable to obtain slates.

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LATEST PRICES.

IRON, &c.

	Per ton.	Per ton.
Rolled-Iron Joists, Belgian.....	£5 5 0 to	£6 0 0
Rolled-Steel Joists, English.....	6 0 0 "	6 10 0
Wrought-Iron Girder Plates.....	6 15 0 "	"
Bar Iron, good Staffs.....	7 0 0 "	7 5 0
Do., Lowmoor, Flat, Round, or Square.....	17 0 0 "	17 10 0
Do., Welsh.....	5 15 0 "	5 17 6

Boiler Plates, Iron—

South Staffs.....	7 16 0 "	8 0 0
Best Snedshill.....	9 0 0 "	"
Angles 10s., Tees 20s. per ton extra.		

Builders' Hoop Iron, for bonding, &c., £6 10s. 0d. per ton.
Builders' Hoop Iron, galvanised, £13 10s. 0d. per ton.
Galvanised Corrugated Sheet Iron—

	No. 18 to 20.	No. 22 to 24.
6ft. to 8ft. long, inclusive	Per ton.	Per ton.
gauge.....	£10 15 0	£11 0 0
Best ditto.....	11 5 0	11 10 0

	Per ton.	Per ton.
Cast-Iron Columns.....	£5 10 0	£8 10 0
Cast-Iron Stanchions.....	5 10 0 "	8 10 0
Cast-Iron Sash Weights.....	—	4 2 6
Cast-Iron Socket Pipes—		
3in. diameter.....	4 10 0 "	4 15 0
4in. to 6in.....	4 5 0 "	4 10 6
7in. to 24in. (all sizes).....	4 0 0 "	4 2 6

[Coated with composition, 2s. 6d. per ton extra; turned and bored joints, 5s. per ton extra.]

	Per ton.
Pig Iron, Lilleshall.....	105s. to 110s.
Hot Blast, ditto.....	57s. 6d. to 62s. 6d.

	75p.c. Fittings 77p.c.
Wrought-Iron Tubes—Discount off Standard Lists f.o.b.	
Gas-Tubes.....	70 "
Water-Tubes.....	72 1/2 "
Steam-Tubes.....	62 1/2 "
Galvanised Gas-Tubes.....	60 "
Galvanised Water-Tubes.....	55 "
Galvanised Steam-Tubes.....	45 "

	10cwt. casks. 5cwt. casks.
Sheet Zinc, for roofing and working up.....	£21 5 0 to £21 10 0
Sheet Lead, 3lb. per sq. ft. super.	12 15 0 "
Pig Lead, in 1cwt. pigs.....	11 13 9 "
Lead Shot, in 25lb. bags.....	15 0 0 "
Copper Sheets, sheathing and rods.....	55 0 0 "
Copper, British Cake and Ingot.....	52 0 0 "
Tin, Straits.....	50 15 0 "
Do., English Ingots.....	63 10 0 "
Spelter, Silesian.....	17 0 0 "

	Per ton.	Per ton.
Cut Clasp Nails, 3in. to 6in.....	8 5 0 "	"
Cut Floor Brads.....	8 0 0 "	"

	B.W.G.
Wire Nails (Points de Paris)—	
0 to 7 8 9 10 11 12 13 14 15	per cwt.
8 6 9 0 9 6 10 3 11 0 12 0 13 0 14 3 15 3	

TIMBER.

	per load £11 0 0 to £16 0 0
Teak.....	"
Quebec pine, red.....	"
" yellow.....	2 5 0 "
" pitch.....	"
" Oak.....	5 0 0 "
" Birch.....	3 5 0 "
" Elm.....	3 10 0 "
" Ash.....	2 15 0 "
Danish and Memel Oak.....	2 10 0 "
" Fir.....	2 5 0 "
Wainscot, Riga p. log.....	2 5 0 "
Lath, Danish, p.f.....	4 10 0 "
St. Petersburg.....	5 0 0 "
Greenheart.....	8 10 0 "
Sequoia, U.S.A., per cube foot.....	0 2 0 "
Mahogany, Cuba.....	0 0 4 1/2 "
" Honduras.....	0 0 5 "
Cedar, Cuba.....	0 0 4 1/2 "
" Honduras.....	0 0 4 1/2 "
Walnut, Italian.....	0 0 3 1/2 "

Deals, per St. Petersburg Standard, 120—12ft. by 1 1/2 in. by 1 1/2 in.:

Quebec, Pine, 1st.....	£21 10 0 to £23 10 0
" 2nd.....	15 0 0 "
" 3rd.....	7 0 0 "
Canada Spruce, 1st.....	8 10 0 "
" 2nd and 3rd.....	7 5 0 "
New Brunswick.....	7 5 0 "
Riga.....	6 10 6 "
St. Petersburg.....	8 0 0 "
Swedish.....	8 0 0 "
Finland.....	8 10 0 "
White Sea.....	9 10 0 "
Battens, all sorts.....	5 0 0 "

	per square of lin.:
Flooring Boards, 1st prepared.....	0 9 6 "
2nd ditto.....	0 8 0 "
Other qualities.....	0 6 0 "

	per standard M:—
Quebec pipe.....	—
U.S. ditto.....	35 0 0 "
Memel, cr. pipe.....	225 0 0 "
Memel, brack.....	200 0 0 "

OILS.

	per ton £15 10 0 to £16 10 0
Linseed.....	"
Rapeseed, English pale.....	27 10 0 "
Do., brown.....	27 0 0 "
Cottonseed ref.....	15 17 6 "
Olive, Spanish.....	29 0 0 "
Seal, pale.....	23 0 0 "
Cocoonut, Cochon.....	28 0 0 "
Do., Ceylon.....	24 0 0 "
Palma, Lagos.....	24 10 0 "
Oleine.....	19 0 0 "
Lubricating U.S.....	0 6 3 "
Do., black.....	0 4 9 "
Tar, Stockholm.....	1 0 0 "
Archangel.....	0 12 6 "
Turpentine, American.....	22 7 6 "

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TENDERS.

Correspondents would in all cases oblige by giving
the addresses of the parties tendering—at any rate, of the
accepted tender: it adds to the value of the information.ABERDEEVEY.—For laying pipes from the old to the new
reservoir, for the urban district council:—
Hughes and Edwards (accepted).BICKLEY, KENT.—For the erection of stable at Shaw-
field Park, for Mr. Gilbert Wood. Mr. Percy B. Strud-
wick, Bromley, Kent, architect:—

Grady, T. D.....	£442 10 0
Harmer, R.....	415 0 0
Podger, J., and Sons (accepted).....	303 5 0
BRACKNELL.—For two shops, houses, &c. Mr. A. E. Sidford, M.S.A., Wokingham, architect and surveyor:—	
Satchwell, W., Stanwell, Staines.....	£1,475 0 0
Stokes, W., Reading.....	1,249 0 0
Hughes, E. C., Wokingham.....	1,244 4 0
East, G., Binfield.....	1,240 0 0
Seward, J. B., Wokingham.....	1,237 0 0
Martin, J., Addlestone.....	1,175 0 0
Clark, H., Bracknell.....	1,175 0 0
May, W., Bracknell (accepted).....	1,145 0 0
Hawkins, W., Reading.....	1,115 0 0
Rack, E., Sunningdale.....	1,099 0 0

(Architect's estimate, £1,148.)

CARDIFF.—For the erection of Presbyterian schools,
Roath Park, Cardiff. Messrs. Habershon and Fawcner,
Pearl-street, Cardiff, and 41, High-street, Newport, archi-
tects. Quantities by the architects:—

Allen, J.....	£2,247 0 0
Cox and Bardo.....	1,947 0 0
Howell, A. J., and Co.....	1,920 0 0
Thomas, W., and Co.....	1,897 0 0
Haywood, G.....	1,892 0 0
Turner, E., and Sons.....	1,848 0 0
Edmunds, F. J.....	1,842 0 0
Knox and Wells (accepted).....	1,838 0 0

All of Cardiff.

CARDIFF.—For erecting the Hayes Market buildings,
for Messrs. G. Rees and Co., Ltd. Messrs. J. P. Jones,
Richards, and Budgen, architects:—
Thomas, W., and Co. (accepted)..... £5,123 0 0
(Lowest tender received.)DULWICH.—For cleaning, Dulwich Hamlet School, for
the London School Board:—

Smith, W.....	£233 0 0
Kemp, G.....	90 0 0
Holliday and Greenwood.....	79 0 0
Mid-Kent Building and Contracting Works, Limited.....	72 0 0
Mallett, H.....	70 10 0
Maxwell Bros., Limited.....	65 0 0
Bowyer, J. and C.....	55 0 0
Somerford, H. S., & Son (accepted).....	43 0 0

CARDIFF.—For the erection of a sanitary steam laundry,
Roath Park, Cardiff, for the Cardiff Steam Laundry Co.,
Ltd. Messrs. Habershon and Fawcner, Pearl-street,
Cardiff, and 41, High-street, Newport, architects.
Quantities by the architects:—

	A.	B.	C.
Beer and Sons, Cardiff.....	£7,000 0 0	£1,500 0 0	£8,500 0 0
Evans Bros. and Co., Cardiff.....	6,525 16 0	1,515 10 0	8,041 6 0
Howell, A. J., and Co., Cardiff.....	6,157 0 0	1,485 0 0	7,642 0 0
Haywood, G., Cardiff.....	6,150 0 0	1,350 0 0	7,500 0 0
Cox and Bardo, Cardiff.....	5,850 0 0	1,227 0 0	7,077 0 0
Gibbon, H., Cardiff.....	5,550 0 0	1,300 0 0	6,850 0 0
Dunn, C. C., Cardiff.....	—	—	6,704 5 8

Cadwallader and Hockridge, Cardiff.....	5,453 10 0	1,220 10 0	6,674 0 0
Knox and Wells, Cardiff.....	5,350 0 0	1,260 0 0	6,610 0 0
Symonds, W., Cardiff.....	—	—	6,400 0 0

Turner, E., and Sons, Cardiff.....	5,068 0 0	1,088 0 0	6,156 0 0
Thomas, W., and Co., Cardiff (accepted).....	4,997 0 0	1,150 0 0	6,147 0 0
Jones and Maddren, Cardiff.....	4,550 10 6	1,370 10 0	5,921 0 6

A.—Laundry. B.—Stables and Boundary Walls.

C.—Total.

FELIXSTOWE.—For making-up Constable-road, for the
Felixstowe and Walton Urban District Council. Mr.
G. S. Horton, surveyor:—

Hobman and Co., London.....	£1,660 0 0
Double, G.....	1,654 4 6
Moran, J., and Son, Dovercourt.....	1,427 0 0
Rackham, G.....	1,290 0 0

GOLCAR.—For additions, &c., to school buildings,
Clough Head, for the Golcar School Board. Mr. Joseph
Berry, 9, Queen-street, Huddersfield, architect and sur-
veyor:—Masons:—A. and T. Haigh, Golcar.
Joiners:—J. Varley and Son, Slaithwaite.
Plumbers and slaters:—T. Allison, Ltd., Milnsbridge.
Plasterer and painter:—D. Shaw, Golcar.
Concrete, wood-block flooring, and stone macadam
asphalte:—J. Cooke, Little Royd.
(Total, £1,100.)HAVERSTOCK HILL.—For providing additional staff
accommodation at the North Western Fever Hospital, for
the Metropolitan Asylums Board:—
Wall, H., and Co., Kentish Town £8,900 0 0
(Accepted.)LEEDS.—For the supply of 400 turned and polished
balusters and other granite masonry in the improvement
of City-square, for the city council. Mr. W. Bakewell,
F.R.I.B.A., Leeds, architect:—McIntosh, J., Lorne Granite Works,
Aberdeen (accepted) about £4,000 0 0LLANILTHELLO.—For excavating and the erection of
retaining walls at Llanilthello, Mon., on the site of the
proposed new hotel. Mr. C. Telford Evans, 8, Queen-
street, Cardiff, architect:—Parfitt, A. E., Newport, Mon. £1,455 0 0
(Accepted.)LONDON.—For alterations, &c., to The Grapes p.h.,
St. Mary-axe, E.C., for Mr. W. C. Gilling. Mr. William
G. Ingram, M.S.A., 44, Theobald's-road, Bedford-
row, W.C., architect:—Maxwell Bros. (accepted)..... £433 0 0
(Lowest of four tenders received.)LONDON.—For alterations, &c., to the Ingleby Arms
p.h., Grove-road, Holloway, for Mr. T. Letchford. Mr.
William G. Ingram, M.S.A., 44, Theobald's-road, Bed-
ford-row, W.C., architect:—

Harris, F. W. (accepted)..... £349 0 0

LONDON.—For alterations, &c., to the Unwin Arms p.h.,
Turnpike-lane, Hornsey, for Mr. W. C. Edmonds. Mr.
William G. Ingram, M.S.A., 44, Theobald's-road, Bed-
ford-row, W.C., architect. Quantities by Mr. F. G. W.
Buss:—

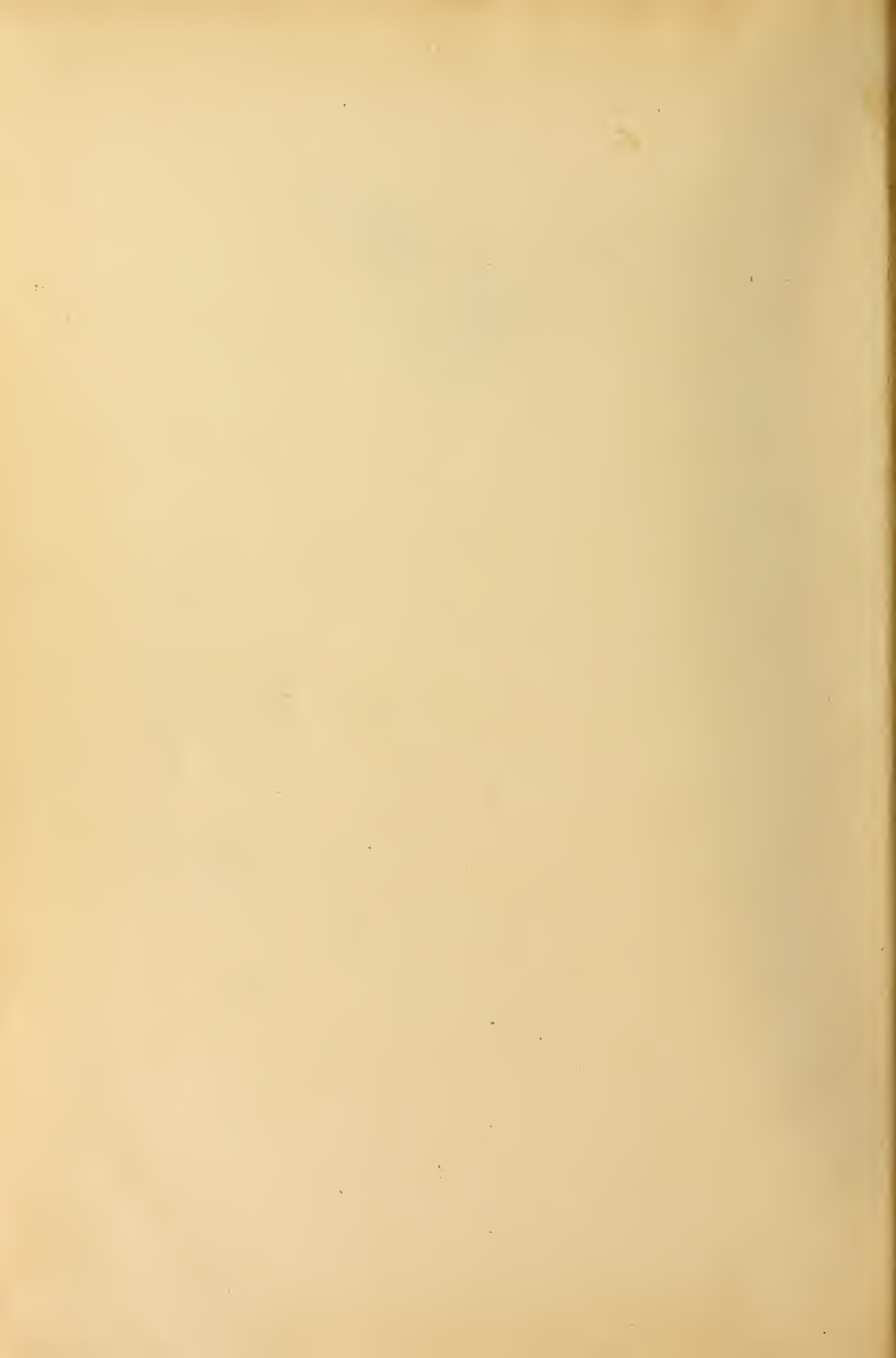
Sabey and Son.....	£2,580 0 0
Antill and Co.....	2,474 0 0
Mattcock Bros.....	2,033 0 0
Lascelles and Co.....	2,030 0 0
Maxwell Bros.....	2,000 0 0
Diamond and Porter.....	1,997 13 0
Whitehead and Co.....	1,975 0 0
Prestige and Co. (accepted).....	1,960 0 0

LONDON.—For alterations, &c., to the Drapers' Arms
p.h., Barnsbury-street, N., for Mr. H. W. Wibrow. Mr.
William G. Ingram, M.S.A., 44, Theobald's-road, Bedford-
row, W.C., architect:—

Saby and Son.....	£953 0 0
Rowe, W.....	940 0 0
Prestige and Co.....	898 0 0
Maxwell Bros.....	889 0 0
Whitehead and Co.....	875 0 0
Laing and Son.....	873 0 0
Palmer, E. R.....	770 0 0
Diamond and Porter.....	762 0 0
Courtney and Fairbairn.....	751 0 0
Mattcock Bros.....	733 0 0

LONDON.—For alterations, &c., to Nos. '88 and 90,
North End-road, Fulham, for Messrs. Gapp, Ltd. Mr.
William G. Ingram, M.S.A., 44, Theobald's-road, Bedford-
row, W.C., architect:—Laing and Son (accepted)..... £470 0 0
(Lowest of four tenders received.)LONDON, E.C.—For improvements at the Flower, Fruit,
and Vegetable Market, Farringdon-street, for the City
Corporation:—Perry and Co., Bow (accepted)..... £18,758 0 0
(Lowest of ten tenders received; highest, Dove Bros.,
£22,335.)

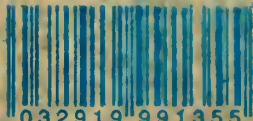
(Continued on page XI.)





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